

Fields of Application of Artificial Intelligence—Financial Services and Creative Sector

Abstract

In this chapter you will see that the financial services market is a particularly exciting field for AI. Artificial Intelligence can support workflow automation in the near future (robotic process automation). Additional important fields of application are credit scoring as well as fake and fraud detection. Robo consultants and robo advisors are increasingly used in asset management. Another interesting field of application is high-frequency trading. AI systems are used in the creative sector, too. AI-supported “new creations” are still based on recognized patterns in already existing pieces of art. Nevertheless, many creative processes can be supported by Artificial Intelligence. This kind of “new creations” of voices, photos and videos are particularly critical. The reason is that in future it will be more and more difficult to distinguish between fiction and truth due to emerging deep fakes.

8.1 Financial Services

More and more financial institutions are already using Artificial Intelligence systems. The opportunities in these industries look very promising. The **Artificial Intelligence market for financial services** is expected to grow from US-\$1.3 billion in 2017 to US-\$7.4 billion in 2022. This corresponds to an average annual growth rate of 40.4% (cf. Fraser, 2017). This development is fueled by a multitude of innovations and challenges in this industry. These include the further expansion of mobile banking, cyber security as well as areas of application for blockchain technology.

The international *Digital IQ Survey 2017* (cf. PWC, 2017) delivers interesting results:

- 52% of financial services companies surveyed stated that they were **currently making substantial investments in Artificial Intelligence**.
- 66% indicated that they **would make significant investments** in three years.
- 72% of decision-makers believe that **Artificial Intelligence will lead to significant business benefits** in the future.

Workflow automation is a first important AI field of application, also for financial service providers. Many financial institutions already use natural language processing to automate business processes. Ideally, this should not only reduce costs, but also increase customer satisfaction. As already discussed, the interests of companies and customers often diverge here.

An example of a successful implementation is provided by *Bank of America* with the virtual assistant *Erica*. This assistant is available as an app to the bank's 25 million customers. Customers can speak directly to *Erica* or exchange text messages with her. In addition to the transfer of funds, *Erica* will also send out notifications in future as to when which payments are due. It should also motivate customers to save money or identify unusual account movements. The services are to be increasingly individualized step by step (cf. Bessant, 2018, p. 26).

JPMorgan Chase uses a **contract intelligence platform** with image recognition. This allows to check contracts and other documents in a matter of seconds. For a manual check of 12,000 credit agreements per year, 360,000 h would have to be invested. *Bank of New York Mellon* uses bots for **robotic process automation** (RPA) to increase operational efficiency. According to their own statements, this would achieve 100% **accuracy in the validation of account balancing** across five systems and an 88% **reduction in processing time** (cf. Singh, 2018).

In the **credit and insurance business**, AI systems are used to process applications faster, more accurately and more cost-effectively (cf. also Sect. 1.2). The complex standards of risk assessment must be fully taken into account. AI-supported processes can make an important contribution to ensuring accuracy and speed in billing processes. In the insurance industry, so-called **dark processing** already occurs very often. This refers to a process that is completely automated without human intervention. Since these processes take place "in the dark", the term dark processing has become established. Such systems have another major advantage: high scalability. After all, such systems can also be used to process large amounts of data quickly.

Since 2018, the *Deutsche Familienversicherung* (German family insurance) has already been offering advice and concluding contracts via *Alexa*. Initially, this offer only applies to foreign health insurance—but further products are to follow soon (cf. Klemm, 2018, p. 34). This already shows the importance to digital personal assistants in the future.

AI systems are also increasingly being used for **credit scoring** because a large number of profile and transaction data has to be evaluated in an integrated manner. After all, the traditional credit rating today is supplemented by a lot of other data, which can be obtained from social media channels or—in real-time—from online transactions.

The fintech startup company *GiniMachine* uses Artificial Intelligence in this way to reduce **default rates on consumer and corporate loans** through innovative scoring models. For this purpose, the *GiniMachine* **platform** enables a comprehensive creditworthiness check. The system automatically creates, validates and implements high-performance **risk models**. *GiniMachine* requires at least 1,000 data records with a status: good (paid back) or bad (overdue). No pre-analysis or data preparation is required for the model construction itself, not even for unstructured data. In addition, detailed validation reports are continuously provided to the user. In this way, the selectivity of the model can be continuously checked. Hundreds of hypotheses can be tested within minutes. *GiniMachine* monitors the performance of the models themselves and gives an impulse when new training is required (cf. GiniMachine, 2019).

Food for Thought

The time has already come when decisions about financial transactions are made less by people than by machine “minds”. We are thus becoming more and more dependent on the data (e.g. also in the social media) that we produce at the most diverse contact points in recent years. The resulting **digital shadow** can work for and against us—and in the future it will become increasingly difficult for us as customers to know which facts led to a decision.

Fake and fraud detection is an important field of Artificial Intelligence. Basically, this is about the detection and **prediction of fraudulent behavior**. The previous systems for the detection of financial fraud usually use a predefined checklist of risk factors, which are linked together in a complex set of rules. In contrast, AI systems can detect behavioral anomalies in advance and send alert messages to risk managers. By continuously feeding in information on whether the AI-based predictions were correct or incorrect, the forecast quality will continuously improve. This means that the proportion of false positives will also decrease in the long term. These are predicted risks that subsequently turned out to be wrong (cf. Singh, 2018).

The *BKA* (German Federal Criminal Police Office) is currently training AI systems so that they can extract information for criminal actions from large—and in some cases leaked—databases. The documents to be processed are so extensive that even hundreds of specialists would have to read their whole lives and still not be able to look at all the files. AI applications can perform time-consuming research tasks here (cf. Ulrich, 2018, p. 44).

In **asset management**, so-called **robo advisors** are used. This is an **algorithm-based, automated asset management system**. The management of the investment portfolio is individually tailored to each investor’s individual goals and risk appetite. *Deutsche Bank* offers such digital investment advice under the name **ROBIN** (cf. Robin, 2019). This term stands for Robo-Invest and combines AI technologies with the knowledge of experienced portfolio managers and advanced risk management. With *ROBIN*, the investor can invest in ETFs (Exchange-Traded Funds) today. It is a special form of the classic investment funds that are traded on

the stock exchange. *ROBIN* makes a professional asset management system available for other market participants, which was previously only available to wealthy investors. For this purpose, *ROBIN* takes over all necessary investment decisions and executes them automatically. A dashboard provides the user with the following overview:

- Value of risk
- Initial investment
- Optional monthly investment contributions
- Minimum investment horizons.

In addition, a diagram shows the possible portfolio composition at the current point in time. These include liquidity, government bonds, corporate bonds, equities from industrialized countries and equities from emerging markets (cf. Singh, 2018).

With *Wealthfront*, the client is offered a “financial co-pilot” as a **complete solution for the financial investment**. For this purpose, the offer relies on a passive investment. This means that interested investors will be offered a globally diversified portfolio of index funds. In order to maximize the return on investment, the aim is to minimize the fees incurred. On the other hand, an attempt is made to reduce the tax burden through a strategically oriented investment policy. At the same time, a portfolio is built up according to the individual risk preferences of the respective investor. If the risk profile of certain forms of investment changes on the market, this immediately leads to a shift in the portfolio (cf. Wealthfront, 2019).

The robo advisors claim to not only automatically and comfortably align the asset investment but also to orient them with the highest scientific and technological standards. *Stiftung Warentest (Finance Test*, a German consumer organization) and the comparison portal *Brokervergleich.de* tested the performance of various systems and came up with some sobering results (cf. Kremer, 2018, p. 31; Motte, 2018, p. 35). Only longer-term studies will show whether Artificial Intelligence can lead to sustainable performance in a dynamic market environment at relatively low costs.

Another interesting field of application for Artificial Intelligence is **high-frequency trading**, which is also referred to as automated or **algorithmic trading**. At its core is the algorithm-supported automated purchase and sale of securities. Complex AI systems allow a variety of market factors to be analysed in real-time to make investment decisions in milliseconds. Thus, global price and knowledge differences can be exploited to optimize investments. The AI-based systems make it possible to carry out hundreds of thousands or millions of transactions per day. By evaluating the results obtained, the algorithms can be continuously improved.

Here, as in all other fields of application of Artificial Intelligence, the quality of the decisions made depends on the quality and reliability of the available data. If incorrect or out-of-date data is used for investment decisions or for the credit rating, serious mistakes can result. In addition, due to the sensitivity of the processed data, data security itself must also be given the highest priority (cf. Singh, 2018).

8.2 Creative Sector

If the Creative sector is discussed separately at this point, this does not mean that no creative processes are necessary in the aforementioned areas. This section is primarily concerned with the artistic areas of our lives through which we differentiate and define ourselves as human beings.

Memory Box

As things stand today, an AI system is not actually capable of being “creative” in the human sense by creating something unprecedented. What can be achieved are **congenial re-creations** in the sense of **high-quality transmissions** (cf. Hofstadter, 2018, p. N4).

AI systems are already able to **simulate creativity** well today, so that we often can no longer perceive the difference between human creativity and AI creations. **AI-supported “new creations”** are based on a very specific procedure model. Again, AI algorithms attempt to recognize certain **patterns** through the evaluation of dozens, hundreds or thousands of musical compositions, images and/or texts. These patterns describe what is often referred to as the **“handwriting” of artists** as a specific approach to composing, painting or poetry. This “handwriting” can be recognized by algorithms and used to create “new” works based on it. The algorithms still have a link to the determined patterns.

Section 4.2.5 already described that AI systems can write texts independently. This is not about literary high achievements, but rather to provide information as quickly as possible. There are already various applications of an **AI-supported film production**. An AI application was specially developed to write a new script for a continuation of the popular sitcom *Friends* from the 90s. For this purpose, the system was fed with all old TV-series in order to recognize patterns and to link to existing strands of action (cf. The Daily Dot, 2016). A manuscript written by an AI algorithm named *Benjamin* provides an outlook on further developments. The seven-minute science fiction film *It’s No Game* with *David Hasselhoff* was created using an AI system. The system was provided with data from *Aaron Sorkin*, *Baywatch*, *Knight Rider* and *William Shakespeare*. The result was published in 2017 on the tech portal *Ars Technica*, where it can still be seen: <https://arstechnica.com/gaming/2017/04/an-ai-wrote-all-of-david-hasselhoffs-lines-in-this-demented-short-film/>.

In 2018, *Lexus* had a commercial developed, supported by Artificial Intelligence. The short **campaign film** *Driven by Intuition* tells the story of a *Lexus* developer who fine-tunes a car before it leaves the factory for a crash test. The script for this spot was developed entirely by Artificial Intelligence. The AI system was fed with campaigns from car and luxury brands over the past 15 years that were recognized by *Cannes Lions* for their creative performance. In this way, the algorithms learned which content was particularly well rated and how to integrate it into a spot. In addition, “emotional intelligence” data from the video service provider *Unruly* was used. Based on this data, the AI system learned how to combine objects and

locations to trigger certain emotions in viewers. To ensure that the AI-created spot corresponded to the corporate design of *Lexus*, the AI system was also taught the appropriate framework conditions. The evaluation of audio, text and visual data of the *Cannes* films was done by *IBM Watson*. Based on the insights gained, British director and Oscar winner *Kevin Macdonald* was hired to film the script. The result can be seen here: <https://www.youtube.com/watch?v=-iaBJ5rqOdg>.

To answer the question why the AI system chose this script (keyword Explainable Artificial Intelligence), *Lexus* shot a making-of video to show the “thought processes” of the AI application. The choice of a Japanese developer for the TV spot was intended to convey the origin of the *Lexus* brand. In addition, *IBM Watson* had recognized that the use of drones in auto spots is very popular, especially when the spots are hilly, and the sea is in sight at the same time. Here, the basic features of Artificial Intelligence are again perfectly visible: recognition of patterns that lead to success (here *Cannes* awards, cf. Rondinella, 2018). The making-of film can be found here: <https://www.youtube.com/watch?v=191ehyqFca8> (cf. McKinsey, 2017 for further information on this topic).

Computer games are another field of application for Artificial Intelligence. Game developers are increasingly relying on Artificial Intelligence to find the perfect opponent for the human player. Through this, overpowering opponents can grow up for the human being. This is the case in the puzzle game *Portal 2*; the dialogs here are spoken by *Glados*—an AI application. Such applications allow the games to adapt in their course to the respective human opponent: The AI-supported opponents recognize typical behavior patterns and can adjust their own actions accordingly. In this way, they become increasingly strong and flexible opponents, who at the same time are justified in the expectation of credible behavior on the part of the characters in the game world.

This shows the same development in the gaming environment that we have already seen with *Chess*, *Jeopardy* and *Go*. In 2017, a computer-controlled bot defeated a professional player in the online real-time strategy game *Dota 2*. This bot was developed by the organization *Open AI*, which is introduced in more detail in Sect. 11.1. The computer trained for two weeks by playing against itself again and again. The amount of data gained made it possible to win the game against a human opponent. The following further games use Artificial Intelligence systematically today (cf. Scheuch, 2018):

- ***Thief—The dark Project***

In this game the AI opponent reacts to noises caused by the opponent.

- ***Left for dead 2***

In this zombie game the AI opponents adapt themselves individually to the respective player and are also able to solve problems independently.

- ***Far Cry and GTA***

Artificial Intelligence has succeeded in creating an independent world to live in, in which people behave very realistically.

- **Fear**

In this first-person shooter game, the AI-supported opponents coordinate with each other so that their actions appear very authentic.

Memory Box

Such a development towards increasingly powerful AI-supported online opponents must also be restricted to—human—limits. If even the professional players can no longer win against AI-supported opponents, the fun of the game is lost.

In addition, the gaming industry makes valuable contributions to the **perfection of customer experience** in the AI world. It is particularly important that services can not only be displayed digitally, but also that an online interface is created that can be used intuitively by customers and leads to relevant service offerings. This is the only way to create acceptance in the long term! An example of this is the approach taken by the startup *Vitronity* from Stuttgart (cf. Vitronity, 2019). They support banks in setting up a VR-supported customer journey. The founding team benefits from their gaming background in order to develop new business models from existing applications. In addition, the important integration of further technologies (here virtual reality and augmented reality) with Artificial Intelligence becomes visible again at this point.

The US series *Westworld* offers spectators an impressive mental game. A **futuristic amusement park** for adults was created to use human-like robots (the so-called hosts) to transcend the limits of legality and to adventure hunt, murder and rape human-like robots at will. In addition, bank robberies and gold searches are on the schedule. The firearms used have been modified in such a way that the hosts can be seriously injured and even killed; guests do not suffer any serious injuries. The very fictional plot also provides interesting information on how the linguistic development of chatbot systems in humanoid robots could look like (cf. Borcholte, 2018).

AI-supported, literary classics can be adapted in such a way that every reader receives his or her favorite version—for example of *Gone with the Wind*. A **one-to-one creation of books** would be possible. For example, if a reader wishes that *Professor Dumbledore* does not die in the book *Harry Potter and the Half-Blood Prince*, an AI application could write such a version in the future. At the non-fiction level, guidebooks could be much more responsive than today to the individual life situation of a person. Instead of a “guidebook for love relations” there would be e.g. a “guidebook for a freshly divorced woman after 11 years marriage, 36 years old, a child at the age of seven years, with house credit over US-\$135.000 in New York, having a full-time job in a large bank”. For this it is necessary that the future reader—on a guidebook platform—makes the relevant data available. It would then be exciting for the learning process of the AI system to learn something about the implementation of the recommendations made and the positive and negative results triggered by them through quarterly surveys, in order to further improve its advice.

In China, a volume of poetry written by the *Microsoft* chatbot *XiaoIce* with the beautiful title “Sunlight without windows” was published in 2017. Before the chatbot itself became creative, it was fed with the works of 519 poets. The work made it to first place in the *Amazon* China ranking. The question of whether poems can be traced back to their AI origin is a hotly debated issue among Chinese writers. A corresponding online test addressed to the readers of *Beijing News* did not lead to a clear result (cf. Hauser, 2018, p. 16).

Memory Box

Artificial Intelligence does not yet master complex creative processes. Their “creations” are based on imitation and variations, whereby primarily semi-original results can be achieved.

In **music**, AI applications can already compose autonomously—e.g. based on the evaluation of **masterpieces** by *Bach*, *Beethoven* or *Chopin*. A so-called **style transfer** is used for this. This is the re-composition of music in the style of the previously analysed music. In the course of this style transfer, the algorithms are fed with the corresponding works of the artists in order to recognize their respective styles and to use it as a base for the composition of “new” pieces or entire “new” sympathies. Again, the “new” works represent nothing more than a new combination of the patterns already recognized from the existing works.

Exciting fields of application for an AI-generated music are less with the great masters than with the **creation of utility music**. In order to compose music for elevators, shopping centers, aircrafts, video games or simple TV series at low cost, appropriate systems can be used. Startups such as Amper Music (cf. 2019) and Jukedeck (cf. 2019) apply Artificial Intelligence to produce music for computer games, videos and advertising. With *Jukedeck* any layman can try his or her hand as a composer. All you have to do is enter the desired style (such as pop, rock or jazz). In addition, the desired length of the piece as well as a possible timing for highlights etc. must be specified. After a few seconds, the software makes the finished composition available for free download (cf. Jukedeck, 2019).

The music artist *Benoit Carré* alias *SKYGGE* already produced the pop album *Hello World* with the AI software *Flow Machines*—an EU research project. The artist was not interested in cheaply produced background music; rather, he wanted to test the possibilities of artistic expression through Artificial Intelligence. The basis for the “new creation” were old folk melodies and jazz recordings. The song *In the House of Poetry* was created on the basis of this basic material. The text was written and sung by *Kyrie Kristmanson* based on *Hans Christian Andersen*’s fairy tale *The Shadow*. In the second part of the song, the voice is generated by *Flow Machines*. According to *Carré*, the greatest challenge in the creative process lies in the structuring of the AI-created music components as well as in their sequences and transitions. Only elegant connections can turn a song into a successful song (cf. Heuberger, 2018).

When **creating voices**, there are still other fields of application to think about. The *VoCo* software program from *Adobe* is able to imitate a human voice almost perfectly using just a few sound examples. Perhaps soon, the familiar voice of *Siri* will no longer illuminate us with her tips, but instead the voice of our beloved (cf. Volland, 2018, p. 43).

In the **visual arts**, too, there are numerous experimental approaches to use Artificial Intelligence. As in music, a **style transfer** is also applied here. This is about the re-composition of images in the style of other images. For example, masterpieces by *Munch*, *Picasso*, *Rembrandt* or *Van Gogh* can be “fed” into the AI system. For example, a mountain landscape can be painted in the style of *Edvard Munch*, according to an AI system. Here it becomes very clear how patterns recognized by Artificial Intelligence (colors, lines) are used for the “new creation”.

An AI application called *The next Rembrandt* has evaluated 15 terabytes of information from the famous painter to learn his painting style. Among them were 346 original works, which were transferred to the system in high-resolution 3D scans. With this knowledge, the system managed to create a painting of a man with a hat and a white collar with the help of a 3D printer in 2016, which looks overwhelmingly real. Even the *Rembrandt* expert and art historian *Gary Schwartz* admitted that the developers had succeeded in identifying those qualities that would turn a *Rembrandt* into a *Rembrandt* (cf. Brown, 2016).

In 2018 a **painting of Artificial Intelligence** was auctioned for the first time. The *Edmond de Belamy* work was sold at the auction house *Christie’s* in New York for US-\$432,500. The image was developed on the basis of a data set of 15,000 real portraits. The signature of the work is exciting: $\min G \max D Ex + Ez (\log(1 - D(G(z))))$ —as an identifier for the AI algorithm used.

At the *Ars Electronica* 2017 the motto was “AI Artificial Intelligence—The Other I”. AI systems for the “art process” were presented there. In the installation *A3 K3* by *Dragan Ilić*, a *Kuka* robot drew a portrait with the help of spectators. The link between man and computer was a brain computer interface (BCI). A further installation entitled *Wind of Linz: Data Painting* follows a different AI approach for the visual arts. For this purpose, the invisible wind currents of the city Linz were recorded and processed into a data painting.

Food for Thought

Can the **creations of Artificial Intelligence be distinguished from human art**? A research team led by Prof. *Ahmed Elgammal* challenged the quality of AI-created artworks with a test. A jury consisting of people should evaluate works from different art movements under characteristics such as aesthetics and stylistic quality, without knowing the respective artist.

It turned out that the work of AI systems was often rated better than that of human-made systems. How was that possible? Behind this are two **logics of Artificial Intelligence**. On the one hand, it attempts in various works to take up the conspicuous—and thus the seemingly proven—in a new form. On the other hand, it tries to create art by combining already established patterns to create new patterns

(cf. Voon, 2017). It is almost inevitable that these will come closer to the “human ideals”.

In the *Prisma* app application, the digital style transfer, which was mentioned several times before, is very simple. You upload a photo as shown in Fig. 8.1. Then you choose one of many different styles (e.g. *Andy Warhol* or *Piet Mondrian*). Within a few seconds it will be transferred to the uploaded photo. Just think how much time a graphic designer would have to spend to deliver similar performance! Here, it should be pointed out that this app belongs to the Russian e-mail provider *Mail.ru* and that it comprehensively accesses user data (cf. Prophoto, 2019).

The creative processing of digital image material goes one step further. It reaches a new climax of the **photomontage**. Using the exact calculation of pixels, familiar faces can be inserted into all possible settings. In addition to the positive effects of new design options, this initiative also entails considerable risks. In the future, the content of any photo in social media may be questioned, as the alleged evidence photo of a crime may be a fake. These **creative counterfeits** pose new challenges not only to the judiciary, but also to enlightened humanity in terms of the credibility of pictorial material. These possibilities for counterfeiting can also be transferred to videos, as a video by *BBC News* impressively shows with a speech by *Barack Obama*: <https://www.youtube.com/watch?v=AmUC4m6w1wo> (cf. *BBC News*, 2017).

The AI system used to copy *Barack Obama* was fed with 13 h of video footage of the former US president. This allowed it to accurately capture the movement of its mouth and apply it to the input of a new speech. With such an application, any interested user can hear their own words from *Barack Obama*'s mouth. The



Fig. 8.1 Creation of own artworks by the app *Prisma* (Authors' own figure)

possibility of such counterfeits is possible for any person of whom there is enough digital image material available. The freely available software *FakeApp* makes it possible. What does the editorial staff of *Chip* magazine call it “beautiful”? “With the free program FakeApp you can create so-called deep fakes and exchange deceptively real faces in videos. ... In a film, for example, the face of the stuntman can be subsequently exchanged for the face of the actor. To try it out for yourself, you don’t have to go to Hollywood, you just have to install the free tool FakeApp” (Chip, 2018).

The AI system *TensorFlow* can also be used for digital face transfer. This was used by a programmer to incorporate the facial features of the actress *Gal Gadot* into a porn video. By the way, TensorFlow (2019) is an open source machine learning framework for everyone developed by *Google*.

Food for Thought

Fake news 2.0: The possibilities of falsifying photos and videos will make it harder and harder to track down “truths”. Since images leave a particularly lasting impression on viewers, the danger of a comprehensive manipulation of people and entire societies should not be underestimated.

The exciting question is therefore: What effects are to be expected if every event can be set visually in scene at any time—by whomever—regardless of whether it has ever taken place like this or not?

For these counterfeits the technical term **deep fakes** was coined.

The artist collective *YQP* with the Berlin painter *Roman Lipski* shows another example of the interaction between Artificial Intelligence and the creative. First, a software was programmed that serves *Lipski* as an **Artificial Intelligent muse**. This first analyses the painter’s pictures with regard to dimensions such as composition, colors, style, brightness, brushwork and other elements that we are not aware of. This is therefore also about pattern recognition!

Using the data generated in this way, the AI system then creates new images that *Lipski* uses as inspiration. When painting, the artist picks up various recognized elements and processes them in his works. The new images are fed back to the AIR (Artificial Intelligence novel). Again, in this application, it is not the AI system that creates something new, but only the cooperation between human and machine leads to a new result.

It becomes clear that a large number of artists deal constructively with the possibilities of Artificial Intelligence (cf. Volland, 2018, p. 64). Many see their use as enrichment and are open to new technologies in order to make new artistic approaches possible, as the camera once did.

Artificial Intelligence is not yet in a position to really act creatively on its own. Again and again, it is first about the recognition of existing patterns in order to develop “own creations” based on them. At the same time, Artificial Intelligence penetrates into areas that we humans regard as specific to our species—as that which distinguishes us from animals and machines. Nevertheless, many fears that AI systems will soon take over the creative part are unfounded, especially in the artistic field. Today, such systems can only support creative processes.

Food for Thought

We should ask ourselves whether Artificial Intelligence cannot or should not become a powerful partner of the creative industry. AI systems can recognize what kind of scenes people like most in movies, what kind of music is most appreciated, and what kind of images we like. The result—whether loved or despised—would be **art-on-demand**.

In the future we might only tell an AI system how many square meters and rooms our house has, how many people of which age and sex it should accommodate and what hobbies they have. In addition, we can still define what it may cost and a ready to implement and well-calculated creative planning for interior decoration is created, which is oriented to these inputs. The necessary artworks and utility furniture can—if you like it—be produced by different 3D printers. The result: individualization in perfection!

In addition to the creation of pictures and artworks, Artificial Intelligence can also be used to **reconstruct destroyed art treasures and cultural assets**. The *Fraunhofer Institute for Production Systems and Design Technology* in Berlin developed a software called *ePuzzler*. It has already made an important contribution to the production of readable files from approximately 600 million snippets of the Stasi (The Ministry for State Security) documents which were destroyed in the last days of GDR (German Democratic Republic) regime.

In a broader sense, the **translation programs** already mentioned in chapter 1 can also be assigned to the creative sector. After all, a good translator should not simply translate word for word, but take into account the aesthetics of the language, the melody of the language and, if necessary, the meaning of the second and third semantic level. While the *DeepL* translation program in particular already performs well (especially in German-English translations), other programs fail because of more complex languages. Fig 8.2 shows an example of this.

It is to be expected that AI-supported translations will become better and better in the future for both written and spoken language. This requires that a comprehensive background and context knowledge flows into the translation process if

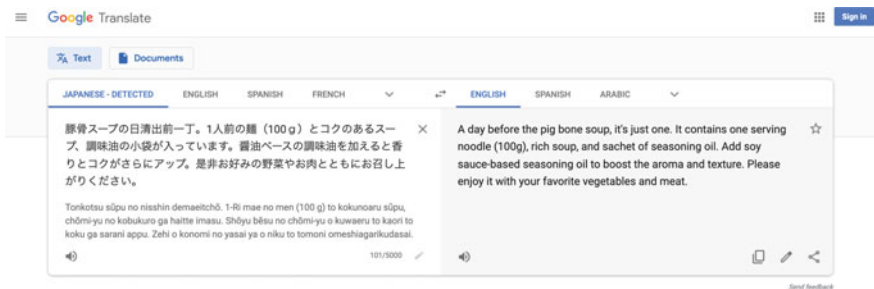


Fig. 8.2 Translation of a noodle product description on a Japanese packaging with the *Google* translator (Authors' own figure)

texts are to be translated not only “word for word”, but “true to content”. Very good translations incorporate many emotional decisions if the core content is to be fully translated into another language (cf. Hofstadter, 2018, p. N4).

Summary

- The **financial services market** is a **particularly exciting field for AI** because the consequences of right and wrong decisions can often be determined very quickly.
- As in many other industries, Artificial Intelligence can support **workflow automation** in the near future. This is referred to as **robotic process automation**.
- An important field of application is **credit scoring** in order to achieve more reliable results.
- In addition, AI systems can be used for **fake and fraud detection**.
- AI deployment is already well advanced in **asset management**. **Robo consultants** and **robo advisors** are increasingly being used here.
- Another interesting field of application is **high-frequency trading**.
- AI systems today are not yet able to be independently creative. With **AI-supported “new creations”**, the AI algorithms are still based on recognized patterns in order to recombine them afterwards.
- With this approach, many **creative processes can be supported by Artificial Intelligence**. This is the case with films, books, music and paintings.
- Particularly critical is the “new creation” of voices, photos and videos. In the future it will be more and more difficult to distinguish between fiction and truth due to emerging **deep fakes**, because **AI-based counterfeits** will hardly be recognizable. We believe that this poses a major threat to democracies.
- **AI-based translation systems** will soon take on many classic interpreting tasks —for texts and spoken language alike.

Bibliography

- Amper Music. (2019). *Amper music, AI music composer*. <https://www.ampermusic.com/>. Accessed April 27, 2019.
- BBC News. (2017). *Fake Obama created using AI video tool*. <https://www.youtube.com/watch?v=AmUC4m6w1wo>. Accessed April 27, 2019.
- Bessant, C. (2018). Künstliche Intelligenz ist nicht besser als die menschliche. In *Handelsblatt* (p. 26f). Accessed September 5, 2018.
- Borcholte, A. (2018). *Regeln für den Übermenschentpark*. <http://www.spiegel.de/kultur/tv/westworld-zweite-staffel-regeln-fuer-den-uebermenschentpark-a-1203614.html>. Accessed November 2, 2018.
- Brown, M. (2016). ‘*New Rembrandt*’ to be unveiled in Amsterdam. <https://www.theguardian.com/artanddesign/2016/apr/05/new-rembrandt-to-be-unveiled-in-amsterdam>. Accessed April 27, 2019.
- Chip. (2018). *Deepfakes FakeApp*. https://www.chip.de/downloads/Deepfakes-FakeApp_133452282.html. Accessed November 19, 2018.
- Fraser, J. (2017). *A primer on AI in financial services*. <https://medium.com/@jeffrey.fraser/primer-on-ai-in-financial-services-686640bd0a61>. Accessed April 27, 2019.
- GiniMachine. (2019). *Fighting bad loans with AI*. <https://ginimachine.com/>. Accessed April 10, 2019.

- Hauser, F. (2018). Ein bisschen kreativ? In *Das Magazin zum Innovationstag 2018* (p. 16f).
- Heuberger, S. (2018). *Das erste KI-Musikalbum, das überzeugt*. <https://www.wired.de/collection/life/das-erste-ki-musikalbum-das-ueberzeugt>. Accessed April 27, 2019.
- Hofstadter, D. R. (2018). Das letzte Refugium menschlicher Intelligenz. In *Frankfurter Allgemeine Zeitung* (p. N4). Accessed June 27, 2018.
- Jukedeck. (2019). *Fuelling creativity using musical AI*. <https://www.jukedeck.com/>. Accessed April 27, 2019.
- Klemm, T. (2018). Hoppla, hier kommt Knoll. In *Frankfurter Allgemeine Sonntagszeitung* (p. 34). Accessed December 2, 2018.
- Kremer, D. (2018). Soll man Robotern sein Geld anvertrauen. In *Frankfurter Allgemeine Sonntagszeitung* (p. 31). Accessed July 8, 2018.
- McKinsey. (2017). *AI in storytelling: Machines as cocreators*, Frankfurt.
- Motte, de la L. (2018). Mehr Kontrolle gefordert. In *Handelsblatt* (p. 35). Accessed July 18, 2018.
- Prophoto. (2019). *iPhone-App Prisma: Nett mit Nebenwirkungen*. <https://www.prophoto-online.de/foto-apps/prisma-10010255>. Accessed January 27, 2019.
- PWC. (2017). *Artificial intelligence and digital labor in financial services*. <https://www.pwc.com/us/en/industries/financial-services/research-institute/top-issues/artificial-intelligence.html>. Accessed April 27, 2019.
- Robin. (2019). ROBIN, damit jeder wie ein Profi investieren kann. <https://www.maxblue.de/robin/startseite.html>. Accessed April 27, 2019.
- Rondinella, G. (2018). *Das kommt dabei heraus, wenn eine KI einen Werbespot schreibt*. <https://www.horizont.net/tech/auftritte-des-tages/lexus-das-kommt-dabei-heraus-wenn-eine-ki-einen-werbespot-schreibt-171191>. Accessed April 27, 2019.
- Scheuch, L. (2018). Zocken auf schmalem Grat. In *Bonner Generalanzeiger* (p. 9). Accessed November 14, 2018.
- Singh, M. (2017). *Artistic style transfer with convolutional neural network*. <https://medium.com/data-science-group-iitr/artistic-style-transfer-with-convolutional-neural-network-7ce2476039fd>. Accessed April 27, 2019.
- Singh, R. (2018). *Wie KI und kognitive Systeme die Finanzbranche verändern – vom Asset Management bis zum Versicherer*. <https://www.it-finanzmagazin.de/ki-kognitive-technologien-finanzbranche-veraendern-70110/>. Accessed April 26, 2019.
- TensorFlow. (2019). *An open source machine learning framework for everyone*. <https://www.tensorflow.org/>. Accessed April 27, 2019.
- The Daily Dot. (2016). *Computer learns 'Friends' personalities, pens all-new sitcom scripts*. Accessed April 27, 2019.
- Ulrich, A. (2018). Jagd nach Schattengeld. In *Der Spiegel*, 23/2018 (p. 44f).
- Vitronity. (2019). *Vitronity*. <http://vitronity.com/>. Accessed April 27, 2019.
- Volland, H. (2018). *Die kreative Macht der Maschinen*, Weinheim.
- Voon, C. (2017). *Humans prefer computer-generated paintings to those at Art Basel*. <https://hyperallergic.com/391059/humans-prefer-computer-generated-paintings-to-those-at-art-basel>. Accessed April 27, 2019.
- Wealthfront. (2019). *Own your finances, not the other way around*. <https://www.wealthfront.com/>. Accessed April 27, 2019.