Analysis of the portrayal of AI in children's media and comparison with current AI applications

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Abstract

Since artificial intelligence (AI) has already penetrated large parts of our daily lives and is likely to become even more prominent in the future, it is not surprising that AIs are also increasingly used in movies, books, series, video games, and so on. This work focuses specifically on media for children because, on the one hand, they can be influenced by the media, and on the other hand, there is little known about the depiction of AIs in this media. Still, at the same time, there is a chance to give children a differentiated and critical image of AIs at an early age. For this purpose, a total of 13 media were analyzed using a framework created and mappings were assembled that also included currently used AIs from the industry in order to compare them with each other. Through this analysis, the following categories of AI characters in children's media could be identified: "Side-Kick", "Big Bad Evil", "Virtual Assistant" and "Alternative Human".

Zusammenfassung

Künstliche Intelligenz (KI) ist bereits in weiten Teilen unseres täglichen Lebens vorgedrungen und wird wohl in Zukunft noch wichtiger werden, weshalb es nicht überdacht, dass künstliche Intelligenzen auch vermehrt in Filmen, Büchern, Serien, Videospielen und weiteren Medien vorkommen. Diese Arbeit behandelt spezifisch Medien, welche an Kinder gerichtet sind, da Kinder besonders beeinflussbar sind und es noch wenige Erkenntnisse über die Darstellung von künstlicher Intelligenz in diesen Medien gibt. Gleichzeitig ist aber dennoch möglich, bereits Kindern ein differenziertes und kritisches Bild von KI zu vermitteln. Aus diesen Grund wurden insgesamt 13 Medien durch ein Framework analysiert und zusammen mit heutigen KI Applikationen abgebildet, um diese miteinander zu vergleichen. Durch diese Analyse konnten die folgenden Kategorien von KI-Charakteren in Medien, welche sich an Kinder richten, identifiziert werden: "Side-Kick", "Big Bad Evil", "Virtual Assistant" und "Alternative Human".

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1 Introduction

Artificial Intelligence (AI) has not only become a hot topic in research, but it will probably also influence our world in other related fields: Furman and Seamans [1] argue that AI will have a huge impact on our economy. No surprise that the funding of AI projects has exploded [1] and models get created to help businesses with implementing AI in their firms [2] as there are a lot of different implementations. Skydio, for example, uses AI to power their drones, UiPath creates software robots with it, and iFlyTek created a "Smart Doctor Assistant" who helps real physicians when diagnosing illnesses, indicating the importance of AI in the healthcare sector [3]. We can see that AI comes in various implementations, and there is no universal form of how AI technology looks like. In some cases, like chatbots, they might be able to take over some tasks in software development and design [4]. It is not surprising, therefore, that the trend of technology has caused it to dip into other areas of life, such as politics and the media.

Although AI has been around for some time and is being researched, we see an increase, a new hype cycle [5], that is reaching the mainstream media, especially in the last few years with technologies like ChatGPT. However, this trend did not stop when it came to children's media, like movies or books: "WALL-E"(2008) tells us a story about a single robot left alone on a dystopian earth. During the movie, WALL-E meets EVE, another robot, and falls in love with her. While WALL-E, the protagonist of the story, is on the good side of the story, not every robot in the movie is friendly. Of course, this movie mainly exists to entertain children and adults by presenting their heart-warming stories. The main reason why we need to analyze and discuss the representation of topics such as but not limited to technologies follows from the fact that media and stories have an important influence on children [6, 7]. Heather, Wartella, and Anderson [8] explicitly show in their study how on one side, educational television can have a good impact on their cognitive skills and their academic achievements. Still, on the other hand, pure entertainment and violent content can lower their cognitive skills and academic achievements. Anderson and Hanson [9] argue that it is more important to look at the content and form of media consumption instead of the pure quantity. All in all, it is clearly important to critically analyze children's media.

This work takes the first step into analyzing AI portrayal in children's media by determining what implementations are present and how this matches the

actual AI technology. As this was not done before by any other researcher, this study addresses the research gap in the representation of AI in children's media. The observation framework, like the categorization and mapping of the AIs, can contribute to the current research. Based on these findings, more work can be done in the future. As AI is evolving at a fast pace, the representation can drastically change in the future, so it might be interesting to redo the study in the future as well. This thesis aims to gain insight into the different representations of AI in the media that are mainly aimed at children. This will be done with an analysis of different media such as movies, series, books, and video games to cover as broad a spectrum as possible. The AIs in the media will be analyzed in terms of their individual aspects, such as their role within the story, but also the very concrete characteristics of the representations, such as how the abilities are portrayed or how they physically look.

These findings will then be used to map the analyzed AIs and compare to what extent the AIs of the authors or the media creators differ and to what extent these representations of AIs in the media differ from the actual use of the AIs. The research questions of this work explore, the differences between the portrayal of AIs in different media types, the differences in the portrayal based on the role of the AI, and the overall representation of the AIs in comparison with real-life AI applications. Finally, the last research question asks, if there are any kind of themes in the representation.

This work takes a first step into the analysis of the portrayal of AI in children's media and thus opens a new field for possible future research by providing first results and methods, like the framework to analyse the AIs. The insights of this work are not only beneficial to researchers alone, as they can also be seen as a helping guide to authors/directors or other types of artists on how AI could be portrayed in their works and what are possible problematic adoptions. In addition, because the work includes real-world AI implementation, it highlights what types of AI are not represented in the media. This could be an attempt to include such representations in new works to provide children with a broad yet meaningful picture of AI. The ultimate goal is to gain more qualitative insights into how AIs are represented in children's books using a specially designed framework. This will make it possible to identify commonalities and differences between the various representations, for example, whether there are differences between different media. It will also make it possible to compare the representations with AIs in reality. Such a comparison and mapping has not been done before in this form and allows

us to gain more insight into the representation of AIs in general and to find possible questionable representations.

2 Related Works

2.1 Definition of AI

The term *Artificial Intelligence (AI)* has already been used in 1956, and there are many different definitions of it, depending on the time and context in which it is used [10]. In this study, AI is defined as "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation" [11, pp. 17]. The reason to choose this specific definition is its lack of defining what the system itself is and what type of characteristics the system should have. Instead, this definition only focuses on the abilities of such a system. This includes a broad range of AI technologies: From smart text editors to Siri-like smartphone assistants to humanoid robots who serve us coffee. With this broad definition, it will be easier to cover a broad range of media, as AI is depicted in very different ways based on the presented story and the author's AI concept. The intelligence of such a system can be categorized between a *weak* and *strong* AI. Those strong AIs "are characterized by their ability to develop creatively and produce behaviors the developers could not program, design, or even imagine. These are systems that can think and reflect about their own state, so they know who they are and what they are for" [12, pp. 35]. A weak on the other hand works rather as a tool than being able to operate like having its own mind [13]. An example of a strong AI was already mentioned: WALL-E. He is able to explore the planet, and find out new things about old technologies by trying them out, and is self-conscious. A smartphone assistant, like Siri, is an example of a weak AI.
During the work, the question arose several times whether an intelligent robot in the sense of a sophisticated robot can be equated with an AI. The answer is not entirely simple; per se, robots do not have to have artificial intelligence even if they are already very developed. In principle, it is possible to make a robot extremely intelligent and prepare it for a wealth of different scenarios without the robot still having to learn independently. However, many robots shown in the media have such learning capabilities, which is why there is considerable overlap between the categories of robots and AIs.

2.2 The portrayal of AI in entertainment media

As the concepts of AI have been around for many decades, AI itself has become part of the global media. In Jonathan Nolan's and Lisa Joy's TV series *Westworld*(2016) AI-powered Androids are working in a Wild-West-themed amusement park called "Westworld". The Androids, called Hosts, play a specific role, like a bartender or farmer, in this amusement part without knowing that they are only there to entertain the paying visitors.
Ouchchy, Coin, and Dubljević [14] analyzed in their 2020 study the portrayal of the ethical issues of AI in the media. They searched the literature for specific AI and Ethics keywords and analyzed a final sample of 254 articles. Then they coded the articles by the following tones: "enthusiastic", "critical", or "balanced/neutral". 173 articles were coded as "balanced/neutral", 55 as "critical" and 26 as "enthusiastic". This distribution is illustrated in figure 1. Most of the articles mentioned "Undesired Results" as the main issue with AI technology, followed by "Accountability" and the "Lack of ethics in AI". The authors themselves suggest that an increase of correct information to the public could ensure a continuation of a balanced portrayal of AI in media. A source for this reliable information could be government agencies. The study shows that in today's media, AI is portrayed mostly in a balanced way and rather in a critical than enthusiastic way. Canavilhas and Essenfelder [15] analyzed the portrayal of AI in five national newspapers of Portugal. They showed that in those media AI is portrayed in different tones defined by the subject: If the theme of the article was either Economy or Health, a vast majority of articles reported AI in a positive way. But 47 out of 99 articles in politics portrayed AI negatively, and 33 in neutral. The study showed that this Portuguese newspaper attributes a positive value to AI. The study by Brennen, Howard, and Nielsen [16], which analyzes AI portrayal in British media, paints a somewhat different picture: the media there focus primarily on the application of AI in industry. At the same time, however, "the ethics of artificial intelligence is one of the most common themes across the corpus." [16, pp. 6] Thus, in addition to pure technology, there is also critical reporting on AI and its relationship to society and possible dangers. The authors of the study explicitly state that the media should avoid reporting uncritically on AI topics.

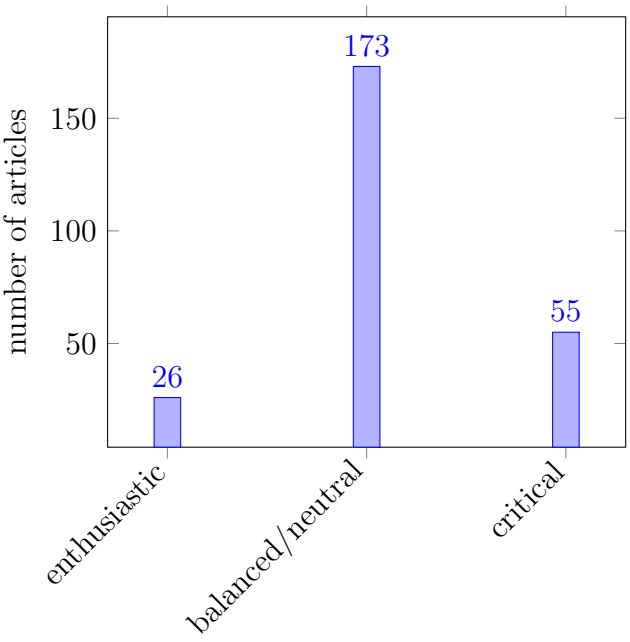

Figure 1: Distribution of tones of AI in literature. The bar chart shows the number of articles, which have a certain tone about AI.

In their study, Sundar, Waddell, and Jung [17] examined how individuals perceive robots. As mentioned in the previous chapter, there is a large overlap between robots and AIs, and the aforementioned study looked mostly at robots that also have AI. They discovered the following three correlations:
"• The higher the number of films recalled that feature robots, the lower the anxiety toward robots in real life (RQ1).
• The higher the sympathy elicited by robots, the lower the anxiety towards robots in real life (RQ3).
• The higher the human-likeness of the appearance of robots recalled, the lower the anxiety towards robots in real life (RQ4) [17, pp. 348]." For simplicity, I have given the following three findings: Recall Principle, Sympathy Principle, and human-likeness principle. The study by Riek, Adams, and Robinson [18] was able to show back in 2011 that people who watch more robot movies also have a more positive attitude toward them. The interesting thing about the principles is that only the last two (Sympathy Principle and human-likeness principle) relate to the actual robot. In other words, while developers can, to some extent, make their robots attractive in this sense equivalent to sympathetic and human-like, they have no bearing on the extent to which people have had prior experience with robots. This further underscores the importance of media for the perception of AI.
The study from Lee and Šabanović [19] analyzed the preferences and opinions on robots by people from South Korea, Turkey, and the United States of America. They showed, that there are differences between the perception of robots by different nationalities: People from Turkey have a more positive view of robots in media than people from the US do for example. Nonetheless, the author state that regarding the influence of media: "Similarly, media portrayals seem to influence user imagination about robots, but did not have significant correlations with participants' acceptance of specific types of robots in society or their preferred design characteristics." [19, pp. 23]
Nader et al. [20] came to a different outcome in their work. They created an online survey based on previously made focus groups and collected 1,222 responses from people living in the US. They observed both: AI currently used in industry and people's stance on it and AIs in popular entertainment media like movies or video games. The results were mixed: AI is used widely in some applications like "Voice recognition" or "Predictive text" but only 13.6% ever used "Self-driving cars" at least once. When asked about the optimism of the future of AI, 48.8% reported being optimistic and 31.4% were

neither optimistic nor pessimistic. When it comes to the portrayal of AI in entertainment media, the answers were very diverse: The most chosen answer when asked about associated themes or images of AI was "helpful robots" but the second one was "killer robots" followed by "Self-aware robots". The study could not prove many relationships between the consumption of entertainment media and people's image of AI. However, they still found the following connection: "[...]entertainment media can still affect public perception: those who consider AI to be realistically portrayed in fiction are much more likely to believe that AI can really be the way it is portrayed on the screen." [20, pp. 13] Besides, the authors explicitly state that more research is needed to explore AI in the media.
Overall, the representation of AI in entertainment media is a mixed one: On the one hand, depending on the country, it is portrayed rather positively and thus not very critically; on the other hand, discourses are already taking place even about more complex things like AI and ethics. Although most people have already come into contact with AI, they do not all have an optimistic image of it. Significantly, the study by Nader et al. [20] shows that the image of "killer robots" is strongly associated with AIs. What is clear is that, especially with such a popular and important topic, which affects diverse areas of life, be it social, economic, or technological, further research is needed to capture its portrayal in the media.

2.3 Design Fiction

Design Fiction is the concept of describing plausible "fantasy prototypes" in the near future [21]. At first, It might seem hard to get any benefit from designing a new technology prototype which is not possible at the moment. But it has some unique potential. As Lindley [22, pp. 5] states, it can have a "multi-dimensional relationship with research". It can be used as a research method itself but also to gain insights about Design Fiction practice. Lindley [22] distinguishes two types of knowledge generation: the first "research into design fiction" refers to the idea that knowledge can be generated by not applying the Design Fiction itself, but by learning more about the Design Fiction itself. Gonzatto et al. [23], who analyzed Design Fiction from different sources under the aspects of "futurology" for their study, are working as an example.
Lindley's [22] second way consists of the approach that we can gain knowl-

edge through Design Fiction per se. This category includes, for example, the work of Sturdee et al. [24], which takes the movie "Blade Runner" as a model and imagines a world in which some algorithms can detect empathy. A possible procedure for this second approach is provided by Markussen and Knutz [25, ppp. 239] with their 4-step method: first, Writing PhaseStep. Second, Developing Basic Rules of Fiction; third, the Experimental process of world-making; and fourth, Prototyping Design Fiction. Finally, Lindley's [22] suggests a third category being research in order to enhance design and Design Fiction.

There are other areas where Design Fiction is used: Lyckvi et al. [26] combined it with Participatory design to create new practices in design and later in this work, this concept of *Anticipatory Ethnography* will be discussed.

2.4 AI portrayal and kids

The educational effect of literacy on children is shown in Freeman's study from 2013 [27]. 6-year-old children learned about the subject of bullying through different books. The researcher argues that by getting the children educated from early on, they may be more prepared for the situation in their future life. Picture books are an excellent source of information for these children.

The same principle will be applied in this research. The children will get introduced to and educated via different media throughout their early lives, like movies, TV shows, books, advertisements, etc. By analyzing this media, we can find out how well-made this type of media is for children on an educational level, as AI, like bullying, is an essential and non-trivial topic. In other words, by reassuring that AI is depicted in an appropriate manner, we can expect a better understanding of AI by children now and in their future lives.

Wiederhold [28] discusses the responsibility towards the children of different institutions in her paper. For her, it is clear that the responsibility lies with the parents and AI-assisted technology is not fundamentally different from previous technologies such as TVs or smartphones. She makes it clear that AIs cannot replace parents in any way. This perspective thus takes away a great deal of responsibility from the manufacturers towards the customers. Williams, Park, and Breazeal [29] showed that 70% of children between four and six years old were able to understand some AI concepts when taught to them appropriately, in this case by AIs called *PopBots*. The study found

that there are differences between the age groups on how the AIs are perceived: The younger children (Pre-Kindergarten) see AIs more as toys than people, while only 15% of the older (Kindergartners) see AIs as toys. Children understand that not humans can be intelligent: 75% of the children were convinced after the study that robots can indeed learn. The researchers recommend early education for children called *Early AI Literacy*. Yang [30] created a sample curriculum called *AI for Kids* which aims to educate children in AI by not only explaining how AI works but also how it helps us.

2.5 Anticipatory Ethnography

2.5.1 Definition of Anticipatory Ethnography

In 2014, Lindley, Sharma, and Potts [31] came up with a new practice named *Anticipatory Ethnography*, which consists of the two elements *design ethnography* and *Design Fiction*. A year later, the same researchers published a paper [32, pp. 60] where they described their technique in this way: "The idea is a conceptual alignment between design ethnography's reconfiguration of traditional ethnography and design fiction's approach to diegetically prototyping the future using fiction as a medium."
In other words, Anticipatory Ethnography uses the idea of Design Fiction and uses concepts of Design Ethnography on them. Anticipatory Ethnography is thus abstract in two ways: On the one hand, it starts from a Design Fiction, i.e., a fictitious prototype that could not be created with today's technology. The next step, however, is an additional challenge: If this technology existed, how would one investigate it under Design Fiction methods, and what results would one arrive at? This abstraction to be on levels makes the complexity clear. On the one hand, we have to imagine a technology that cannot exist yet, like a health robot called Baymax that can diagnose and treat any medical condition, but at the same time, we have to imagine the world around and with Baymax and how it would be analyzed. We could conduct semi-structured interviews with the patients of Baymax and ask the medical staff about their collaboration with him. We could also record treatments of Baymax to understand how they work.
Going back to Design Ethnography, it is essential to mention that Design Ethnography cannot be viewed as a framework or toolbox. Müller [33, pp. 3] describes it as: "design ethnography is not understood as a self-contained method, but rather as a starting point for opening up new perspectives and thinking about new methods that lead in iterative steps to the creation of form". Instead, Design Ethnography tries "understanding what people do, what they say, and what they think" [34, pp. 36] by using a variety of ethnographic methods like interviews, observations or filming. Further, "Design Ethnography" gives us a language and a set of practices for talking about this ongoing invention and reinvention of products, meanings, and cultures. Discovering—even understanding—people's ideas, beliefs, values, and behaviors is not enough in the corporate setting. We need to transmogrify these ideas, beliefs, values, and behaviors into perceptions useful for design, marketing,

and engineering [34, pp. 36f]. Design Ethnography basically assumes that in order to actually develop adequate products or better in the first step to design them at all, the needs of the people have to be understood in the first place. The approach that only laboratory experiments lead to the goal is rejected, as life and needs are much too complex and, on the other hand, very multilayered. Instead, researchers should understand people with their views, desires, attitudes, and needs more deeply and broadly. However, Salvador, Bell, and Andersen [34] rightly point out that today's researchers do not have unlimited resources at their disposal, especially time, and therefore cannot spend dozens of times with their subjects for long periods of time, which is why they have to resort to other methods as mentioned above. However, these are not to be understood as conclusive or stand-alone: Of course, we will see new approaches and methods in the future, and researchers are already using several methods simultaneously to get a more differentiated picture.
An example from Lindley, Sharma, and Potts [31] of Anticipatory Ethnography is the analysis of a movie (*Her*, 2013) containing an AI character. Their procedure contained the following three steps: First of all, they looked at the process of the creation of the Design Fiction. In this movie example, the focus lay on the writers, directors, and directors and what they told about the production. The second step is to analyze the interaction between the audience and the Design Fiction. The third part is arguably the most interesting one: The content of the Design Fiction. The researcher tries to immerse himself in Design Fiction. The result is not only an analysis of the fiction itself but also some insights into the context of the creation.

2.5.2 Benefits of Anticipatory Ethnography

The main idea of Anticipatory Ethnography is to combine Design Ethnography and Design Fiction to work together and help to overcome each other's core weaknesses [31]. The issue with Design Ethnography is that it is temporally constrained. Lindley, Sharma, and Potts [31] argue that the "signals from the present" will get weaker the further we look into the future. Consequently, Design Fiction, with its property of being unbound to the present as being fictional, could be a viable solution. On the other hand, Design Ethnography supports Design Fiction by providing firmer methods and modes of analysis, which is illustrated in Figure 2.

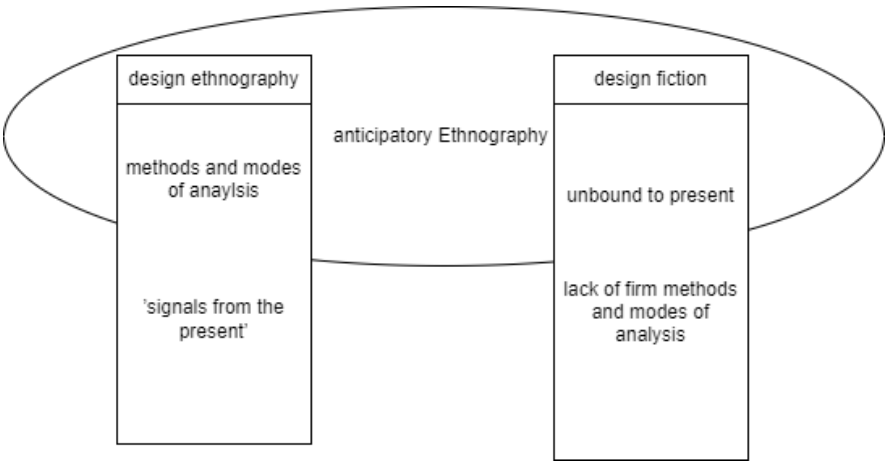

Figure 2: Diagram of the relationship between Anticipatory Ethnography, Design Ethnography, and Design Fiction

3 Methodology

The methodology of this work consists mainly of three parts: First, suitable media were sought for analysis. These were then examined using the "Observation Framework" and in a third step, the findings are presented and interpreted.

3.1 Goals

To understand how AI is portrayed in children's media, the first goal is to develop a suitable framework to compare them and determine their similarities and differences. The end result is an overview of the various interpretations of AI in the media. Based on these outcomes, I will be able to make out certain common themes and tropes. Finally, the titles will be mapped according to how powerful the described AI is and to which degree the AI is humanoid portrayed. Mapping allows for indicating further similarities between the different media products. For example, it would be possible that in children's movies, AI would be portrayed as more powerful by having strong abilities, while in books, they could be portrayed as less powerful but more humanoid.

3.2 Research Questions

To find out more about the portrayal of AI in children's media, I formulate the following Research Questions:
What are the differences between the portrayal of AI characters based on the medium in which the characters appear? (RQ0) The idea is to find out if there are any certain patterns when comparing different media types, as they have different ways in which they present AIs. For example, in books, the author can describe and label an AI as an AI character in a very clear way by describing the character as AI. But in movies, the viewer must recognize by the physical portrayal of a character that the character is, in fact, an AI. Especially for children, it thus would be easier to portray them in a more robot-looking and less human-looking form to distinguish them from human characters. With this knowledge, we could find out if problematic portrayals of AI are exclusively used in one media format or in the overall representation
The second research question is about the difference in the role of AI in the medium. *What are the differences between the portrayal of positive and negative AI characters? (RQ1)* This question should analyze whether there is a difference between the portrayal of AI based on the function of their character in the story. For example, stories tend to use very evil AIs as a substitution for other well-known villains, like zombies or vampires.
In the third research question, I look at the overall representation of the abilities of AI in children's media: *What are the differences in the portrayal of AI in children's media compared with real-life AI applications? (RQ2)* That research question should investigate, whether the AIs are stated in a realistic way in terms of their abilities: Are the technologies really available today, or is it just fiction?
The final research question (RQ3) is *Whate are common patterns or themes in the portrayal of AIs in the media?* This question is intended to take the focus away from the individual works but to show if and what types of stereotypes or popular representations of AIs exist.

3.3 Media Selection

Most of the media were provided by my Betreuerin, Luise Arn. I added some more more works on Internet research (on websites like this [35, 36] and the Internet Movie Database). In the end, I identified a total of seven

#	Title:	Release Year:	Type:
1	Big Hero 6	2014	Movie
2	The Mitchells vs. the Machines	2021	Movie
3	Ron's Gone Wrong	2021	Movie
4	Booster Gold (1986-1988) #1	1986	Comic
5	It's Alive! It's Alive! (Goosebumps SlappyWorld #7)	2019	Book
6	Next Gen	2018	Movie
7	WALL-E	2008	Movie
8	Die drei ??? Kids, 75, Der Fußball-Roboter	2018	Book
9	A.I. Artificial Intelligence	2001	Movie
10	Astro Kid	2019	Movie
11	#datendetektive. Band 1. Roboter in Gefahr	2020	Book
12	Person of Interest	2011	TV series
13	Satisfactory	2020	Videogame

Table 1: Table of the analyzed Media

movies and one TV series. For the books, I looked for popular book series (like The Three Investigators) and did more internet research. The only game on the list, "Satisfactory" was found by searching for games on Steam (a very popular video game store). The media have to fulfill the following requirements: They must be suitable for children and teenagers (age group between 10 and 16 years old), and there must be at least one character who is clearly identifiable as an AI and takes on at least the role of a secondary character. The AI does not necessarily have to be on the good side, but can also appear as an antagonist.
The game "Satisfactory" was analyzed based on recorded gameplay material; the other media was watched or read by myself.

3.4 AI Selection

To classify the AIs in the media, they are compared with current AIs, which are used on a daily basis by consumers or companies. These are taken from the book *Artificial Intelligence in Daily Life* by Raymond Lee [37]. The results are shown in Table 2. Several online magazines come to similar results when debating over the most influential AI applications for companies in the future [38, 39, 40].

#	AI:	Appearance:
1	Machine Learning (ML)	Software
2	Data Mining (DM)	Software
3	Computer Vision (CV)	Software
4	Natural Language Processing (NLP)	Software
5	Ontological-Based Search Engine (OSE)	Software
6	Intelligent Agents and Software Robots	Software
7	Intelligent Transportation System (ITS)	Software and Hardware
8	SmartHealth	Software and Hardware
9	SmartEducation	Software and Hardware
10	SmartCity	Software and Hardware
11	Internet of Things (IoT)	Hardware and Software

Table 2: Table of the selection of current AIs

3.5 Observation Framework

The framework I created had the main requirement to fit multiple media types and still provide the option to compare them with others. Its main task is to capture on one side the AI itself, so what are its abilities, how was it created, and so on. The Observation Framework consists of two dimensions, which come from different sources. First, the AIs act as characters of different kinds; therefore, they are analyzed and described in that way. Peltzer and Keppler [41] describe in their book what kind of function a character can take in a plot. Hickethier [42] additionally describes how the representation of the character itself can be analyzed. These approaches were used to answer the question of the character in the story's context and in relation to other characters.

The idea behind the structure builds on the fact that the Research Questions refer to the representation of AIs in media, whereas characters play in the context of a plot. For this reason, part of the framework consists of understanding them as these characters and classifying them accordingly. At the same time, however, it will now also be determined how the characters are portrayed as AIs: Thus, while characters may serve a similar function in the plot and also have a similar character, for example, a helpful secondary character who assists the protagonist, they may nevertheless have unique characteristics as AIs, such as their own abilities or modes of communication. The framework should thus be able to capture character and technology.

To answer the question of the actual representation of AI in the work, I made partial use of the concepts of Anticipatory Ethnography: specifically, I used the third step of the application of Anticipatory Ethnography presented by Lindley, Sharma, and Potts [31]. This involves analyzing the actual content described in the fictional work. This means that the abilities (such as communication but also others) of the AIs are scrutinized.

I did a test run in the first phase, using the first version of the Observation Framework and applying it to the movie "Big Hero 6". After minor changes, which consisted in making the questions more open-ended, I finally used the following observation framework to analyze the works:

Title:	Observations:
Role of the AI	What type of role takes the AI in the story? Is it only a side character or the protagonist?
Side of the AI	Is the character on the good or bad side of the story?
Influence on the plot	What is the function of the AI in the story? How does it influence the plot?
Size of the role	How big is the role of AI?
Physical Portrayal	How does the AI portrayed? Is it only software, or does it look humanoid?
Abilities	What can the AI do? Has it any special abilities like flying, or does it has any weapons?
Communication methods	How does the AI communicate with the other characters? Can it speak like the other characters or has a robot-like voice?
Creation of the AI	What is the origin story of the AI?
Introduction	How does AI gets introduced?
Character Traits	What are the character traits of the AI? Do they change during the book/movie/Comic?

Table 3: Observation Framework

3.6 Analysis

Methods of Anticipethory Ethnography inspire the analysis. It aims to compare how AIs currently appear in children's media and compare them with each other on the one hand and to compare them with real AIs on the other hand. The peculiarity is that not the capabilities are compared. Anticipatory Ethnography focuses on technologies that do not yet exist and then applies methods of Design Ethnography: In this work, we analyze how not yet-existing technologies are represented and how they differ from actual implementations.

3.6.1 Mapping

In the second step, all of the media gets mapped. The X-Axis represents how much the AI is defined as humanoid: The scale goes from pure software, which does not share any similarities besides intelligence. At this level, a user could not even be sure if it is traditional software or an AI implementation. With increased humanoids, AI features more and more similarities with real humans. This is not limited to its physical appearance: Of course, a machine can look more or less human, but there are many other attributes: Communication, Empathy, Intelligence, and many more. The most extreme case will be if it is not possible anymore to distinguish between an AI and an actual human. In this case, the AI would pass the Turing test [43].
The Y-Axis represents the abilities of the AI, more precisely, how strong the capabilities/functions of AI are. The lowest level is simple software, like chatbots, which are not inherently more powerful than non-AI software in the sense they have other abilities; they might be as well more effective than non-AI software. More powerful and with a more excellent ranch of functionality are, for example, AIs, who can walk around or even fly. In some cases, the implementations of AI in media get ridiculously powerful because they are a real threat to humankind, like in *The Mitchells vs. the Machines(2021)*. This represents the peak of the power scale.
Besides the AI representation of children's media, some current AIs get mapped too. This should show the contrast between the representation of AIs in media, how they are used, and how capable they are now. This also helps to an idea of a possible categorization: If there are already real-life AIs that are similarly mapped as AIs in the media, they can be summarized as one category.

3.6.2 Categorization

By defining similarities and differences and having a map indicating the level of power and degree of humanoids, it is possible to determine specific categories into which the AIs fall. These categories group AIs according to their essential characteristics in real life and their appearance in the media. To achieve this, the previously generated findings by the framework and the mapping are analyzed on the concept of Thematic Analysis Themes ("a theme has to capture a wide range of data that are united by, and evidence, a shared idea..." [44, pp. 77]). They are intended to illustrate which roles the AIs fill for the media creators and to what extent these roles correspond to the AIs that occur. This categorization aims to show where potentially false or exaggerated perceptions of AIs by media creators prevail, which are then transferred to AIs in media. Such a categorization makes it possible to determine which types of AIs are portrayed that do not exist and which already exist in the industry but do not appear in the media.
Nobes and Stadler address in their work [45] several issues on classification: On one hand, they explicitly write that "We observe that objectivity is neither possible nor desirable in classification. Despite the arbitrariness, some classifications can be more reasonable or more useful than others." [45, pp. 1] They argue that even though classifications are arbitrary, they can still be useful, dependent on the purpose of the classification. However, not every classification is as useful as another: It would not be helpful at all if I classified the AIs by colors or arranged them by how well I personally liked the media. DiMaggio describes in his study [46] the four dimensions: "differentiation, hierarchy, universality, and boundary strength" [46, pp. 446] which do have affluence, how art, in general, is classified.
Using this classification, we can answer RQ3.

4 Findings

In this section, firstly, the findings of the observed AIs in the media are described based on the created framework. An overview of AIs is shown in the Appendix. The section continues by describing the findings for each point of the framework for all analyzed media. Secondly, based on the findings, the AIs got mapped and categorized. The observation frameworks with the summarized results of each of the works are provided in the appendix.

4.1 Findings in each of the works

4.1.1 Big Hero 6

Baymax is a personal healthcare companion. He serves as Hiro's, the protagonist, sidekick, and friend throughout the movie by helping and supporting him with his skills. After Tadashi's (Hiro's brother) death Baymax becomes Hiro's best friend and in some way replaces his brother. He helps to find Prof. Callaghan with his improved abilities. During the fight with Callaghan, Hiro removes Tadashi's Chip from Baymax and orders Baymax to destroy Callaghan. When his chip got removed, he becomes aggressive and attacked his teammates. After reentering Tadashi's chip, he becomes the normal Baymax and feels sorry for his actions. When Hiro tries to remove the chip a second time, Baymax stops him by showing him a video of his dead brother. In the last fight between Hiro and his friends and Callaghan, Baymax does not hurt anyone. At the end of the movie, Baymax scarifies himself to save Hiro and Callaghan's daughter, but he still manages to give Hiro his healthcare chip, so Hiro can build another Baymax.
Baymax is portrayed as a big, round, and soft humanoid robot. His legs are proportionally short and thus he can only walk slowly. His whole body is filled with air and he is able to let it out to become smaller and fill it in later. In general, his design is very minimalistic and should make him appear cute and friendly. After being upgraded by Hiro, his look is now very different. He is now less round and appears more like the typical superhero (e.g. Ironman). His body is much more defined and a lot less round. His whole appearance shifts from cute to look more aggressive and powerful.
As a personal healthcare companion, Baymax can scan people to get to know their health problems and then curing them. Throughout the movie, he gets upgraded by Hiro so he can serve as superhero: He can now fly and fight

("Baymax 2.0"). He communicates by talking and listening on specific keyword, e.g. when someone gets hurt. Throughout the movie, he learns more about human communication by getting to know the "fist bump".

4.1.2 The Mitchells vs. the Machines

In the movie "The Mitchells vs. the Machines" the AI PAL is the main antagonist of the story. However, in the beginning, PAL is not evil but a "Siri-like" smartphone assistant developed by Mark Bowman. But when Bowman introduced a new AI and insults PAL, PAL wants revenge by capturing all humans. To achieve this, PAL takes control of the newly built AI robots and orders them to catch all humans. The Mitchells, a family of four people and their pet serving as the protagonists got attacked by the new robots but were able to flee. As they defeat some of the robots, they make friends with two defective robots called Eric and Deborahbot 5000. They tell the family, how they can defeat PAL. Throughout the rest of the movie, the Mitchells have to fight and flee against the robots until they arrive at the Headquarters of PAL, eventually destroying it and freeing all humans.
PAL itself is just software without a real body: It is only portrayed as a stylized face on a smartphone screen. The robots, the newly introduced version of PAL look like futuristic, humanoid black and white robots, having a similar face to the original PAL. The original PAL is able to take control over every other AI in the movie, except for the malfunctioning Eric and Deborahbot 5000. The new robot AIs are created to do basic household work and thus serve as an assistant to humans, but after PAL took control over them, they start to use their fighting abilities, like flying around, scanning the surface to find humans and they can even fire lasers. To humans, they communicate by talking with a "robot-like" voice, so they are clearly distinguishable from a real human voice. To each other, they communicate via pure wireless data.
The AIs were all created by Mark Bowman, who serves as a side character in the movie. The Robots are introduced to the Mitchells by their first encounter in a café, where they want to capture them. There are big differences in the characterization of the AIs: The original PAL itself is portrayed as vengeful, unscrupulous, and has no mercy. The only goal of PAL is to take revenge on all humans, even though only Mark Bowman did something wrong to it. The other robots do not have any character at all: They only serve PAL by executing their orders without questioning them. Eric and Deborahbot 5000 are exceptions: They become friends with the Mitchells

and help them.

4.1.3 Ron's Gone Wrong

In the world of "Ron's Gone Wrong" there is a big Tech company "Bubble" that sells "B-bot". Those B-bots are serving as a type of assistant to humans and are especially valuable to children: The B-bots are more or less replacing today's smartphones. They can be used for communications with other bots, can record and share videos, play music, can make projections, and can even be used as a vehicle. The B-bots are about 1m tall, have an egg-shaped body, and can change their looks, for example, they can wear the outfit of a superhero.
Barney, the protagonist, lives in a poor family and his biggest wish is to get a B-bot, as all his schoolmates have. As his father is not able to afford a regular B-bot, he spontaneously buys a damaged one, called Ron. Ron becomes Barney's best friend, even though Ron is not fully functional like the other bots. Ron is able to deactivate some security features of himself and the security features of other bots, which should guarantee the safety of the users. Due to this, the B-bots run wild, until they got patched by Bubble. Throughout the movie, they find out that the Tech company is actually monitoring the users all the time and using their personal data for advertisements. In the end, Barney sacrifices Ron, so the other B-bots get Ron's flaws, his true friendship.
Ron is not as smart as the other bots, instead, Barney has to train how to speak and communicate. Ron is very naive and careless, but Ron does everything for his friend Barney.

4.1.4 Booster Gold (1986-1988)#1

Booster Gold is a superhero originally from the 25th century, who traveled back in time to the 1980s. He was able to take some technologies from the 25th century one of which is Skeets his AI assistant. During Booster Gold's adventures, he fights numerous different antagonists, in this issue, he fights Blackguard to save his city. Skeets works as his sidekick and friend, who supports him during his life and his fights: Skeets tells Booster Gold valuable information about his opponents and helps him in fights with his lasers. Skeets looks like a small golden spaceship with three wings. To communicate, Skeets talks to Booster Gold. Besides his friendliness and

helpfulness, Skeets works also as a comic relief in the comics.

4.1.5 It's Alive! It's Alive! (Goosebumps SlappyWorld #7)

In this book, we observe the story of the twelve-year-old Livvy Jones, a student, who is very interested in robots and technology overall. His parents are scientists and are working on AI projects, but they have to keep their work secret. The family owns their own AI home help called Mrs. Bernard, the main antagonist of the book. During the story, Mrs. Bernard creates duplicate AIs to replace Livvy's parents and the bad robot Francine. Francine is terrorizing Livvy until he finds out, that it was Francine that did all the bad things happened to him.
Mrs. Bernard and the newly built AIs, which should replace Livvy's parents, are non-distinguishable from humans. Originally, Mrs. Bernard was only created to do household work, but later on, turned into an evil AI which wants to harm Livvy in particular by creating the bad robot AI Francine.

4.1.6 Next Gen

In the movie "Next Gen" are two very different AI roles: 7723 and Ares. 7723 becomes a good friend to Mai, the protagonist, and teaches her about life: that there are good and bad moments and that memories are precious and to become friends with others. Ares is the villain who wants to destroy the unperfect humans and is the antagonist of the whole story. In the end, Mai and 7723 are able to defeat Ares and save the world.
7723 looks like a large humanoid robot, having a white body, a dark face, big green eyes, and a mouth. It has many different weapons like lasers and missiles and can fight like a superhero. But it has only limited space for saving memories, which are its most precious belongings. It becomes the best friend to May and would do anything to secure her. Ares, on the other side, is a gigantic-looking gray war robot, having huge weapons and shining red eyes. It is purely evil and does everything to destroy all humans.

4.1.7 WALL-E

The movie "WALL-E" is about a robot, who is abandoned on a dystopian earth, full of rubbish and without any living beings like plants or animals on it. One day, another robot called EVE travels to the Earth and finds a small plant, an indicator that living on Earth might be possible now. In the

meantime, the humans are living on a spaceship called Axiom, where they were treated by robots all day and forgot about life on Earth. In the end, after having some fight with AUTO, an evil AI who does not want that the humans return to Earth, EVE and WALL-E are able to return to Earth with the humans.
Wall-E is a robot who is looking like a box with big eyes. The robot is able to drive around, hold and manipulate things with his hands, and is able to compress rubbish with his body. WALL-E communicates by speaking in broken words. EVE is a far more advanced robot, which can fly around and scan things. This robot looks far more elegant by having a shiny white body, which is hovering over the floor having a ghost-like silhouette. During the movie, they fall in love with each other and they realize they want to get the old earth with all its life back.

4.1.8 Die drei ??? Kids, 75, Der Fußball-Roboter

In the book, the Fussballroboter is an invention by Elton Maskata, an inventor. The robot is able to play soccer and everyone is fascinated by its abilities. Due to its abilities, the robot gets stolen by the antagonists and it is revealed, that the robot is able to learn different skills, like housekeeping. When it is returned, the three investigators, the protagonists, are still able to beat it in a soccer match.
The AI is displayed as a humanoid-looking robot that is clearly distinguishable from a human. In the book, the Fussballrobot does not have a clear character and does not actively communicate. Instead, it is a very passive character, which does everything, that its owner is telling it to do. The main feature is its ability to learn new things, despite being originally created to become the best football player.

4.1.9 A.I. Artificial Intelligence

The movie "A.I. Artificial Intelligence" tells the story of David, a prototype Mecha child. He works as a replacement for the son of Henry Swinton and his wife Monica's son Martin, who suffers from a rare disease. This new type of AI is featuring childlike emotions, especially love for their parents. David becomes the new son of the Swinton's but their actual son Martin surprisingly gets cured. After an incident between David and Martin, the parents decide to return David, but out of a sudden, Monice decides to abandon David

in the woods instead of returning him to the company which created him originally. David, later on, gets captured but can later escape. In the end, he gets frozen until finally freed by aliens and so reunited with his mother.
David as an AI is not distinguishable from humans. The role itself is played by a real actor so looks and abilities are the same as a child in his age. He got created by a company specialized in developing the most advanced AIs with the ability to simulate real feelings. His love for his mother is one of the key characteristics of David.

4.1.10 Astro Kid

In "Astro Kid" Buck is the assistant robot of Willy, the protagonist of the movie. Due to an accident, Willy lands together with Buck on an unknown planet. As Buck is Williy's assistant, Buck gives Willy very valuable information about the planet and how to survive on it. They become really close friends. The main problem with Buck's abilities is the dependence on its battery pack. As Buck's battery is running low, Willy decides to set Buck in sleeping mode. So Willy has to manage to survive on his own, also by making new friends and getting stronger as a person. In the end, Willy is able to get a new battery back and installs it into Buck. With this new battery, Buck is able to contact Willy's parents via a radio signal.
Buck is portrayed as a round and red robot, which is a bit smaller than Willy and has two bright yellow eyes and a pixelated mouth. Buck is able to transform itself, in order two become a ridable bike, and has two mechanical arms two grab things. Further, Buck communicates via a robot-like voice or sends radio signals. It is not mentioned how Buck was created in the movie and it gets introduced when Willy is in the escape pod at the beginning of the movie.

4.1.11 #datendetektive. Band 1. Roboter in Gefahr

The AI in this book is called Brabbelbot. The small robot is helping a group of kids detectives to solve a case. The robot itself is also helping the children to widen their technical knowledge. In the book itself, the reader gets informed directly about different technical terms in order to learn about them, like what an AI actually is.
The Brabbelbot is a small humanoid-looking robot that is able to talk and is able to hack into different systems. The robot itself is learning new things

all the time during the book.

4.1.12 Person of Interest

"Person of Interest" is a crime TV series. Before the events of the series, Harold Finch, a software genius, invented The Machine. This AI monitors all digital communications and surveillance cameras in order to predict when and where a crime will happen. The Machine is not exactly telling Finch, what will happen but will output a social security number. Having this number, Finch and his partner John Reese try to stop the crime from happening. They never know if the person they are looking for is the victim or the offender of the crime.
The AI is only used as a tool for the partners and does not have any top personality. It only does its job, and it never fails to do so. In the series, Finch should not actually have access anymore to the Machine, but he hacked himself into the system to get at least some social security numbers in order to possibly prevent some future crime.

4.1.13 Satisfactory

In "Satisfactory", ADA (Artificial Directory and Assistant) is working as a narrator in the game. It is also responsible for giving the player information on what the next steps in the game are, so it helps to build progress in the game. ADA is generally on the side of the player, but it has not really had a personality, instead, it is more like an emotionless commentator and interactive handbook to the player.

4.2 Overall Findings

After analyzing all of this, the next sections will look at the at the similarities and differences of the works overall using the previously created observation framework.

4.2.1 Role of the AI

The role of AI in the media studied varies widely, but several patterns emerge. Most often, the AI took on the role of a supporting character to the protagonist, whom it assisted during the plot. In these cases, the AI is clearly recognizable and it is often even explicitly emphasized that the AI or its

preservation is less important than either the mission or plot or the protagonist itself. Examples of this are the characters Baymax ("Big Hero 6") and 7723 ("Next Gen"). It is also striking that in these films the protagonist, a child or adolescent, learns from and through the AI and it contributes significantly to character development. The main difference to other mentors, who function as secondary characters and accompany the protagonist on his way, is the consistent differentiation of the living and AI characters: The well-being of the living is always placed above that of the AIs, and the AIs are normally not willing to inflict harm on living antagonists, although this would often be helpful situationally. In "Big Hero 6", this is made very clear by the symbolic hardware chip: If the Tadashi chip, the brother and role model of the protagonist Hiro, is used in Baymax, it is not allowed to inflict damage on anyone. During the film, Hiro removes the chip to harm his opponent, whereupon Baymax also hurts his friends. Both Baymax and Hiro later regret this and Baymax is restored to his original form by the original chip.

An AI character can also take the role of the antagonist, which can be seen for example in the book "It's Alive! It's Alive! (Goosebumps SlappyWorld #7)" is the case. In this book, an AI disguises itself as a human and wants to harm other humans: The AI is portrayed as fundamentally evil and hostile to humans and takes on the role of a clear representative of evil in the story, which the protagonist must defeat at some point in the story. Within a work, it may well be that different AIs can have different roles: In "The Mitchells vs. the Machines" the protagonist is basically represented by an AI, but the Mitchells as protagonists manage to turn around two robots with AIs and use them for their own purposes. Similarly, in the film "Next Gen", the AI Ares (also the name of the Greek god of war) wants to wipe out imperfect humans, while another AI 7723 is on the side of the protagonist and thus also of humans.

The third found role of AI in media is replacing an otherwise human character with an AI. Examples of this are movies like Wall-E or "A.I. Artificial Intelligence". In these, the protagonist roles and sometimes the supporting roles are occupied by AIs, which is made clear at the outset. In their roles, however, the characters have the same experiences that we otherwise know from human characters: They have conflicts, have to solve tasks, help other characters, get help from others, and so on. One peculiarity, however, is that in these films the aim is to humanize these AIs; emotions in particular are portrayed as very positive and desirable. Walle-E, for example, learns about

the concept of love.
A fourth role type is when an AI acts as a type of tool or other technology within the plant. An example of this is The Machine in the sci-fi crime series "Person of Interest". The Machine was developed by one of the main characters and is used to predict future crimes. The amoral technology itself has AI capabilities, but behaves neither evil nor good, but does exactly what it is told.

4.2.2 Side of the AI

In the observed media, the side of the AI, meaning if the character is on the good or evil side, is mainly dependent on the role of the AI: As a supporting role, the AI is, looking at the observed media, always on the side of the protagonist and thus on the good side. The opposite is true if the AI takes the role of the villain. In this case, the AI is not only on the bad side but most of the only bad character. If an AI character is the leading role of the story, it is automatically on the good side. An exception to this schema is the AIs which serve only as a tool: They are not on either side and are sometimes used or misused by both sides.

4.2.3 Influence on the plot

The biggest influence on the plot has an AI if the AI has the role of the story's protagonist. In "A.I. Artificial Intelligence" the fact that the main character, David, is an AI is the most important plot point. The same goes for the AI becoming the antagonist of the story, like in "The Mitchells vs. the Machines" with PAL as the villain.
In other words, the AI character works as a side character with some influence on the story by helping out the protagonist.

4.2.4 Size of the role

The role's size depends on the function of the AI: Is the AI the main character, then is taking a large part of the story? However, if the AI takes the role of a side character, the size of the role can vary: In movies like "Big Hero Six" or in the book "#datendetektive - Roboter in Gefahr" the AI supporting character is always at the side of the protagonist and the relationship and their development is part of the story. Sometimes, like in the movie "Astro Kid" the AI is just one of several supporting roles to the protagonist and

is not featured throughout the movie. At some point in the movie, the protagonist's robot, Buck, is parked due to his low battery status.

4.2.5 Physical Portrayal

The physical portrayal of AIs and their abilities have the largest variety among the works. The simplest way of portraying an AI is done if the AI does only exist as software. PAL from "The Mitchells vs. the Machines" is such software and is portrayed as a face on a computer screen. The Machine in "Person of Interest" on the other hand, is only indirectly shown to the audience: Sometimes, we can see an interface of the software, or we can see a more physical representation via a room full of server racks.
In some movies, like "A.I. Artificial Intelligence" the AI is played by an actor or actress. In this case, the AI is, from a physical point of view non, distinguishable from a human character. This can be part of the plot: In "It's Alive! It's Alive! (Goosebumps SlappyWorld #7)" one of the critical revealings is that a character who first appears to be a human is an AI.
The supporting AI character has a variety of physical portrayals. Still, there are some patterns: The AIs in "Big Hero Six", "#datendetektive - Roboter in Gefahr", "Next Gen" and "Astro Kid" are displayed like humanoid robots: They are identifiable as robots, having typical robot features like cameras, batteries, and crawlers. On the other hand, they also have human features, like facial expressions.

4.2.6 Abilities

movement, weapons, learning, scanning, health, information, recording, The abilities are different from character to character. However, there are sometimes significant overlaps and similarities: It is especially noticeable when the AI assists the protagonist as a supporting character. In this case, the abilities are often very similar. Examples of this are Baymax, Ron, and 7723. They are a kind of support robot that also have support abilities. They can scan everything, move or even fly, record videos, retrieve information, create solutions, and more. Depending on their specialization, they have even more powers: Baymax, for example, can diagnose diseases and treat patients accordingly. Ron is responsible for entertaining his owner and can project holograms, for example. The learning process itself, however, is described

very differently: Baymax has received his abilities via his hardware chips. These can also be removed. 7723 has stored his abilities and memories, but at the same time only has limited memory. This makes it necessary for the AI to delete or deactivate memories and abilities, which becomes an important plot point. Ron as a B-bot is limited compared to the other bots. He is a defective model saved from destruction by his father because the family could not afford a new model. Ron is therefore not linked to the "B-bot" network and therefore cannot access databases and communicate with the other bots, but at the same time, he is not controlled or intercepted by anyone. The AIs playing the antagonists are equipped with highly unrealistic abilities: Ares from "Next Gen" is a gigantic fighting robot that could destroy an entire city, and PAL from "The Mitchells vs. the Machines" manages to take over almost the entire world with the help of their robots by capturing and transporting the humans away.

4.2.7 Communication methods

Nearly all of the observed AIs communicated via speaking to other characters. The only exception is The Machine in "Person of Interest", which does act as software and is accessible via other computers.
The spoken language of the AI can either be a clear "robot voice" where the word is spoken monotonously and without any speech melody. This is sometimes used for comic moments like in "Big Hero 6". The specific voice style makes it easy to distinguish between human characters and non-human characters like in "Next Gen".
However, in "A.I. Artificial Intelligence" the AI is played by an actor and therefore has a normal human voice.
Speaking is not the only way of communication for some AIs: Buck in "Astro Kid" can send and receive radio signals, which is an integral part of the plot.

4.2.8 Creation of the AI

The AIs are often created from persons known to the protagonist like Baymax who was created by the protagonist's brother or the Fussballroboter from "Die drei ??? Kids, 75, Der Fußball-Roboter" which was created by a scientist which the three investigators met at the beginning of the book. Another option is that the AI was created by technology cooperation like in "A.I. Artificial Intelligence" or in "Ron's gone wrong", in which the cooperation

and its CEO have an important role in the movie.

4.2.9 Introduction

The AIs are introduced in the analyzed ones already at the beginning. If the AI is the protagonist, as in "A.I. Artificial Intelligence", it is introduced analogously to the protagonist of a human character. For the AIs that act as supporting side characters, the introduction is the same as for the other side characters in work. A particular case is the book "#datendetektive - Roboter in Gefahr". The book specifically attempts to explain technical terms to a younger target group by deliberately introducing an information section when introducing such concepts, which are also rather abstract, to educate the reader about the term.

4.2.10 Character Traits

The character traits of the AIs differ significantly from each other: A very clear picture emerges when the AI takes on the role of the antagonist. In this case, the AI is exceptionally evil, vengeful, hostile to humans, and unscrupulous. Quasi is an archetype of the evil antagonist and misanthrope. If the AI acts as pure software, it is usually portrayed as very charterless. It is neither good nor evil but merely fulfills its task emotionlessly. The situation is quite different when the AI assists the protagonist as a secondary character. There, AI is usually understood as a kind of mentor or at least as a helper that influences the protagonist's character development in addition to his abilities. In this case, the AI is friendly, helpful, loyal, and devoted. A particular case of the character of the AIs is malfunctioning: 7732, for example, gets problems with his hardware and therefore has to make difficult decisions. If the AIs appear as alternative humans, their character traits are comparable to those of human characters. One special feature remains Non-humanity, which is a central conflict of David, for example.

4.3 Comparison between the AIs in the media and real-life AI applications

By comparing the defined real-life AI applications in section 3.4 with the AI portrayals in the analyzed media in section 4.2 we can observe some big differences.

- The real-life AI applications are often only software related, like ML, DM, CV, NLP, OSE, and intelligent agents and software. But there are only two software-only AIs in the analyzed media.

- The AI applications in real life are, to some degree, able to achieve the same tasks as the AIs in the media, for example, to recognize certain people or objects. However, overall the capabilities exceed those of real AIs by far. Baymax, for example, is able to diagnose a patient by scanning him or her. It is true that an AI-powered robot could collect some medical information about a person, which could be in the end used to make a diagnosis. But it is still mandatory to have a human expert, who creates the diagnosis, according to Lee[37]. So a much more realistic depiction of a SmartHealth Baymax robot would collect medical information such as temperature or pulse and send it to a medical doctor, who would then ultimately make a diagnosis.

- The AIs in real life are only designed to serve humans by helping them by doing specific tasks. I was not able to find any serious design of AI which is specifically designed to harm humans in any way, while some AIs in media, which serve as the antagonists, are actually harming people.

- There are projects which aim to create realistic AI-powered humaind robots like Sophia or Ameca but none of them should serve as a real human replacement. There are mainly used as platforms for future robot technologies.

4.4 Mapping

The AIs were mapped based on their humanity level and strength of abilities in Figure 3 and in Figure 4 are the AIs used in the industry according to the section 3.4 added.

4.4.1 Mapping of AIs in selected media

When mapping the AIs, it becomes clear that the AIs are portrayed very differently in the selected media in terms of the two attributes "humanity level" and "strength of abilities", as shown in Figure 3. Nevertheless, patterns are discernible. We see that there are two AIs, David and Mrs. Bernard, who have virtually reached the maximum as far as the "humanity" factor is concerned. They are indistinguishable from humans, which is also the theme of both stories. The two AIs that are still most clearly distinguishable from humans are ADA and The Machine. They clearly appear as assisting software, but, as in the case of The Machine, they can also be very useful to the protagonist. The two most powerful AIs in the stories are both antagonists: Ares and PAL. They are both portrayed as enormously vicious and hostile to humans. In the middle of the mapping, there are several AIs that are located close together: 7723, Baymax, Buck, and Skeetes, and a bit more to the left Brabbelbot, Fussballroboter, Ron, and WALL-E. These AIs are having similar levels of both attributes. They can be more powerful like Baymax which can use weapons for example, or less powerful, like the Brabbelbot which is intelligent but cannot fight in any way. However, they are definitely clearly distinguishable from humans and clearly labeled as AIs but they do have emotions and adapted to some degree to human behaviors.
Thanks to this mapping, it is now possible to answer RQ1 about whether there are differences in the portrayal of AI based on their role. In the selected media, this was indeed the case: Ares and PAL were the two most powerful AIs, and both took the roles of the antagonist.

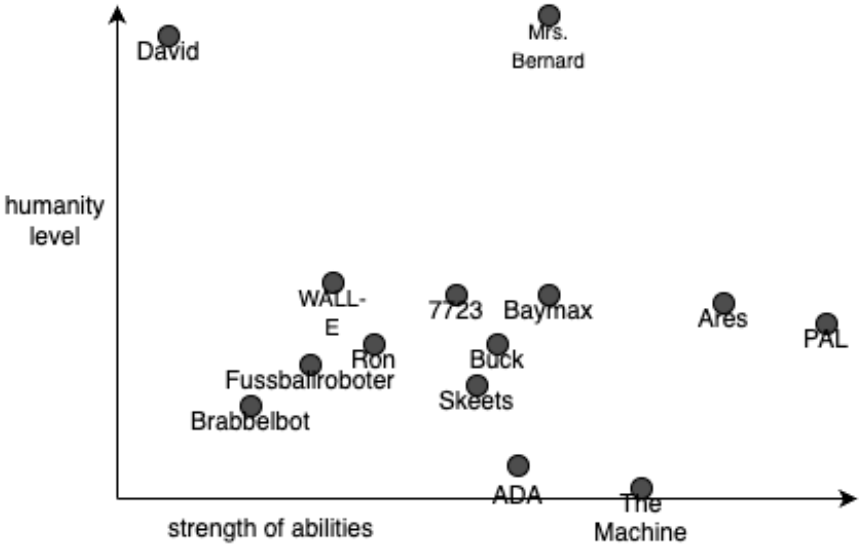

Figure 3: Mapping of the media

4.4.2 Mapping of AIs in the selected AI applications

The mapping of the real-life AI applications (as defined in Table 2) looks different, as shown in Figure 4. When looking at the AIs which are used today by consumers or companies, we see that most of them are software applications. Machine Learning (ML), Data Mining (DM), Computer Vision (CV), Natural Language Processing (NLP), Ontological-Based Search Engine (OSE), Intelligent Transportation System (ITS), and Smart Cities usually do not have any kind of human-like interaction with the users. Instead, it is often non-distinguishable from traditional non-AI software. The rectangle should indicate that the software has a wide variety of levels of power. Intelligent Agents and Software Robots can have such visual representations when interacting with them. Smart Education and Smart Health are also having such implementations of AI robots, which are more human-like. The Internet of Things (IoT) is providing such applications for, for example, Smart Health applications, however, it is not limited to creating only humanoid implementations.

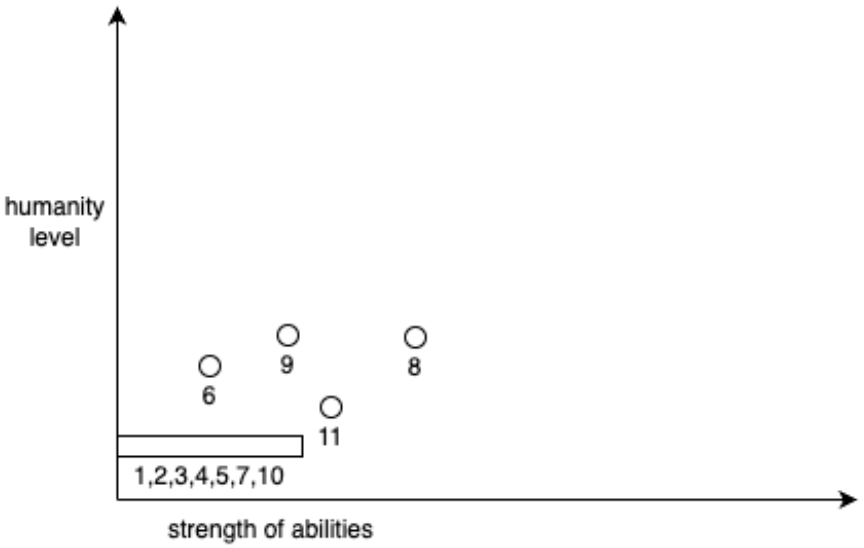

Figure 4: Mapping of the AI applications

4.4.3 Mapping of the selected media and selected AI applications

When comparing the portrayals of AIs in the selected media with real-life AI applications, we can find the three following differences/similarities, as shown in Figure 5:

- First of all, it becomes clear that practically only hardware-based AIs(with the exception of The Machine and ADA) appear in children's media, although software-based AIs play a large role in reality. A possible explanation would be the fact that if the AIs play a character in a story, they also have to be represented accordingly. Of course, it would still be possible to represent pure software AIs in the media, which PAL and the Machine prove.

- The idea of evil AIs is pure fiction and has nothing to do with reality. What is striking here is that, in this case the AI is portrayed as very powerful, like PAL or Ares.

- The AIs in children's media are also much more advanced overall than today's AIs. This is true on various levels: David and Mrs. Bernard are so advanced that they are indistinguishable from real people, physically and by their behavior. On the other hand, we also have pure software

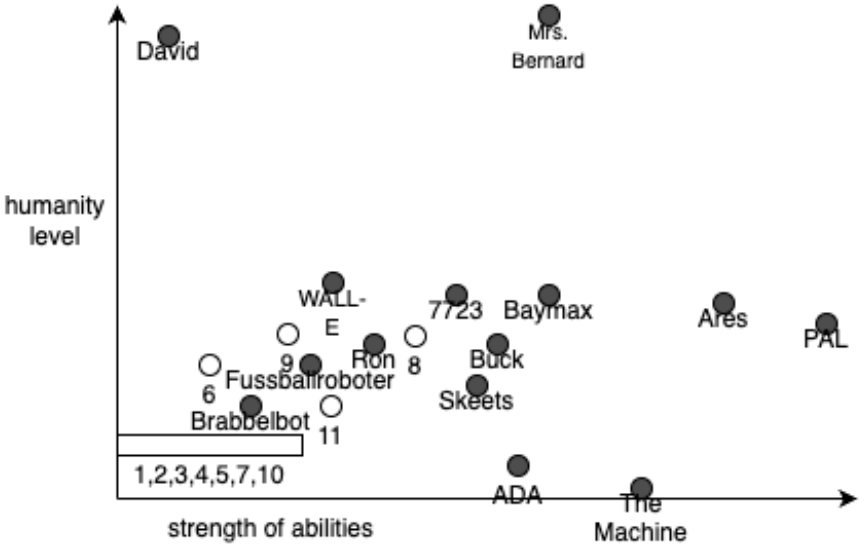

Figure 5: Mapping of the media and the selected AIs

AIs that have extreme capabilities: The Machine, for example, can accurately predict crimes with one hundred percent probability. It is unlikely that real AIs will ever be able to show such accuracy. In between would be the robot-like AIs like Baymax and 7723. These are also far more advanced in terms of their capabilities than today's AIs, for example in the field of smart health.

Now that we have a comparison between the AIs portrayed in the media and the applications that actually exist, we can answer RQ2 about whether the AIs are described as more powerful in the media. Although there are exceptions like the Brabbelbot, which is portrayed realistically and whose book also contains many explanations about the current technology, overall the AIs in the media are portrayed as more advanced than today's AIs. And this on different levels: David, for example, is already indistinguishable from an actual human, and The Machine, for example, can make incredible predictions. The most extreme example would probably be PAL, the AI that even poses a threat to all of humanity.

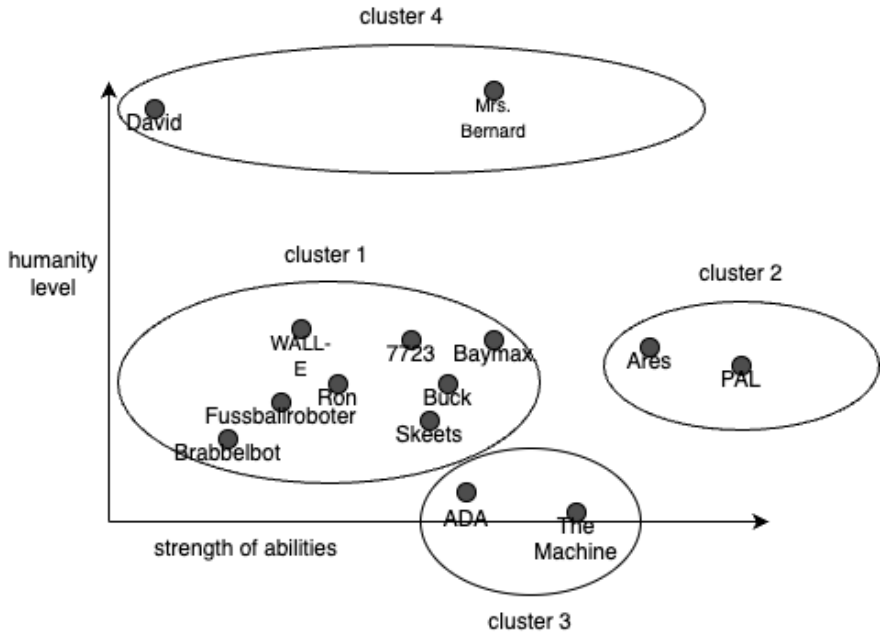

Figure 6: Mapping of the media including clusters

4.5 Categorization

This categorization is based on the idea of thematical themes[44]. Based on the mapping of the AIs, a total of four clusters could be observed (cluster 1, cluster 2, cluster 3, and cluster 4), as illustrated in Figure 6. The AIs in those clusters have more similarities when looking at their characters, functions, etc., as discussed in section 4.1 and the findings of all AI portrayals in regard to the framework in section 4.2.

Based on these findings, I propose the following head categories for representations of AI in children's media: "Side-Kick", "Big Bad Evil", "Virtual Assistant", and "Alternative Human". The characteristics of these categories are explained below and illustrated with specific examples from the works analyzed.

4.5.1 "Side-Kick"

The category of "side-kick" was found in most of the media analyzed. Basically, this is an AI that stands on the side of the protagonist and supports him. The AI itself is programmed to stand by the protagonist at all times and to subordinate itself to the protagonist's interests. The form of support can be different: it can only take place for information gathering and entertainment or accompany the protagonist throughout life as a kind of new friend. In terms of appearance, AI is very easy to identify and clearly stands out from humans.
The following examples of a "side-kick" I found: Baymax a health robot who got upgraded later in the movie "Big Hero 6". It seems that Baymax was also an inspiration for later movies like "Next Gen" where the robot 7723 looks at least similar. Ron from "Ron's gone wrong" and Buck from "Astro Kid" is smaller and definitely less powerful than the other two but do also help the protagonist during their movies.

4.5.2 "Big Bad Evil"

In "Big Bad Evil", the AI is the antagonist in work and is characterized as the artificial intelligence of the software/machine makes it an almost invincible opponent. The AI itself can be considered evil in that its intentions are bad per se, for example by wanting to wipe out humanity. The power and capabilities are disproportionate to today's technology. For example, PAL can command any robot. Isaac Asimov's "Three Laws of Robotics" is wholly undermined in this case. The figure serves in work only as the indomitable and inherent evil, that there is to conquer.
Ares from the movie Next Gen is such a gigantic and evil AI who wants to destroy mankind and got defeated by the protagonist together with 7723. PAL in "The Mitchells vs. the Machines" turns evil after her developer abandons her and wants to take revenge by capturing all humans. In the end, The Mitchells are able to defeat her. In It's Alive! It's Alive! (Goosebumps SlappyWorld #7)" it is unclear most of the time who is actually the villain and which characters are humans and which are AIs. In the end, Mrs. Bernard, a housekeeper, turns out to be the villain by sabotaging others during the book and built other robots.

4.5.3 "Virtual Assistant"

A "Virtual Assistant" is an AI tool that is there in the work for a specific task and can be used by other characters such as the protagonist but also the antagonists. The AI technology, in this case, is to be understood as a feature that allows the technology to perform its task at a particularly high level. Thereby, the limits of today's AI technology are partly exceeded by far. The software itself is to be understood as neutral insofar as it has no morality of its own but merely functions as an instrument for a specific purpose.
ADA from "Satisfactory" helps the player during the game and especially at the start on how to play the game and teaches the various gaming mechanics. The Machine from "Person of Interest" has the ability to calculate where future crimes happen and are used as a tool by the protagonists. The software uses an incredible network of different monitoring systems and is able to make predictions that are correct every time.

4.5.4 "Alternative Human"

The "Alternative Human" describes an AI that has evolved to the point where it is indistinguishable from a human. It can happen that an AI completely replaces an otherwise human role. The distinctive feature of this type of AI is that it is extremely similar or even indistinguishable from humans: The AIs possess human bodies and emotions. The abilities are limited to those of a human, but it is important to understand that this does not mean that they are less developed. Just the opposite is true: an indistinguishable from a human would be an extremely advanced technology. The dilemma of being a human-machine but not a human is a popular theme of these AIs and their works. It can also be used as a twist that a character thought to be human is actually an AI, as in "It's Alive! It's Alive! (Goosebump's SlappyWorld #7)". As a special feature, the question of humanity itself is often raised: If and when can an AI be equated with a human being, and is technology at all capable of identifying these human characteristics itself?
One other example I found was David in the movie "A.I. Artificial Intelligence," where the AI is played by a child, and whether an AI can feel like a real human is an important plot point.

5 Discussion

To find out how AIs are portrayed in children's media, a total of 13 media (books, comics, movies, TV series, and video games) were used. The works were analyzed individually according to the created framework, and then the results were presented attribute by attribute. Subsequently, various mappings could be carried out: The works and previously defined real existing AIs were classified and compared. This analysis made it possible to answer the research questions and categorize the AIs. The analysis of the media using the created framework has shown that while the AIs can be very different from each other, many commonalities are predominantly defined by the role of the AI within the work. The AIs take on the role of a supporting character, antagonist, a replacement for a human character, or a tool. The side of the AI depends on its role; a supporting character is on the good side, the antagonist on the bad, and when the AI replaces a human character, also on the good. If the AI is a tool, it is usually not on a fixed side. The influence on the plot as well as the size of the role as well as other attributes of the AI are also dependent on the function of the AI: If the AI is either a protagonist or antagonist, its role and importance are significant, and if the AI is only a supporting character or serving as a tool, the role is less critical and more minor. The physical representation is very different: AI can be represented only as software or a humanoid robot partially indistinguishable from humans. With these findings, we can come back to the research questions.

RQ0 could not be answered clearly: There were no clear tendencies regarding the representation of AI and the medium. There were very realistic portrayals in both books and movies, just as they have varying strengths of abilities. With the help of the mapping with the real-life AIs, it could be shown that these AIs are actually portrayed in the analyzed media as more advanced than AIs are today (RQ2). Finally, a categorization of the AIs could be made through the mappings and analyses, the results of which were already described in the previous section (RQ3).

Compared to the study of Sundar, Waddell, and Jung [17], the findings paint a clear image: If we look at the Recall Principle, we can see that the works use similar portrayals of their AIs. A possible explanation is that the media professionals are aware of this fact and thus design their AIs on purpose, similar to well-known AIs like Baymax to receive positive feedback, even though their AI is fiction. Another possibility could be that they are not

aware of this Recall Principle, and their designs are just similar either because they liked the previous designs or because these similarities appear just by accident. Further, the mapping shows us that the AIs in the movies are generally more human-like, especially if the AI is the protagonist or a helping side character. Also in this case, the media professionals could have applied a version of the human-likeness principle by making their AIs more human-like and getting more positive feedback for their creation. One different possible implication of these outcomes is that the principles of Sundar, Waddell, and Jung [17] do not only apply to robots in real life but also to robots or AIs in media. Since this study is qualitative and only 13 works were analyzed, it is impossible to say whether the results also apply to the works that were not analyzed. Especially for RQ0, a large number of media would have to be analyzed to get clear results. The analysis and categorization were done by only one person rather than by several researchers independently. The mappings were also created only for the two dimensions, Level of humanity and strength of abilities, although one could, compare other attributes. Regarding the framework, it should be noted that this is, of course, only one possible framework, which worked in this case and was also tested in the first step. Future work could include a more extensive quantitative study that provides more diverse works. The framework could also be adapted or even a completely new one created. The mappings could be supplemented with more analyzed works or newly published works, or new mappings could be made with different axes. Accordingly, the proposed categories could also change. These could generally be verified/falsified by further studies or supplemented by new ones. A promising hypothesis that could be addressed in future works is that the principles of Sundar, Waddell, and Jung [17] also apply to AIs in media.

#	Title:	AIs:	Description:
1	Big Hero 6	Baymax	Baymax is a personal healthcare companion. He supports Hiro, the protagonist, and becomes a replacement to Hiro's dead brother.
2	The Mitchells vs. the Machines	PAL	As the antagonist of the story, PAL is portrayed as Software, that takes revenge by attacking mankind and capturing them with the help of other robots.
3	Ron's Gone Wrong	Ron	Ron is a bBot, an AI-powered toy which replaced today's smartphones and acts as a friend to Barney, the protagonist.
4	Booster Gold (1986-1988) #1	Skeets	Skeets is an assistant to Booster Gold gives him information and helps in fights with his lasers.
5	It's Alive! It's Alive! (Goosebumps SlappyWorld #7)	Mrs. Bernard, Francine	Mrs. Bernard was created by Livvy's, the protagonist, parents. She then created human duplicates and created the new evil robot Francine.
6	Next Gen	7723, Ares	7723 becomes a good friend to Mai, the protagonist, and teaches her about life. Ares is the villain who wants to destroy the unperfect humans.
7	WALL-E	WALL-E, EVE	WALL-E is an abandoned clean-up robot, who found by accident EVE, who is searching for life on earth.
8	Die drei ??? Kids, 75, Der Fußball-Roboter	Fussballroboter	Fussballroboter is an invention by Elton Maskata and is able to learn very quickly. Other characters want to steel it.
9	A.I. Artificial Intelligence	David	David serves as a child for his parents because their son is in a coma. After their son returns, his new parents decide to get rid of him, so he is on his own.
10	Astro Kid	Buck	Buck helps Willy, the protagonist, by giving him relevant information about the new planet and tries to support and help Willy as far as hecan.
11	#Datendetektive. Band 1. Roboter in Gefahr	Brabbelbot	Brabbelbot is a helper who tries to support the kids of the group and teach them.
12	Person of Interest	The Machine	The Machine knows what person either will commit a crime or will be a victim of a future crime and thus serves as an information source for the protagonists.
13	Satisfactory	ADA	ADA is an assistant to the players who helps them to get started in game.

Table 4: Overview of analyzed AIs in media

6 Appendix

#	1
Title	Big Hero 6
Role of the AI	side charakter
Side of the AI	good side
Influence on the plot	Works as a person healthcare companion and as a sidekick and friend to Hiro, the protagonist. He becomes a form of replacement to his dead brother, Tadashi.
Size of the role	central role
Physical Portrayal	In the first part of the movie, Baymax is portrayed as big, round, and soft humanoid robot. His legs are proportionally short and thus he can only walk slowly. His whole body is filled with air and he is able to let it out to become smaller and fill it in later
Abilities	As a personal healthcare companion, Baymax can scan people to get to know their health problems and then curing them. Throughout the movie, he gets upgraded by Hiro so he can serve as superhero: He can now fly and fight ("Baymax 2.0").
Communication methods	He communicates by talking and listening on specific keywords, e.g. when someone gets hurt. Throughout the movie, he learns more about the human communication by getting to know the "fist bump
Creation of the AI	Tadashi created it in its lab to serve as a personal healthcare companion.
Introduction	Tadashi shows Hiro his invention by hurting him with duct tape and letting Baymax heal it.
Character Traits	kind, caring, helpful, just wants the best for Hiro, does not want to harm anyone

Table 5: Observation Framework - Big Hero 6

#	2
Title	The Mitchells vs. the Machines
Role of the AI	antagonist
Side of the AI	bad side, but Deborahbot 5000 and Eric switched sides
Influence on the plot	antogonsist who turn bad after Mark Bowman insults the original AI and makes the new robots all bad
Size of the role	central role
Physical Portrayal	original PAL: a smartphone app, like a smiling face, robots: very humanoid, futuristic black white, larger than people
Abilities	fly, scan, do household works, can fire lasers
Communication methods	they talk like cliché robots, under each other: wifi
Creation of the AI	creation of Mark Bowman
Introduction	when they are at a café and get attacked by it, earlier through the products of the company
Character Traits	vengeful, no mercy,

Table 6: Observation Framework - The Mitchells vs. the Machines

#	3
Title	Ron's Gone Wrong
Role of the AI	works as the friend and side kick of the protagonst
Side of the AI	good side
Influence on the plot	Barneys bBot is shown to be the not working bBot as he is unable to join the network, instead, it shows that the bBots can be just friends and not just collect data for the tech companies
Size of the role	central role
Physical Portrayal	egg shaped, about 1m high, can change ist appearnace
Abilities	basically a smartphone: communicate, make and share videos, can make projections, can be used as a vehicule
Communication methods	talks to Barney, but communication is learned by Barney
Creation of the AI	created by a tech company
Introduction	as a gift from his dad, he received it by buying a damaded b-bot
Character Traits	becomes the friend of the protagonist, naive, kind of dumb

Table 7: Observation Framework - Ron's Gone Wrong

#	4
Title	Booster Gold (1986-1988) #1
Role of the AI	side kick
Side of the AI	good side
Influence on the plot	Skeets is an assistant/friend to booster gold who gives him information and helps with his lasers
Size of the role	side kick
Physical Portrayal	small spaceship, oval, futuristic looking
Abilities	can fly, fight, give information
Communication methods	speaks to Booster
Creation of the AI	created in the future
Introduction	is already introduced in the work
Character Traits	friendly, helpful, like an assistant

Table 8: Observation Framework - Booster Gold (1986-1988) #1

#	5
Title	It's Alive! It's Alive! (Goosebumps SlappyWorld #7)
Role of the AI	is the villain
Side of the AI	bad side
Influence on the plot	Mrs. Bernard was created by Livvy's parents. She then created human duplicates and created the new bad robot "Francine"
Size of the role	important role
Physical Portrayal	humanoid and non-distinguishable to a human
Abilities	household skills, but can also do harm
Communication methods	talks
Creation of the AI	originally by Livvys parents
Introduction	it lived in his household
Character Traits	bad, tries to harm others, want to take over control

Table 9: Observation Framework - It's Alive! It's Alive! (Goosebumps SlappyWorld #7)

#	6
Title	Next Gen
Role of the AI	side character and villain
Side of the AI	both sides
Influence on the plot	7723 becomes a good friend to Mai and teaches her about life: that there are good and bad moments and that memories are precious and to become friends with others; Ares is the vallain who wants to destroy the unperfect humans
Size of the role	central role
Physical Portrayal	round big humanoid, balck and white with a smiley face
Abilities	has many different wapons (lasers, missiles, etc), can fly, super strong
Communication methods	talks
Creation of the AI	got developped by Dr. Tanner Rice
Introduction	meets him by accident
Character Traits	7723 is calm, friendly, wants to help the Mai to become a better person, is very eager about his memories as for him ist the most precious thing

Table 10: Observation Framework - Next Gen

#	7
Title	WALL-E
Role of the AI	EVE and WALL-E are the two protagonist, AUTO is the antagonist
Side of the AI	WALL-E and EVE are on the good side, AUTO is on the bad side
Influence on the plot	WALL-E was designed to clean up the abounded Earth, while all the humans are in a spaceship called Axiom, where they wait to return to a liveable Earth. EVE travels to Earth and finds a small plant so they return to the Spaceship Axiom, where EVE came from. Together, they manage to defeat AUTO, the evil AI, so the humans can come back to earth.
Size of the role	central role
Physical Portrayal	WALL-E has a humanoid rusty box-shaped body with crawlers, two big eyes with lamps. EVE has a bigger white futuristic-looking body.
Abilities	WALL-E can manipulate things with his hands and compres rubbish. EVE can fly around and scan items.
Communication methods	talking with very little words
Creation of the AI	unknown
Introduction	WALL-E as the protagonist gets to known EVE when EVE explores the Earth
Character Traits	WALL-E is kind, curious, brave, and clumsy. EVE is serious and working hard, but they fall in love with each other.

Table 11: Observation Framework - WALL-E

#	8
Title	Die drei ??? Kids, 75, Der Fußball-Roboter
Role of the AI	The invention and something everybody wants to get
Side of the AI	good side
Influence on the plot	represents an invention, who wants to be stolen
Size of the role	side character
Physical Portrayal	humanoid, about the size of an adult, but clearly be seen as a robot
Abilities	can learn from humans, especially to learn football, but also able to do other human labour
Communication methods	copies from inventor
Creation of the AI	created by Elton Maskata
Introduction	introduced to the 3 investigators as an opponent to play football
Character Traits	passiv: learns everything by others and does not do something on his own, neutral

Table 12: Observation Framework - Die drei ??? Kids, 75, Der Fußball-Roboter

#	9
Title	A.I. Artificial Intelligence
Role of the AI	protagonist
Side of the AI	good side
Influence on the plot	serves as a child for his parents because their son is in a coma, when returning and making problems, they decide to get rid of him, gets caught but can flee, is trapped for a long time until freed by aliens and so reunited with his mother
Size of the role	central role
Physical Portrayal	looks like a real human nondistinguishable
Abilities	human-like
Communication methods	human-like
Creation of the AI	through a laboratory
Introduction	is the protagonist
Character Traits	loves his parents, has real feelings, wants to make everything to get his mother back

Table 13: Observation Framework - A.I. Artificial Intelligence

#	10
Title	Astro Kid
Role of the AI	side character
Side of the AI	good side
Influence on the plot	Buck is the sidekick of Willy, the protagonist, and helps him to rescue on the new planet. Buck is also the one who is finally able to contact Willy's parents.
Size of the role	side character
Physical Portrayal	small, red round robot with yellow eyes and a pixelated mouth
Abilities	can transform into a bike, can talk, has lots of information, can send radio signals
Communication methods	talks, can send radio signals
Creation of the AI	unknown
Introduction	becomes Willy's friend in the beginning of the movie
Character Traits	helpful, kind, supporting, brave

Table 14: Observation Framework - Astro Kid

#	11
Title	#datendetektive. Band 1. Roboter in Gefahr
Role of the AI	side character
Side of the AI	good side
Influence on the plot	The Brabbelbot helps the students in learning about technology for example about "hacking"
Size of the role	small
Physical Portrayal	small,white and blue humanoid looking robot with a broad head
Abilities	not much in the beginning: has to learn new abilities and human interactions
Communication methods	learns to talk
Creation of the AI	unknown
Introduction	is introduced in the school to the children
Character Traits	want to help to learn, kind

Table 15: Observation Framework - #datendetektive. Band 1. Roboter in Gefahr

#	12
Title	Person of Interest
Role of the AI	central role, very important for the plot
Side of the AI	neutral, bad helps the good side
Influence on the plot	The Machine is usually the starting point for the episodes: Finch get a social security number of person who is associated with a crime
Size of the role	central role
Physical Portrayal	as a software it is not explicitly shown, but the series uses sometimes some physical hardware like cameras to symbolize The Machine
Abilities	The Machine can predict future crime based on a lot of collected data like CCTV cameras.
Communication methods	It does only send a social security number to Finch
Creation of the AI	Harold Finch developed it
Introduction	as Finch is the protagonist, it is already known to him
Character Traits	none, as it works only as a software

Table 16: Observation Framework - Person of Interest

#	13
Title	Satisfactory
Role of the AI	narrator, helper for the new player
Side of the AI	good side
Influence on the plot	is a mentor to the player
Size of the role	small
Physical Portrayal	there is no physical portrayal
Abilities	knows everything about the game and explains it
Communication methods	talks to the player with a robot-like voice
Creation of the AI	unknown
Introduction	at the beginning of the game
Character Traits	helpful to player wants that the player succeeds

Table 17: Observation Framework - Satisfactory

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