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Applications of Generative AI in Business

Exploring use cases of creative video AI for Valossa

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ABSTRACT

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This thesis aims to give the reader an insight into generative artificial intelligence, and its' uses in business applications. From chatbots to targeted marketing, AI is an exceedingly potent tool in aiding business operations from small businesses to large corporations alike. In addition to figuring out the uses of generative AI, the thesis aims to find the benefits and risks of applying generative AI into daily business operations.

The commissioner of this thesis, Valossa is an artificial intelligence developer based in Finland. The Valossa creative video AI has uses in facial recognition, and automation for production companies, like automatic highlight and accessibility features. The focus of the thesis is to explore these applications and to create and innovate new use cases for their creative AI, with an emphasis on commercializable applications.

Keywords: Artificial Intelligence, ChatGPT, AI in marketing, AI, Generative AI,

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1 INTRODUCTION

1.1 Topic & Justification of research

The topic of this research is to determine some use cases of generative artificial intelligence from a business perspective. This includes explaining some of the core terminology used in artificial intelligence, as well as highlighting the different types of artificial intelligence models there are. Explaining the strengths and weaknesses of these models and the applications for business use cases, such as chatbots or marketing, and the threats that may arise from the use cases of generative AI.

Even though artificial intelligence and everything related to it are highly technical subjects, it is important to research it from a business perspective, as with the advent of many exciting new technologies, there arises new opportunities for business to bloom. Artificial intelligence has proven itself to be a powerful tool for companies, as it is capable of reinforcing or even outright replacing human workers, which leads to decreased costs and increased revenues.

As AI has become more accessible to everyone, largely thanks to OpenAI's ChatGPT, the incredible capabilities of the technology have become more apparent as more people are using it and coming up with creative use cases. In a Vice article by Strachan (2023) he interviewed people using ChatGPT as a tool to do their job faster and more efficiently. One of the interviewees was a man working in marketing, and according to him, ChatGPT could do 80% of his of his job for him. With the help of the language model, he applied for a second job, which he also automates as much of it as possible with ChatGPT. This raises some concerns about the threats of artificial intelligence, as jobs like creative writing are in danger of being completely overrun by artificial intelligence, and if people can hold even up to four jobs at the same time with the help of AI, there won't be enough jobs available for everyone in the future.

1.2 Research problems & objectives

Objectives of the thesis are as follows.

Review the current existing literature on generative artificial intelligence and artificial intelligence and conduct an interview with professionals in the field to find answers for the research questions. Create new viable use cases for a creative video AI through methods like scenario planning.

The aim of the thesis is to answer the following research questions:

What are the current commercial applications of generative artificial intelligence?
What is generative artificial intelligence, including its capabilities and limitations?
What are the benefits of generative artificial intelligence applications for businesses?
How can the Valossa AI be commercialized further, what new applications could we find?
What are the possibilities and risks of those new applications?

1.3 The structure of the thesis

Firstly, the thesis explains What is artificial intelligence, introducing the reader to the few core concepts, like algorithms, machine and deep learning, and generative AI, focusing on two subsets of generative AI, text, and text-to-image AI models. After gaining a basic understanding of the core concepts, the thesis explores the use cases of these two generative artificial intelligence models using the most popular models as examples. In this applications chapter, in addition to exploring the applications, the risks and future aspects are analysed leaving the reader with an idea of how companies could implement these technologies into their daily operations, what benefits would follow, as well as what things to look out for and what to avoid. The final part of the thesis explains briefly what Valossa AI is and explores new use cases for Valossa. As the commissioner of the thesis, Valossa has requested that I research commercializable new use cases. In addition to identifying these use cases, scenario methodologies are applied to figure out the possible risks, value and challenges to the provider, and the client company that may arise from implementing the new application.

2 WHAT IS ARTIFICIAL INTELLIGENCE

To gain a comprehensive and full picture of the subject matter at hand, we must first establish some core concepts. This chapter aims to give a concise knowledge basis for the reader of the thesis and to act as a point of reference for terms and concepts used going forward in the research topic. According to McCarthy (2007,1) artificial intelligence is the science and engineering of creating intelligent machines, and in particular intelligent computer programs. It is closely related to leveraging computers in understanding human intelligence but is not restricted by biologically observable methodologies.

According to a 2019 survey conducted by Gartner of over 3000 CIOs, forty-nine percent of the surveyed Chief Information Officers had digitalized or are in the process of digitalizing their business model. In addition to this, they also found that AI implementation has risen drastically from only 10% in 2015, to a whopping 37% in 2019. In 2022, in a study by McKinsey (2022) companies implementing AI in at least one of their functions or business units was at 50%. In 2019, McKinsey's data suggests that 58% of businesses had incorporated AI into their daily operations. The lower percentage in 2017 (Table 2) is explained by the change in the survey, which was defining AI adoption from a core part of the organization's operations, to at least one business operation. The difference in data could be due to surveying companies in different fields with varying possibilities for AI implementation.

Artificial intelligence is a rapidly growing industry, and it is seen as one of the main driving forces in the fourth industrial revolution. Its rapid surge in popularity is largely thanks to OpenAI's ChatGPT, which will be explained thoroughly in a later part of the thesis. Massive corporations like Google are rapidly implementing artificial intelligence into their existing services such as the Google search. According to (Sundar 2023), the CEO of Google, the scale of the largest AI computations is doubling every six months, outpacing Moore's law, which is the doubling of the transistors within a microchip every two years, effectively doubling the performance of the chips (Tardi, 2023). Private investments into the field have shown steady increase across 9 years, doubling from 2020 to 2021. This growth is largely driven by OpenAI, as tech-giant Microsoft has invested billions of dollars in them, and Microsoft made another multi-billion-dollar investment into OpenAI in 2023.(OpenAI 2023)

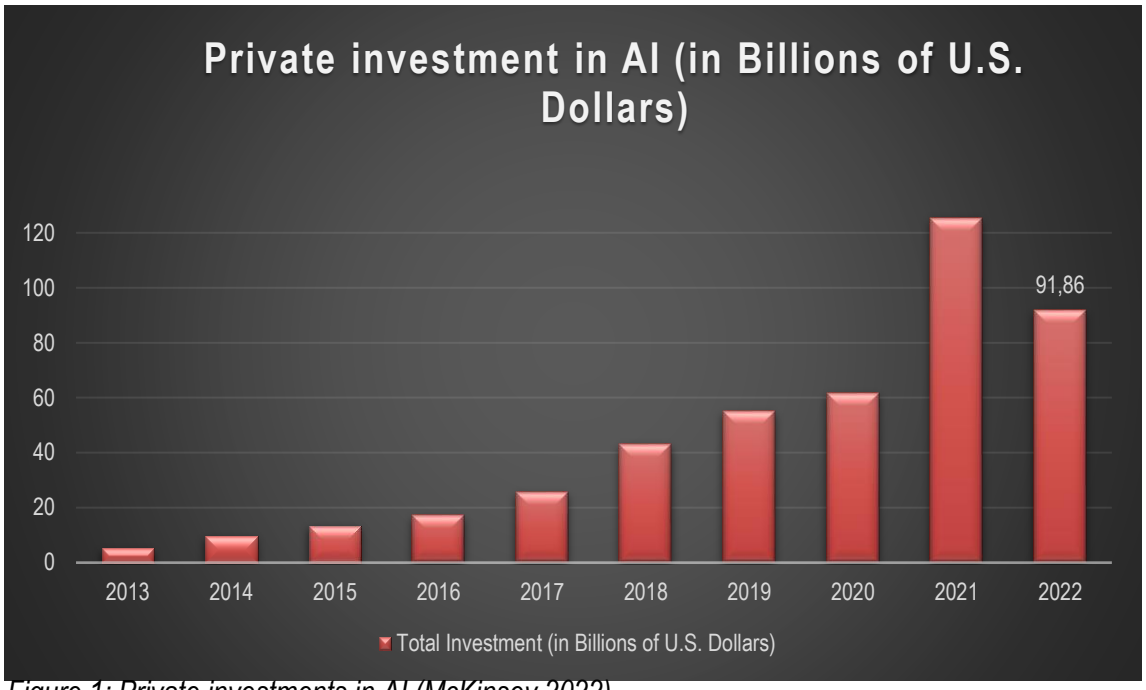

Figure 1: Private investments in AI (McKinsey 2022)

2.1 Machine learning

Machine learning, also referred to as classical artificial intelligence is a form of artificial intelligence that allows a system to learn from data rather than through explicit programming (Hurwitz & Kirsch 2018, 4) This means that machine learning allows computers to adapt and produce new outcomes without the need for new instructions.

These instructions are called algorithms. An algorithm is "a set of instructions to be followed in calculations or other operations." In essence, algorithms are programmed sets of rules that tell a computer program how it should operate to arrive at the desired outcome. Traditionally, an algorithm takes an input and leverages mathematics and computer logic to produce an output. Contrary to the traditional way that an algorithm works, AI algorithms generally use both the inputs and outputs simultaneously to "understand" the data, and produce new outputs based on the pre-existing data it has gathered and created by itself. (Burns, 2021) This logic allows an artificial intelligence to learn to be more efficient and precise in the future when dealing with the same or similar input.

According to Mahesh (2020) machine learning algorithms can be categorized into broad distinctions. Supervised learning, Unsupervised learning, and Reinforcement learning. All these algorithm groups include many specific algorithms and serve different needs for different use cases.

Supervised learning bases its predictions of pre-existing data within its dataset, which needs to be clearly labelled for optimal efficiency. Common use cases for supervised learning algorithms includes spam detection and bioinformatics, like the fingerprint sensor on your phone. (OpenDataScience, 2020)

Unsupervised learning is the opposite of supervised learning, as there are no correct answers and no teacher. The algorithm finds and presents the interesting structures within the input data it receives. (Mahesh 2020) These algorithms are best leveraged when it is unsure what the desired outcome of analysing data is. Use cases for unsupervised learning includes bot detection, and audience segmentation.

In the field of artificial intelligence, many of the inner workings work in a similar fashion to how a human brain operates, and reinforcement learning algorithms are no different. They simulate dopamine in the human brain by rewarding the algorithm for correctly predicting the next outcome, thus incentivizing the algorithm to produce similar outcomes consistently. This makes reinforcement learning algorithms perfect for predicting consumer behaviour in marketing through contextualized advertising. (Hao 2020)

2.2 Deep learning

Deep learning is a subset of machine learning. Deep learning relies on neural networks, which is a method that teaches computers to handle data in a similar way than the human brain. It uses interconnected nodes known as neurons in a structure with layers. This structure is then capable of hosting an adaptive system that is capable of learning from their mistakes as well as improving its operations constantly. Neural networks can solve more complicated problems, and have higher statistical accuracy, because in essence it is just scaled machine learning. Deep learning neural networks require more computing power, but it also provide greater and more accurate results. (Amazon Web Services Inc. -)

A neural network becomes a deep learning neural network when it consists of more than three layers, in addition to the input and output layers. In the table below, there is the input layer, where the user's input is transported to be evaluated by the neural layers. The neural nodes evaluate the data based on pre-existing datasets, and then analyse the input based on specified threshold values of certainty. If the node's certainty threshold is fulfilled, the data is not passed along the network, otherwise it will get passed on to the next node and so forth, until the network is able to reach an outcome. (Kavlakoglu, 2020)

General use cases of deep learning include speech recognition and synthesis, for applications like Siri and Google Assistant, and synthesising text-to-speech. Self-driving cars are a fantastic example of deep learning applications in the real world as they highlight the incredible potential that deep learning provides in automating daily tasks. Self-driving cars combine computer vision and autonomous decision-making, because when driving a car, you must be able to quickly adapt to any situation to reduce risks to a minimum. In addition to autonomous vehicles, the largest applications for deep learning include healthcare, natural language processing and facial recognition.

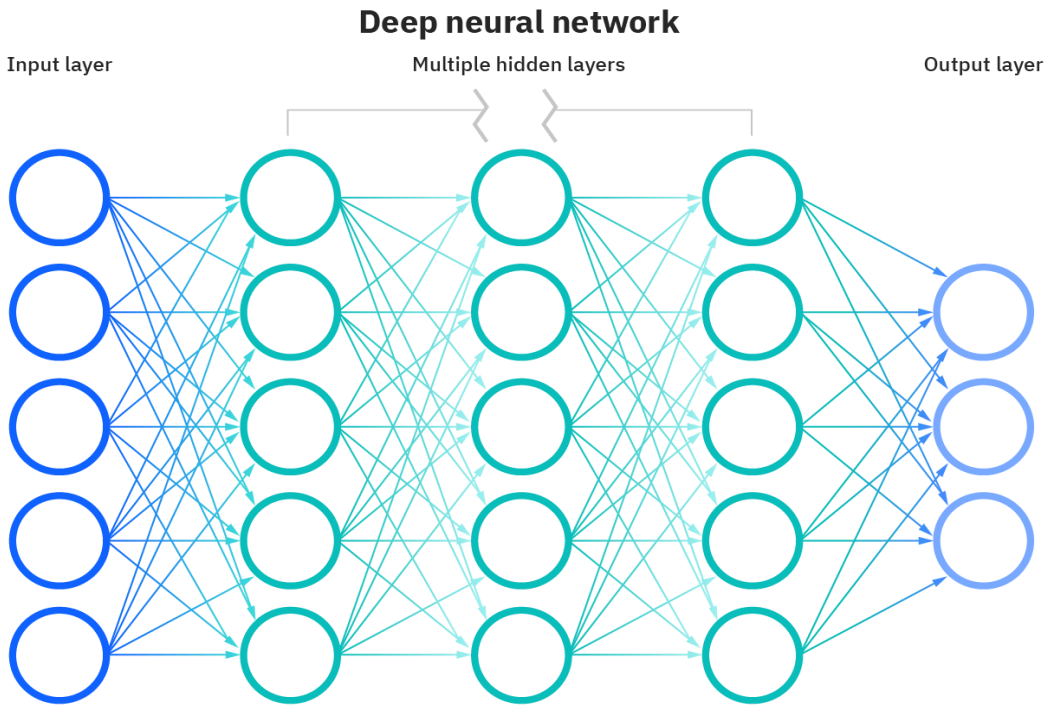

Figure 2: Visualization of layers in a deep neural network (Kavlakoglu, 2020)

3 APPLICATIONS OF GENERATIVE AI

3.1 Generative AI

Generative artificial intelligence is a type of artificial intelligence that can generate a varying range of content including text, images, audio, and video. (Lawton 2023) The technology was created in the 1960s to be used in chatbots, and became more akin to its current state in 2014 with the introduction of generative adversarial networks (GANs) but has recently risen to new heights with the introduction of large language models, (LLMs)

Generative AI models generate their outputs based on inputs by referencing their training data, and then use the pre-existing data to create new outputs, which are similar, but not completely identical to the original data (Martineau 2023). This raises questions about the ethics of generative AI that will be explored in a later chapter.

LLMs are machine learning models that leverage deep learning algorithms to process and comprehend language. The models are trained using large amounts of text data, which allows them to learn patterns within the language. It is the basis of the most advanced generative AI models to date, and even if it is based on understanding text, the model can be trained to even output images based on the text input. (Carle 2023)

The LLM technology, in conjunction with big data, which is any kind of data source that shares at least one of the four definitive characteristics, which are extremely large volumes of data, the ability to mote that data at a high data rate or speed, a constantly expanding variety of data sources, or truly truthful data sources (Hurwitz & Kirsch 2018, 6) has enabled generative AI models to access vast databases of information and use this data to create and analyse content in a way that was not possible before (Lawton 2023).

3.2 Text generative AI models

The most popular and advanced text generating language model as of when this thesis was published is ChatGPT, developed by OpenAI. In this chapter we will be using ChatGPT as the scope of exploring the subject of text generative AI models. ChatGPT is a conversational large language model, and its goal was to become 'humanlike' in its answers, and to be the most advanced artificial intelligence language model ever created. ChatGPT was launched to the public on the 30th of November 2022, and within its first week of existence, it managed to cross a million users, and by January 2023, the AI had already been used by over 100 million users. (Ruby, 2023)

Currently, the version of ChatGPT available to the public to use freely is the ChatGPT-3.5 model, generally referred to as GPT-3. However, OpenAI has developed a much stronger version of ChatGPT, ChatGPT-4, which is currently only available to paying customers. Below is a figure portraying the performance increases in specific tasks of ChatGPT-4 compared to ChatGPT-3. A notable increase was seen in the Uniform Bar Exam for lawyers, where GPT-3 scored in the bottom 10th percentile, whereas GPT-4 scored among the top 90th percentile. This tremendous improvement portrays the leaps in the development of large language models, and the availability of information that previously was difficult to find for ordinary people. In essence, this exam result means that anyone with access to the internet could get a lawyer's advice on legal matters, 24/7, completely free.

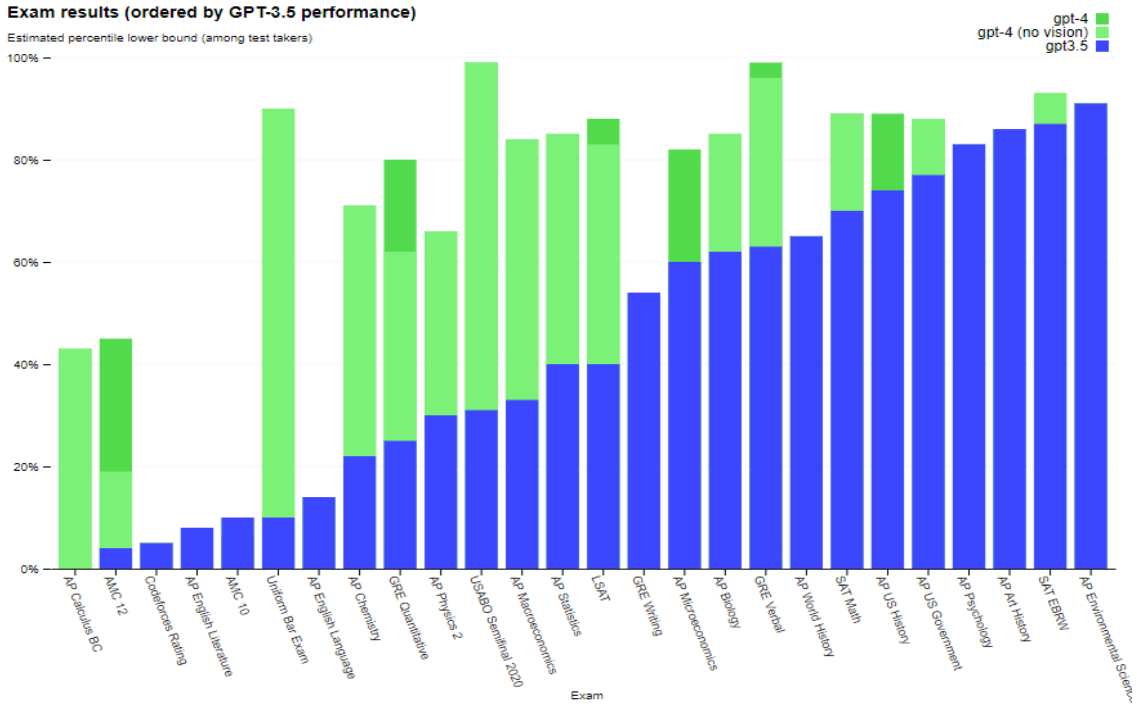

Figure 3: Results from varying exams between GPT-3.5 and GPT-4 (OpenAI, 2023)

ChatGPT was trained using Reinforcement Learning from Human Feedback, which is a method that uses input from two humans, one acting as the user, and the other responding as an AI assistant. They then fused this human interaction dataset with their pre-existing dataset from an earlier chatbot they had developed, called InstructGPT. (OpenAI 2022)

ChatGPT can perform creative writing tasks, such as writing essays or code, and content summarization. Its biggest applications for business use are customer service inquiries, external communications, use as a coding tool, writing emails, creating presentations, and search engine optimization. (O'Sullivan 2023) Still, while ChatGPT can be a powerful tool for many things, the user should always ensure that the results generated by the AI are, in fact, correct.

It's largest shortcomings and limitations are related to the reliability of the answers, as well as it's linguistics, as it often responds in an excessively verbose manner. Its unreliability comes from the fact that it cannot access the internet to search for data, and it must fully rely on its training data which severely hinders its trustworthiness, and it will sometimes generate believable but false answers. As an example of nonsensical answers, I asked ChatGPT to recommend me a bar in Oulu, and it told me about a hidden bar in an alleyway, and to access it I must give a password to the bouncer. This was nonsense, but the language model still told it as if it were true. The language model is also limited to data before the year 2021, as that is the year its training was halted.

The applications of the technology in business are being widely implemented. As surveys suggest that it's being used by almost half of US companies, 93% of whom are planning on expanding the usage of ChatGPT in the following months. (O'Sullivan) The most common use cases are in customer support, external communications, marketing, and search engine optimization.

3.3 Example of text generative AI applications - Chatbots

In e-commerce, live chats are an incredibly useful tool for the consumer, as well as the seller. Live chat had the highest customer satisfaction level of 73% when compared to other service channels such as email or phone (Charlton,2013). The usage of chatbots also had positive effects on trust, satisfaction, and customer retention. (Mero, 2018)

According to (Gupta & Divya 2020), chatbots that are designed for customer service can be categorized in three main groups.
Menu/Button-Based Chatbots are the simplest form of chatbots, where the user follows a chain of options through decision trees, and upon arriving at the end question the chatbot will answer the question accordingly. These types of chatbots are slower and cannot be relied upon fully to get the answer the customer needs, as the options available to the customer are limited.

Keyword Recognition-Based Chatbots recognize specific keywords inputted by the customer to find the desired result. They recognize the keywords from a customized dataset of keywords, which can be updated by the service provider to include or exclude words. The shortcoming of this type of chatbot is that if a customer uses multiple keywords within the help request, the bot could struggle in finding the correct answer. (Gupta & Divya 2020),

Contextual chatbots are one of the most advanced bots available. They rely on machine learning and AI technologies such as voice recognition and text-to-speech algorithms to understand the customer's input. These bots can contextualize the user's inputs and responding to them with a unique and thought-out answer by referencing the query to the database, as well as using existing information on the customer such as their purchase history. This enables them to even suggest products for the customers based on their likings. Additionally, depending on the depth of the neural network, these kinds of chatbots can also be capable of using existing resolved customer support cases as a part of their database, thus learning from their own operations. (Gupta & Divya 2020),

Using artificial intelligence to automate customer service is a great way for a company to reduce costs and streamline the customer experience, as chatbots are nearly instantaneous with their answers, as well as more efficient in searching information than their human counterparts and they can be accessed 24/7. In 2019, business leaders saved an average of $300,000 from their chatbots

(Intercom Inc.). According to a study by (McKinsey Analysis 2014) 29% of customer service representatives could be replaced by chatbots or other form of automation. Chatbots still are not advanced enough to handle all customer service inquiries, especially in fields requiring some sort of specialization. Regardless, they still reduce the response times by an average of 3x (Yin 2019), which allows the specialized human agents to have more time helping the customers with more specific issues, since the chatbots are so effective at handling customer service inquiries that they can answer.

Chatbots can serve many purposes outside just customer support. They are powerful sales agents capable of analysing the customers' interests and habits, and creating personalized offers based on said interests. In fact, chatbots are mostly used for sales purposes, according to research data from Intercom, 41% of chatbots are being used for sales, while support chatbots are slightly behind at 37%. 17% of bots are used in marketing and the remaining 5% are unspecified use cases (Yin 2019). Chatbots have increased sales by an average of 67%, acting as a starting point for 26% of all sales.

3.4 Text-to-image generative AI models

(McFarland 2023) An AI image generative model is an artificial intelligence system created to generate new images from a set of input parameters or conditions. The model is based on machine learning algorithms, like text generative models, but instead of the database consisting of mostly text, their databases consist of images. This means the images generated by the model are always very similar to the style and content of the images in the training dataset. Regardless of this, the model requires text data in addition to image data to understand the text inputs. For this reason, the models include parts of language models to transform the text input into a dormant presentation form, which the generative image model then translates into an image.

Currently the most popular and advanced forms of text-to-image generative AI models include VQGAN, CLIP and stable diffusion. Usually, VQGAN and CLIP algorithms are combined in a text-to-image AI model to enhance the accuracy of the image. A VQGAN acts as the image generator, and CLIP acts as an agent determining how well a caption matches the image (Klein 2022).

VQGAN stands for Vector Quantized Generative Adversarial Network, and it is a type of neural network that combines neural networks with Transformers. In a VQGAN, the generative model is faced against an adversary, which is a discriminative model that learns to judge whether a sample is from the model distribution or the data distribution. The generative model can be thought of as a team of counterfeiters, trying to produce fake currency and use it like genuine currency, while the discriminative model is acting like the police, trying to find the counterfeit currency. Both the generative model, and the adversary model are thus competing against each other, and will improve upon their actions, generating a more trustworthy output overall. (Goodfellow, et al. 2014, 1)

CLIP (Contrastive Language–Image Pre-training) is a neural network "which efficiently learns visual concepts from natural language supervision" (OpenAI 2021) Its purpose is to allocate the most probable text description for an image. It uses a combination of Natural Language Processing and Computer Vision to determine the most accurate description for any given image. Its training data consists of 400 million image-text pairs. (Kafritsas 2022)

Stable Diffusion is a latent diffusion model. Latent meaning "a simpler, hidden representation of a datapoint" (Bok, Langr 2019). This latent space is 48 times smaller than regular image space, which gives stable diffusion a unique edge against other text-to-image models, which is that it is relatively lightweight to run, even on consumer-grade hardware. Within this latent space, stable diffusion adds noise to the latent representation of the image, to completely corrupt the image, imagine white noise, but in colour. Then, a noise predictor is trained to estimate the noise added to the image, and when a text input is added to the noise predictor, it will subtract noise from the latent image, using its training data in conjunction with the text input to match the text and visual output. This process is repeated a certain number of times. Finally, the latent image is converted back to pixel space by a decoder, which should lead to a visual representation of the input text. (StableDiffusionArt 2023)

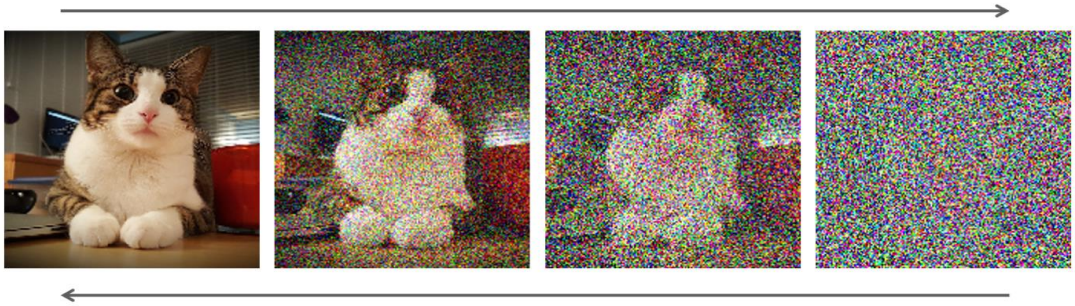

Image 1: Stable diffusion visualized (Vahdat, Karsten 2022)

The risks and concerns of text-to-image generative models revolve mainly around the copyrightability of AI generated imagery, and the ethicality of using other people's art as training data, this is especially an issue with the nature of AI, because a human artist can draw inspiration from others' work, an AI model simply extracts parts of the art as is and implements copied bits from multiple sources. (Kalebich 2023)

Copyright and fair use are topics in heated discussion right now as lawmakers and organizations are dealing with an unprecedented problem regarding the copyright of AI generated content. In the US, "*an image generated through artificial intelligence lacks the "human authorship" necessary for protection*" (Borg, et al. 2023) In September 2022, the US Copyright Office granted registration for a comic book illustrated with assistance from AI. After a few months of granting the copyright, USCO retracted their earlier decision, with emphasis on the fact that copyrighted works must be created by humans to gain official copyright protection. (Borg, et al 2023)

Within EU, in 2020, a four-step test was proposed by the European Commission. This test includes the following criteria that an AI production must meet to be considered work capable of being copyrighted. Production in literary, scientific, or artistic domain, human intellectual effort, originality/creativity and finally, expression. Within these guidelines, AI creations with human interaction, or human creations with AI interaction in the form of AI tools and such are capable of copyright but work completely generated by AI is not. (Borg, et al. 2023)

In addition to copyright regarding content generated by AI, conversation has been had about the transparency of the training data used by the AI models. In January 2023, a class action lawsuit against Stability AI, DeviantArt and Midjourney was filed on their use of stable diffusion. The lawsuit was based on the AI systems being trained on large amounts of copyrighted work without consent from the original creators of the data, in addition to not receiving credit or compensation for their used assets. (Butterick 2023)

3.5 Example of text-to-image and text generative AI applications – Marketing

Artificial intelligence is capable of automating much of the analysis and creation process that goes into marketing, and is a great tool for completing tasks, or drawing inspiration from its results. AI can be used for data analysis or content creation, and this chapter will be focusing on the generative applications of AI marketing.

At the beginning of every marketing campaign, a marketing strategy must be created. Large language models like ChatGPT can come up with a general marketing strategy that is applicable in the general field the product lies in based on the information it has within its massive database of knowledge.

According to Gill 2023, generative AI can be leveraged in automating content creation in the form of emails, social media or blog posts, scriptwriting for videos and advertisements and generating engaging and interesting product descriptions that all cohere with the branding of the company. To aid in the creation of advertising content text-to-image models can be applied to create realistic images of products, create visual branding like logos, and easily make visually appealing and engaging advertising visuals. The image on this page was generated by Midjourney AI with the prompt “promotional images for a spicy steak sauce”. Clearly, generative AI is a notable tool in content creation, but its versatility allows it to also analyse data very effectively, thus leading to the third use case, search engine optimization. Generative AI can conduct keyword research, automate technical parts of the SEO process, like create static XML sitemaps and create new title and description tags. (Doyle 2023)

Image 2: Midjourney

As an example of AI generated marketing content, Heinz used an AI generated image of a ketchup bottle with a label with similarities to the Heinz label to argue “This is what ‘ketchup’ looks like to AI” Nestle also used an AI-enhanced Vermeer painting in an ad for its yoghurt brands. (Davenport, Mittal 2023)

Image 3: Heinz (2022)

To conclude, generative AI is a strong tool in marketing, and can be used for inspiration and ideas, generating concept art and content that is not an integral part of a company’s intellectual property, like images and text for blog posts, automating mundane tasks, like summarizing large pools of text such as customer reviews, and for trying out new ideas very quickly, cutting down on the overall time required to find the most compatible solution (Graham 2023)

3.6 Benefits and risks of Generative AI

As useful artificial intelligence is, it does not come without flaws, and in a business environment risk management and aversion are key in ensuring successful operations. For this reason, this chapter will highlight the AI's largest weaknesses alongside its biggest strengths, so the reader may achieve a holistic view on the real-world usefulness of artificial intelligence, and what to expect when implementing such technologies.

Companies looking to integrate generative AI into their daily operations should first and foremost recognize the parts of their operations that could be automated by AI, have the largest and rapid impact as well as how to implement a way of monitoring the work of the artificial intelligence. Use cases of generative AI are quite vast, ranging from marketing and sales all the way to the IT department. (Chui, et al. 2022)

As an example of a company implementing AI solutions into their operations, an interview with the CEO and the COO of Valossa was conducted. In this interview, the CEO, Mika Rautiainen commented "It is still early in the development of generative AI models, so we don't have implicit applications for them so far in our daily business operations, but we have been successfully experimenting with generative AI in the form of generating product descriptions and value propositions for our products, as well as looking into using autonomous AI agents. Without going into too much detail we have found that these AI models can be useful in many cases from marketing to analysing business operations and strategies. To conclude generative AI is a potent tool already."

The COO, Luca Zurlo had this to say about AI integration strategy for companies in general in the interview. "Testing (generative AI models) is very important. Companies should allocate focus, attention and budget into testing and take it seriously. When testing new applications for business operations, companies should ensure adequate monitoring, and acquire feedback on the model's implementation into operations. Quality control is also very important. To summarize, a big recommendation for the market is to focus your task with a proper budget and spend time to really work out the possibilities of the technology for your specific field." Rautiainen also commented on AI integration in the interview by saying "It is currently the early adoption stage, but it is still wise to

explore the possibilities, because otherwise companies risk rapidly falling into a laggard status, whereas other companies ahead will rapidly jump to the opportunities."

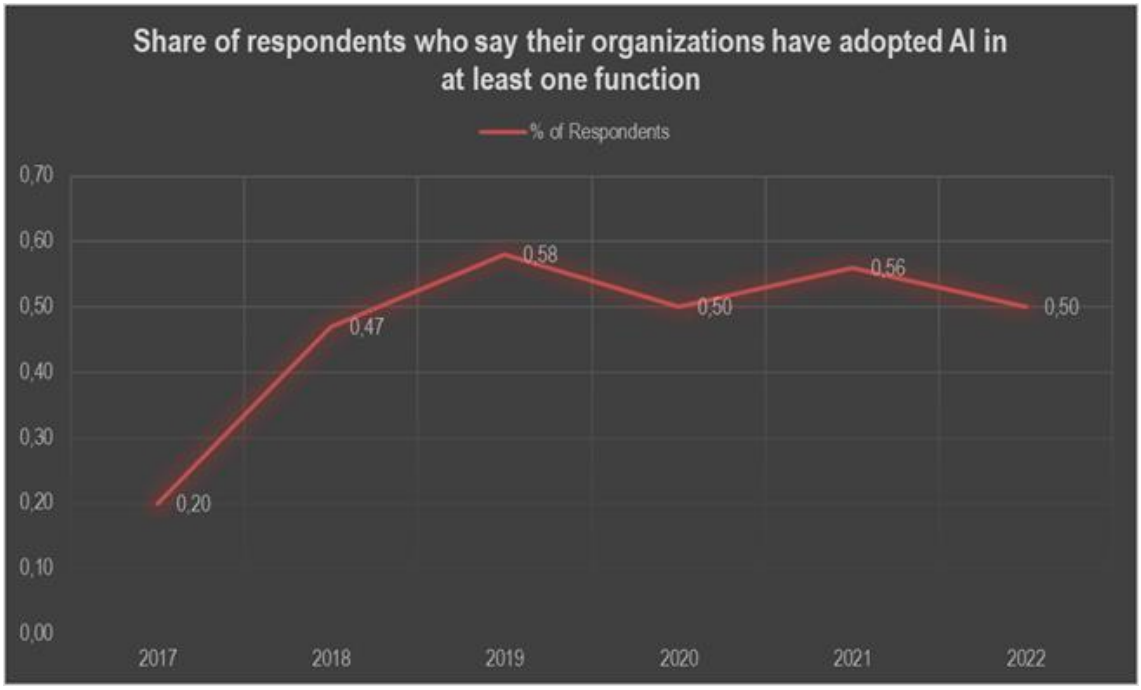

Figure 4: Share of respondents who say their organizations have adopted AI in at least one function (McKinsey 2022)

In the interview with Rautiainen and Zurlo, the ethical considerations of generative AI, and risks of AI in general were discussed. Some ethical considerations that rose were centred around exploitation, and the need for government regulations for AI. Both were heavily in favour of active regulations that ensures the fairness for all parties involved and preventing people to gain benefit in unfair ways by using AI. In addition to regulations, the biggest risks around AI revolved around the database and training data, especially making sure the data used does not lead to biased outcomes from the AI. To combat these biases, Rautiainen said that Valossa alongside every AI company is looking to mitigate implicit biases. They constantly investigate training data used to mitigate all possible biases. He continued, that often in data there are emerging properties that arise from the structure of the data, so they are applying a multitude of techniques to evaluate outcomes and reveal internal biases. In addition to administration of the database, they are monitoring why the AI and its algorithms are capturing biases, and applying techniques that mitigate that iteratively to ensure high quality outcomes.

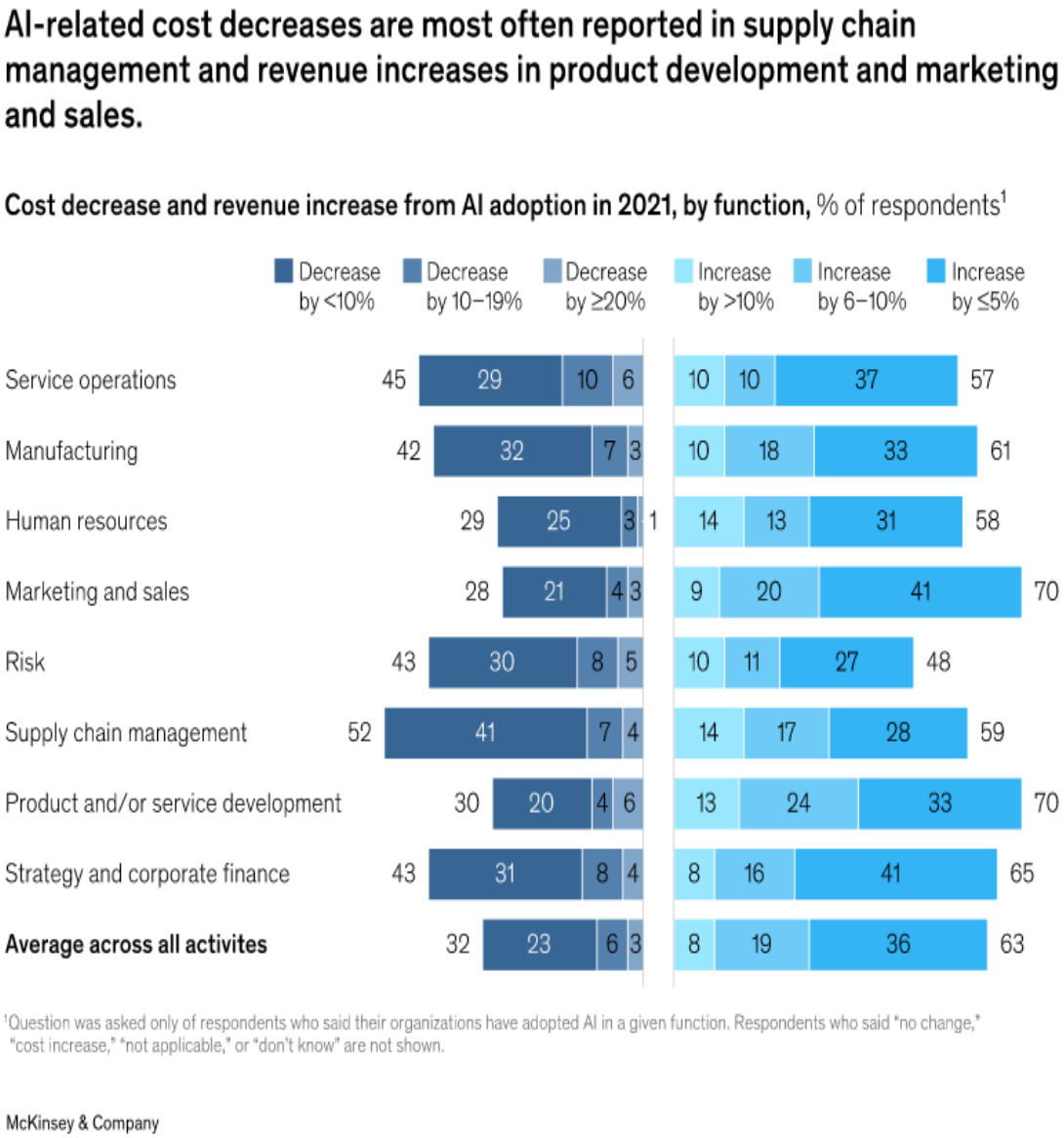

Figure 5, AI-related cost decreases (McKinsey 2022)

This figure portrays the many different business operations that AI can help automate or improve. The largest cost reductions were seen in supply chain management and manufacturing, and the largest revenue increases were seen in product and service development. These numbers are from 2021, and as AI has improved within the last few years, the numbers may be a bit skewed, but should still give an idea on how AI can generate value for businesses in the forms of cut expenses and increased revenue.

4 INTRODUCING VALOSSA AI

Valossa AI cannot generate a new video from an input. Its nature could be described as more creative and transformative, rather than generative. It can analyse the input video and output results specified by the user. The solutions that Valossa offer are Autopreview for Video Promotions, which can create preview videos from the desired content, Video Moderation Metadata for identifying inappropriate or harmful content, Contextual Video Metadata for searching, profiling, keywording, and subtitling, Face Analysis with Emotions and Real-time Face Analysis Toolkit for emotion analysis for saved video content, or real-time applications.

4.1 Example of current use case of Valossa AI

As an example of current applications of the Valossa AI, a Finnish commercial television broadcasting and video content company MTV implemented Valossa's Autopreview Valossa Contextual Video Metadata and Valossa Video Indexing for their on-demand video streaming service C-More. MTV's aim was to improve content discoverability, enhance viewer engagement and retention and ease the management of their content and media libraries.

According to Merja Multas, MTV's Product Lead, "With the help of advanced AI technology, users get the right feeling about our content at the first sight. They become more engaged with our services, and content discovery is made easier. This ground-breaking technology allows us to focus on our key areas in design, development, and analytics to create solutions that we find are most important." (NVIDIA 2022)

The biggest improvements for the company after the implementation of Valossa AI were seen in the user experience, as the service providers are now able to better predict what audiences want to see, and therefore the users can find new recommendations and interesting content more easily.

4.2 Valossa's value proposition

During the interview with Valossa's CEO Rautiainen and COO Zurlo, the unique aspects of Valossa and their differentiating factors from other AI developers on the market was discussed. To paraphrase the main points, Valossa's main value proposition involves their deep specialization within their field. As companies are currently experimenting with AI are applying generic features into their existing services, Valossa has pioneered a service that was categorized for the first time as a concept, and that service is a visual contextual AI as an asset. Valossa aims to automate the actual process of human understanding and contextualization of video and surpass the limitations of humans in their use case. The limitations of using human labour to complete the tasks they are aiming to automate come from the requirement of special training required for humans to efficiently perform these tasks, as well as the general benefits of AI automation. These benefits include the fact that AI never gets tired, doesn't need breaks, and can work continuously.

The main differentiating factors for Valossa that sets them apart from the other players in the field is their unique positioning between AI function providers and AI developers, so they get to enjoy the compounding benefits of a broad range of artificial intelligence technology, and they can employ their technology to multiple solutions. Their clients enjoy a vast array of tools at their disposal from a centralized provider. (Valossa 2023)

5 INVESTIGATING NEW APPLICATIONS FOR VALOSSA AI

5.1 Research methodology

To answer the research questions, the research involved a theoretical and an applied side. The theoretical sources were largely directly from the developers of such technologies. Especially OpenAI had extensive blogposts and articles on their site on the development of their products, which gave important information on the inner workings of the field of artificial intelligence they work in. When explaining central concepts around artificial intelligence, the aim was to keep the explanations as simple as possible, to ensure that anyone could read the chapters and gain a practical insight into how they work, which would serve as an insight into their possible applications and use cases.

Qualitative research was conducted in the form of finding existing interviews with people that leverage artificial intelligence in their daily working lives, as well as interviewing senior developers working at the commissioner of this thesis, Valossa. As Valossa is one of the most prestigious computer vision and video AI developers in the world, having a source of information with a combined research and development experience of over 70 years in the field was essential for the qualitative research of this thesis, as they were able to provide interesting insights on the future possibilities and risks of artificial intelligence, as well as insight into implementing generative AI solutions to business operations through their experiences.

Latter of the use cases created for the commissioner of the thesis will be investigated through a method called scenario planning. According to Dean (2019) basic explorative scenario planning consists of six steps, scoping, information search, trend and uncertainty analysis, scenario building and strategy definition. The method was popularized by RAND and Shell Oil and is based on the identification of two main driving forces, which work as a basis for the overall logic of the scenario. For the purposes of exploring these use cases, these general rules will act as a guiding force, rather than a static and forcing guideline.

Regarding new use cases for the Valossa AI, two possible new applications have been identified. One is expanding their current use cases to new markets, and another is a possible future use case that may arise from the future regulations and limitations that may be imposed on AI generated content.

5.2 Use case 1 – Content Creators

The first use case will be applying the existing Valossa AI technology into a market largely unexplored by them. By expanding the market they operate in, there is no requirement to build a brand-new service for the use case, which translates to lower risks and higher reach. In addition, Valossa technology is currently being applied in video production, which means the existing value proposition can be used for this new market as well. For these reasons, expanding to the online content creation market should be a natural step.

The first theorized use case is expanding Valossa's current Autopreview and Contextual video metadata technologies to be applied to the online content creation market. This market consists of bloggers, podcasters, youtubers, influencers and streamers on platforms like YouTube, Twitch and Spotify. The worth of the content creation industry in 2020 was estimated at around 44 billion dollars and is expected to reach 51 billion by 2027 (Backspace Ltd. 2020). YouTube alone contributed 19.77 billion dollars in revenue from their content creators in 2020. Influencers with over 500,000 subscribers on YouTube earn on average $3857 per video, and influencers with a following ranging from 50,000 to 5 million averaged $2500, $1000, and $400 per content uploaded to YouTube, Instagram, and Twitter respectively (Backspace Ltd. 2020).

Currently, social media marketing is one of the best ways for companies to promote their products and services. This is no different for online content creation, as posting your content on multiple social media sites is a great way to gain traction and followers. This is where content creators stand to gain the most benefits from Valossa's technology. For example, someone creating gaming content on YouTube generally has at least one additional person helping him create content, a video editor. With the help of Valossa Autopreview, they could automate the process of looking through a many hour-long recording to find the most interesting parts to include in the final product, and

automate the simplest and the most repetitive editing tasks, such as adding captions. The captions could also easily be translated to multiple different languages, expanding their audiences and consumer segments. Valossa Autopreview could be trained to search for clips most suitable for other social media channels, like Instagram, TikTok, and YouTube shorts, where short bite sized clips are valued heavily. As portrayed in the market research, influencers and content creators can earn sizeable income from posting on multiple social media platforms, and streamlining and automating the actual process of creating content would directly lead to additional income. Other artificial intelligence-based analysis tools could be implemented to analyse which clips perform the best and use that to feed the Valossa AI with training data to suggest similar clips to be uploaded.

This application of Valossa AI would help content creators and their editors save time, which would lead to them being able to produce more content, as well as automatically create promotional content for their other media channels, leading to accelerated growth, and leaving them with more time to create the content itself, as well as reduce costs of human labour, as cloud based GPU computing used to run the Valossa API is rather cheap. Based on information from Valossa's CEO, running an hour of video through the Valossa AI takes around an hour, meaning the scale is set at 1:1.

Using Google's Cloud Video Intelligence API pricing as a point of reference in creating a price point for the new use case. Using the Google API for 1 hour and including label detection and speech transcription would cost $8.88, though the first 1000 minutes every month are free of charge. These features were chosen since in this use case, the Valossa AI is doing speech transcription to generate captions, and analysing the entire video for highlights, like the label detection is detecting entities within the video. Of course, these comparisons are not accurate, because of the sheer difference between these two APIs. A reasonable hourly rate for the use case, assuming the going rate for cloud GPU computing is around $0.74 per GPU hourly (Google 2023), and the median hourly salary of a video editor in media streaming distribution services or social networks, according to the U.S Bureau of Labor Statistics (2022) is $37.81, would be around $9.50 hourly.
This is since this applications' value offering is higher than the Google APIs, but much lower than that of a professional video editor. An hourly billing module is not the only option though, as licensing and monthly subscriptions exist, though the hourly billing module is the most sensible for this use case, as licensing has very high upfront costs for consumers, and the monthly subscriptions are ineffective since the usage will differ between timeframes and users.

The other approach would be to ignore selling the service directly to the content creators, and instead collaborating with an existing service provider in the streaming market, like Streamlabs. As they already have a service for formatting clips for TikTok and YouTube shorts, integrating the Valossa AI to automate operations would provide them with more value propositions for their users. Suggested action for Valossa is to research the market further, and explore ways their technology could be implemented, and look for possible co-operation with companies already operating in the field.

5.3 Use case 2 – Regulation of AI Created Content

For the following use case, the two main driving forces are the growing regulations concerning artificial intelligence, and the constantly growing amount of content generated by artificial intelligence. Experts from the Copenhagen Institute for Future Studies predict that in a scenario where large language models remain unregulated 99% of all content on the internet could be AI-generated by 2030 (Hvitved 2022). In a future possibility, where regulations on AI generated content are implemented, a method of identifying content generated by AI is required. Laws could dictate content to be verifiably created by humans and training the Valossa AI to recognize abnormalities in video or images to then act as a verifying element in ensuring the absence of AI generated content would provide a very large market for this use case.

The scope of this analysis will include the global content creation market, media, marketing, the news, and everything that can be AI generated. The scope will be limited to theoretical possibilities outside of the technological part. No regulation to this scale currently exists within Europe or the United States, but China has adopted regulations for AI-generated content in 2023. (Grimes 2022) The timeframe is also very difficult to predict but based on the amount of discussion on rights to AI generated content, some forms of regulation could be expected to arise in the west within the following five years.

Trend and uncertainty analysis will be conducted by dividing data into two main sets, key trends with low uncertainty and high impact, and critical uncertainties with high uncertainty and high impact. The key trends with low uncertainty include the arising regulations, and a need for technology to verify the presence of AI generated content. Trends with medium uncertainty include the applicability of the use case, as video generating AI models are still in very early stages of development

and may take very long to become relevant, and the Valossa AI specializes in analysing video data, rather than image data, and the transferability of its video processing capabilities into image processing are unknown. Another trend of medium uncertainty is the method of verifying the generation methods, and the severity of including AI generated content. Critical uncertainties include the development process of the use case, as the uncertainty surrounding a need for this application is very high as of right now, and making pre-emptive preparations could be completely fruitless, thus wasting resources. Another critical uncertainty is the overall need for an AI of this type, since the regulations could just require companies to disclose the generation methods used and no further verification could not be needed.

Next, four scenarios will be built on highly negative, negative, positive, and highly positive outcomes of the critical uncertainties that were identified before. These scenarios will be named scenario A, B, C and D respectively.

Scenario A consists of a negative outcome for both the legal requirements of verification of content and the development of this possible future use case. In this scenario the verification is either not required at all or is generated by other methods than the use case planned. In addition, Valossa has already spent resources on the investigation and development of this use case, that has now been rendered moot.

Scenario B is built on the assumption that legislation governing AI passes, but Valossa has not prepared for the advent of this new use case, and are unable to produce a solution in time, and another AI development company with more preparation jumps to the possibility and gains a notable lead in the market for this new need. Competing in this market could prove unfruitful, and the risk of taking a completely new direction in development proves to be too high. Some features could be implemented for existing customers, but a widespread use case is not developed.

In scenario C, a regulation mandating the provability of only human created content is passed, and companies are given a grace period and time to prepare for the coming changes. In this scenario, the possibilities have been explored beforehand, but no development has been started yet, and video generating AI has become more prevalent, creating a small market for AI detection. This could lead to two possibilities. First, AI video generation becomes the norm, as it is now easy to differentiate between AI generated and human generated work, and the regulations work in a way

that they enable the usage of AI generated work, as long as it is verified, and a disclaimer is included. A more negative outcome would be that due to the new regulations, the value of AI generated content diminishes, and the amount of AI generated content in the commercial space plummets as a result.

Scenario D, where everything plays out as desired, consists of regulations being applied in a way that AI detection could be applied, video generating AI becomes the most effective way of generating video content, and Valossa has prepared accordingly to this future scenario. Here Valossa stands to gain a notable lead in the market, as they already have an applicable solution for the problem and could get backing from international committees and governments to apply the technology to enforce the regulation.
A sensible approach to this possible future use case is to monitor the legislation as it forms, making plans to quickly adapt to grasp possible opportunities. A large investment of resources is not advisable at this point, as everything regarding the regulations of AI are still in very early stages, and if the method that China is employing becomes the norm in western society, humans using AI as a tool would require verification from a government organ, and the work itself would be branded as AI generated in the creation process, eliminating any need for future verification.

6 CONCLUSIONS

This thesis aimed to identify the applications of generative AI in business and find the benefits and risks of using AI technology. Based on the research conducted, generative AI can be applied to a multitude of business operations including external communications, marketing, advertising, data analysis and customer service. The benefits include reducing the cost of labour, time spent on creating new content or analysing existing data and automating parts of business operations completely, like customer service. The identified risks include a requirement for active supervision of the AI, the copyrightability of AI generated content, and the possible future legislative regulation regarding AI generated content. The benefits identified could lead to more companies integrating AI solutions into their business operations, as well as new business opportunities for AI developers to grasp, such as providing customized generative AI solutions as readymade packages. Risks involved in generative AI include regulation of AI generated content, and applying this technology requires companies to do extensive testing in finding the best use case for them.

In addition to finding general applications of generative AI, a sizable chunk of the thesis was committed to the commissioner of the thesis, Valossa. They wanted the thesis to explore possible new use cases for their product, which was done by conducting research on markets currently unexplored by them, identifying the key players in the market, and benefits that this new market could bring them. After identifying a new market that could benefit from their product, an intuitive scenario plan was conducted regarding the subject matter, laying out the possible actions they could take to develop a use case for this specific market, which was the online content creation market. Another use case was explored through a more structured scenario planning, which included identifying the driving key trends and critical uncertainties. This use case revolved around the possible future trend of regulation of AI generated content, and a need for a system that can effectively detect AI generated content and provide content creators with a means of easily verifying the lack of AI interaction within their work. Four different scenarios were presented ranging from very negative to very positive. To finish the scenario plan, some suggestions on preparing for the possible future use case were laid out, giving some strategic plans for Valossa. The research shows that there are still unexplored areas that their product could be applied in, and there are future possibilities that could arise. It is important for them to keep an open mind, and consider all future outcomes, not just the one explored in the thesis. Possible future research for Valossa is advised, as this thesis' scope

and time limitations did not allow a very thorough examination of the new use cases. As a suggestion on the course of action for the future, Valossa should at the very least investigate partnering with existing service providers in the field, to see if their AI could be implemented into their existing products creating new value for the users.

After finishing the thesis, I noticed that the scope of the thesis was too broad, which convoluted answering the research questions simply and effectively. A better alternative for the thesis could have been to co-operate with a commissioner interested in trying AI applications in their business operations, and monitoring and reporting findings from doing so. This would have been a more effective way of finding the benefits and risks involved when incorporating artificial intelligence to business operations. As for the current form of the thesis improvements could have been made by better planning and time management. Granted, the schedule was rather tight to begin with, but by planning out every chapter beforehand the overall outcome would most likely have been more polished. Especially the applicative side of the thesis felt lacking and should have received an emphasis from the start, or the entire thesis could have been structured around exploring the new use cases, instead of using the entire industry as a scope for applications of generative AI.

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APPENDICES

APPENDIX 1 VALOSSA INTERVIEW

How do you see the future of generative AI specifically?

Mika: As I see it, there are three categories of AI development. Agent AI that executes operations by applying intelligence, the second is the analytical AI that increases our understanding of the existing phenomenon. Lastly there is the generative AI that creates new information or new experiences and even creative works. The agent or executive AI is something that can start replacing some of the jobs that we want to get rid of, such as repetitive processes, The second is a kind of advisory data science AI that helps us to make sense of the data and amplify our understanding of reality. The third one is about generating voluminous content. All these types will evolve and spread out into different sections of life, and with the current digitalized processes and workflows there is an ever-growing possibility that AI can replace human workers in the repetitive work processes. The fourth category would be real-life applications of AI such as robotics. There will be leaps in the development of autonomy in real world environments such as self-driving cars.

Luca: The magic word is automatization. Everything repetitive will be automated. I will avoid talking about the future, especially as long as five years, as it is in my opinion impossible to accurately predict where artificial intelligence is going in the future.

How has Valossa leveraged generative AI within their business model?

Mika: It is still early for the development of these generative models, so we don't have any implicit applications for them so far, but we have been experimenting with the appliances of generative AI, and the early experimentation has been very promising. We have been trying to apply generative AI in the form of generating product descriptions, creating value descriptions for our clients about our products. We have been experimenting with many types of generative AI, and without going into too much detail we have found that these AI models can be useful in many fields ranging from marketing to business strategies as well as finding new opportunities and analyzing business operations. To conclude it is a powerful tool.

What steps should corporations take to prepare for the future of AI, so they will be well positioned to take advantage of the new opportunities that may arise.

Mika: Companies should experiment with the current technology, getting accustomed to the new technology is wise, and failure to do so may lead into placing themselves into an underdog position, because other companies are actively trying out new things and are actively applying AI into their daily operations. It is currently the early adoption time, but it is still wise to do so, because otherwise they are risking quickly falling into a laggard status and other companies ahead will rapidly jump to the opportunities.

Luca: Testing is very important, you should allocate focus, attention, and budget into testing, and take it seriously. When testing new applications for your business operations, companies have to make sure they have adequate monitoring of the tool to acquire feedback on the operations, and thorough quality control to ensure that the quality of the operations is good. For example, with ChatGPT, you can never ensure the quality of the sources, which could lead to an outcome that on the surface looks fine, but is actually not factually correct. A big recommendation for the market is to focus your task with a proper budget and control and spend time to really work out the possibilities of the technology for your specific field.

How does Valossa differentiate itself from the other AI developers on the market? What unique aspects does Valossa bring compared to other AI companies?

Luca: We are providing technology capable of contextualizing visual assets. Our main market is media entertainment production. Companies experimenting with AI right now are applying very generic features, but what we do is we have pioneered a service that we categorized for the first time as a concept, a visual contextual AI as an asset. In a nutshell, we are trying to apply the benefits of our technology to automatize the actual process of humans seeing and understanding video. Commercially, we think our use cases will be beneficial to producers, broadcasters, and distributors of video content. This is because they can accelerate the cognitive process that humans are currently doing, and is currently very costly as humans require specialized training to efficiently do. The benefits of Valossa is that it is capable of comprehending the content and is able to use parts of the content that are applicable for advertising or marketing very easily and without the need for lengthy human analysis.

Mika: Basically, there are foundational technology providers, such as Amazon, Google and Microsoft. They provide tools and plumbing systems for a kitchen sink, but the application builders build the kitchen sink itself. On the other side, are the application providers that include AI functions within the application. Valossa is in the between in the sense, that we have the compounding benefits of a broad range of artificial intelligence, and we can apply it to multiple solutions, like analytics, metadata extraction and automated promotional clips. We are positioning ourselves in a place where we have the best of both worlds. We have integrated solutions that provide multiple benefits for cognitive video automation problems, thus generating value in the form of cost benefits, as well as the convenience of having a centralized tool, instead of multiple tools from different providers. Our key value proposition for the client is that we provide a wide array of benefits for people dealing with video for business processes. This differentiates us from the other players in the field.

What are some ethical considerations that will need to be considered as generative video AI becomes more advanced and widely used? Are there any guidelines or frameworks that you think should be put in place to ensure responsible use?

Mika: It is already being discussed at least in the European Union. The biggest questions are exploitation of other people using AI, such as using AI to gain benefit in unfair ways in the market need to be regulated. The exploitative aspect is a big question that needs to be handled, and people must be aware when they are interacting with an AI or a bot, or a human being.

Luca: Atleast in Spain, it is required by law to disclose whether someone is interacting with a human or an AI. For example, in the industrial revolution machinery replaced repetitive human work, but people were still needed in factories to monitor and supervise the machinery. The same thing will happen with AI, where using AI to automate monotonous tasks will serve humans by generating new jobs where humans leverage and control the AI. This point fortifies the need for active regulation from governments to ensure that the use of AI is fair for everyone.

Possible future risks in the field of AI, such as other limiting factors that aren't directly related to the development of AI.

Luca: How AI works is like blockchains, where large amounts of processing power is required. The value generated has to be greater than the energy required to generate that value. We must be mindful of where the energy required to power AI comes from. Also, data used by the AI has to be

regulated, because if in the future AI is writing news, the data to which the AI refers to must be trustworthy and transparent. We must know where the data is from, who it is administered by and how it was transformed, and ensure the data is not biased.

Mika: Going forwards from what Luca said, there are implicit and explicit biases, implicit biases are something that every AI company are looking to mitigate. We are constantly looking at our training data to mitigate all possible biases. Often in data there are emerging properties that arise from the structure of the data, so we are applying many techniques to evaluate the outcomes in order to reveal internal biases, and techniques that reveal why and how AI and algorithms would be capturing biases, and finally techniques that mitigate that iteratively to ensure high quality outcomes. Supervision of outcomes is always important regardless of the training methods used.