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**ARTIFICIAL INTELLIGENCE IN E-COMMERCE**

**Case Amazon**

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The aim of this thesis was to show what artificial intelligence is and how it works in modern life in general and especially in e-commerce. The theoretical framework of this thesis narrated how artificial intelligence started through its history. The two main classifications of artificial intelligence are technological and scientific, and they are described in the theoretical part of this thesis. Due to artificial intelligence working systems, there are significantly six applications that incorporated into the umbrella of the artificial intelligence fields. All six main artificial intelligence applications are defined in an understandable way with examples from many e-commerce companies. This study also showed the benefits and opportunities of using artificial intelligence techniques and the current situation of artificial intelligence in the world and Finland.

The applications of artificial intelligence in e-commerce showed more details with many practical examples from Amazon.com. The company is a powerful international e-retailer that is using artificial intelligence techniques for online shopping. In this part, it was shown how Amazon has used artificial intelligence in e-commerce; how Amazon's customers have achieved better experience and expectation when purchasing online through artificial intelligence in e-commerce techniques and the future of Amazon how to carry out online business successfully.

In conclusion, artificial intelligence obviously affects a lot in the world and human life. In this thesis, the way how artificial intelligence is changing business in e-commerce industry can be seen more deeply.

**Key words**

Amazon, artificial intelligence, business, e-commerce, machine learning.

**ABSTRACT**  
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## 1 INTRODUCTION

Artificial intelligence is not a strange term for everyone today. Artificial intelligence's practical applications appear everywhere in the house and outside: in the office, the bank, the hospital, the factory, the internet and even in outer space. As everyone can see automated robots, voice recognition, self-driving car, satellite navigation systems are all the phenomena based on artificial intelligence techniques. Artificial intelligence seems like a wide area but nowadays people focus on using its applications in narrow areas such as in healthcare, biology, information technology as well as in business.

Artificial intelligence helps to develop intelligence in software and machines and create some abilities for them to think and act like a human. The development of artificial intelligence is past creative ability with different diverse procedures and strategies to execute the equivalent. In business, its techniques bring many benefits for a company such as improving customers' decision-making, predicting the revenue correctly, reducing expenses as well as increasing customers' purchasing experience. Through this thesis, people can now understand what artificial intelligence is, its history and main styles of it as well as some outstanding practical applications in theoretical parts.

My study aims fundamentally at the issue of whether artificial intelligence applications have entered the business, especially in the e-commerce industry. The point of this thesis is to clarify if artificial intelligence has had an essential and gradual effect on e-retailers with an iconic e-retailer company, Amazon. This thesis also introduces which kind of artificial intelligence techniques are utilized today in e-commerce with highlight applications from Amazon. In addition, artificial intelligence not only has played an important role to enhance the customer service for the company in e-commerce but also helped improve their yearly profit by creating more effective online shopping strategy campaigns and achieve client goals by learning their needs and expectations. Besides, the thesis also focuses on how Finnish companies have responded to the ascent of artificial intelligence and what Finland will do for artificial intelligence in the future.

## 2 ARTIFICIAL INTELLIGENCE

This chapter focuses on the main concepts of this thesis. The meanings of terms, for example, “intelligence” and “artificial intelligence” are given, together with a connection between human and artificial intelligence.

### 2.1 History of artificial intelligence

The historical backdrop of artificial intelligence is very fascinating and begun around 100 years ago. The Czech writer Karel Čapek introduced a science fiction play that was called *Rossumovi Univerzální Roboti* (Rossum’s Universal Robots), known as R.U.R. in the year 1920. The robots in R.U.R. first worked for the people, however then there was robot disobedience which prompts the eradication of humankind. The play is very fascinating, in light of various reason. First, it is presenting the term robot, even though it does not actually speak the advanced thought of robots. Next, it is additionally recounting the account of the formation of robots, so some sort of computerized, which initially is by all accounts a constructive outcome to the people, however later on the will be the robot disobedience which danger the entire human race. (Schultebrucks 2017.)

Alan Turing, a noted British computer scientist worked to break the “Enigma” code which utilized German armies to send messages safely during World War II. Alan Turing and his group made the Bombe machine that was utilized to decode Enigma's messages. The Enigma and Bombe Machines established the frameworks for Machine Learning. As indicated by Turing, a machine that could chat with people without the people realizing that it is a machine would win the "imitation game" and could be said to be “intelligence”. (Ray 2018.)

In 1956, John MacCarthy, an American computer scientist invented the word “Artificial Intelligence” when he organized the Dartmouth Conference. Research focuses sprung up over the United States to investigate the capability of artificial intelligence. Analysts Allen Newell and Herbert Simon were instrumental in advancing artificial intelligence as a field of software engineering that could change the world. In the 1950s, a machine known as Ferranti Mark 1 effectively utilized a calculation to master checkers and also John McCarthy, regularly known as the father of artificial intelligence, built up the LISP programming dialect

which wound up critical in machine learning. In the late 1960s, PC researchers dealt with Machine Vision Learning and creating machine learning in robots. WABOT-1, the main 'insightful' humanoid robot, was worked in Japan in 1972. Between the 1970s and 1990s, computer scientists managed an intense deficiency of subsidizing for artificial intelligence inquire about. These years wound up known as the "Artificial intelligence Winters" known as "AI Winters". (Ray 2018.)

In the 1980s neural systems turned out to be generally utilized and "The Society of Mind" a hypothetical depiction of the aggregate personality, was distributed by Marvin Minsky. In the 1990s, artificial intelligence took noteworthy improvements in territories, for example, machine learning, computer-generated reality and in amusements. A chess program expands on artificial intelligence won the chess big showdown and the primary independent mechanical autonomy hardware framework "Sojourner" was conveyed on the surface of Mars by NASA. Intelligent robot pets turned out to be financially accessible, Stanford's self-ruling vehicle, Stanley, won DARPA Grand Challenge race and The Nomad robot investigated the remote districts of Antarctica searching for shooting star tests amid the early long periods of the 21<sup>st</sup>. (Tekoäly 2018.)

Some artificial intelligence financing evaporated when the dotcom bubble burst in the mid-2000s. However, machine learning proceeded with its walk, to a great extent because of upgrades in PC equipment. Enterprises and governments effectively utilized machine learning strategies in tight areas. Exponential gains in PC handling force and capacity enabled organizations to store immense, and crunch, tremendous amounts of information out of the blue. In the previous 15 years, Amazon, Google, Baidu, and others utilized machine figuring out how to their gigantic business advantage. Other than preparing client information to comprehend customer conduct, these organizations have kept on chipping away at PC vision, common dialect handling, and an entire host of other artificial intelligence applications. Machine learning is currently implanted in a considerable lot of the online administrations we utilize. (Ray 2018.)

## **2.2 What is artificial intelligence?**

Artificial intelligent (AI) is an area of computer science dedicated the creation by machine that related to work and respond like human intelligence. These processes include learning, planning, and problem-

solving. The major target of artificial intelligence is to make expert systems- the frameworks which show the conduct, learning, illustrate, clarify, and counsel its clients. The second goal is to implement human intelligence in machines that are making frameworks about comprehend, thinking, learning and respond like human's action. Nowadays, artificial intelligence has become a crucial part of the technology industry. (Aws Amazon 2018; Best Tech Guru 2016.)

### **2.2.1 Classifications of artificial intelligence**

According to Bonden A. Margaret (2016), artificial intelligence has two major targets: technological and scientific. In the first aim, artificial intelligence has used to get useful things done and the other one is that using artificial intelligence in both models and concepts to solve questions about humans and other living things. (Bonden 2016.)

Technological artificial intelligence includes Narrow artificial intelligence and General artificial intelligence. Narrow artificial intelligence is intelligent systems what people can see around in computers. It focuses on solving one problem that has been learned and taught to handle some specific tasks without being programmed obviously how to do. This kind of machine insight is clear in the vision-acknowledgment frameworks on self-driving vehicles, in the voice recognition of Siri virtual function on the iPhone Apple, and in the suggestion motors, the recommend items customers may depend on what they purchased previously. There are countless applications for narrow artificial intelligence such as reacting to basic client benefit inquiries, coordinating with other clever frameworks to do undertakings like booking a lodging at an appropriate time and area, helping radiologists to spot potential tumors in X-rays, hailing unseemly substance web-based, identifying mileage in lifts from information accumulated by Internet of Things, the run-down continues endlessly. (Heath 2018.)

General artificial intelligence is a different system that focuses on solving a wide range of problems. This system is the kind of adaptable intellect found in people and adjusting quickly of insight fit for figuring out how to complete incomprehensibly extraordinary undertakings, anything from haircutting to building spreadsheets, or to reason about a wide assortment of themes dependent on its gathered understanding. (Heath 2018.)



Between the year 2012 and 2013, a gathering of artificial intelligence specialists and analysts directed a review and detailed that Artificial General Intelligence (AGI) would be increased from 2040 until 2050 about 50 percent in this period. Creating AGI by 2075 was evaluated to have a 90 percent probability. A few specialists trust that those projections are savagely idealistic and trust that AGI is hundreds of years away, due to our restricted comprehension of the human mind. (Heath 2018.)

Scientific artificial intelligence is based on its functionality and known as relative machines, limited memory, theory of mind and self-awareness. Relative machines are one of the essential types of machine learning. It is known as Deep Blue, the IBM chess program that beat Garry Kasparov during the 1990s. (Kumar 2018.)

Limited memory is the systems that can use past encounters to educate future choices. A portion of the basic leadership works in self-driving vehicles are structured along these lines. Perceptions advise activities occurring not long from now, for example, a vehicle moving to another lane. These perceptions are not stored for all time. (TechTarget 2018a.)

Theory of mind is the phenomenon to be able to understand that others have their very own convictions, wants, and expectations that affect the choices they make. Although there is a lot of improvement in this area, this sort of AI does not yet exist. (Kumar 2018.)

Self-awareness is artificial frameworks have a feeling of self, have cognizance. Machines with mindfulness comprehend their present state and can utilize the data to derive what others are feeling. Like the theory of mind, this kind of AI does not yet exist. (TechTarget 2018a.)

### **2.2.2 Application fields of artificial intelligence technology**

Computerized reasoning performs undertakings in a smart way (assignments are executed as we people do) and along these lines, it creates higher exactness, effectiveness, and efficiency for the general framework. Machines do not become weary of working and as they do not have feelings. In addition, the machines are

not influenced by any such sentiments or feelings by which people are influenced and, in this manner, the throughput of machines having knowledge is a lot higher. Knowledge in such machines is known for the capacity to apply rationale and produce a productive and precise yield for the final client. This insight into the artificial intelligence framework is dictated by the learning present in the model (artificial intelligence consciousness framework is manufactured utilizing a numerical model) at first as preparation information. Further, this information is then used to perform different errands which enable the client to show signs of improvement results. (Duniya 2019.)

Due to artificial intelligence working systems, there are significantly six application that incorporated into the umbrella of the artificial intelligence fields in figure 1 below. The six fields are the ones which are presently the trendy expression in the business and organizations and enormous enterprises are currently attempting to make utilization of it and server buyers in a vastly improved manner. The six fields are as per the following:

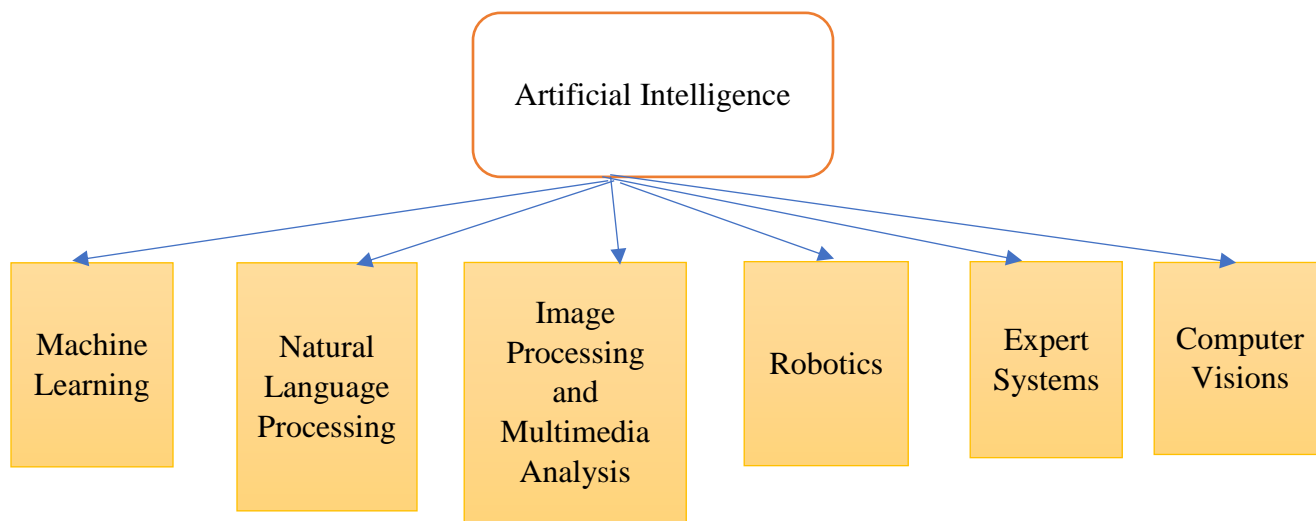
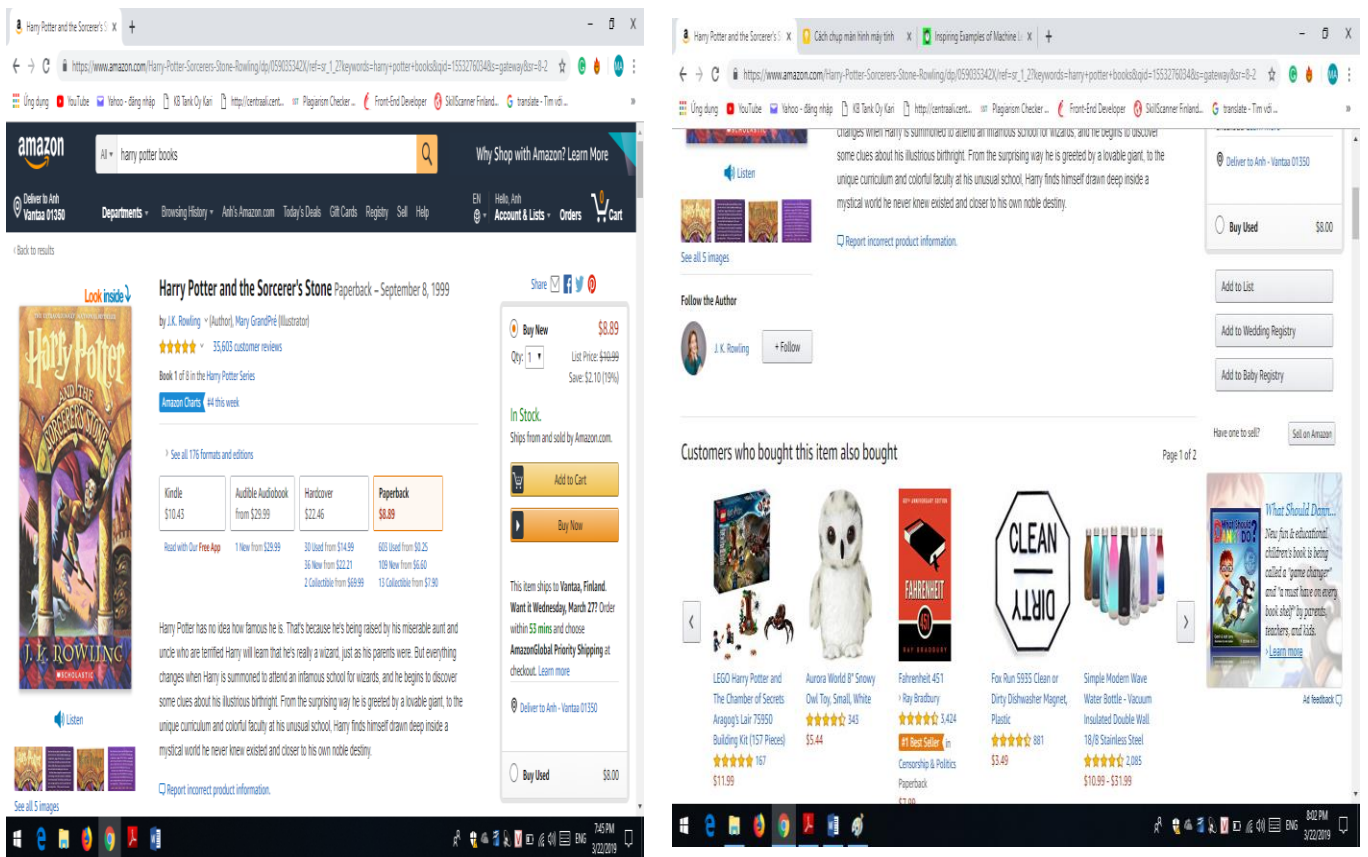


FIGURE 1. Main fields of artificial intelligence (Adapted from Karazeev 2018.)

Machine learning (ML) has used algorithm tools that enables software applications to more correctly in predicting results without being explicitly programmed. The purpose of machine learning is to create algorithms that can accept input data and use analysis systems to forecast output data. (TechTarget 2018a)

There are various ways that machine learning is influencing organizations in business. One of the practical applications of machine learning in business that will help increase the client experience at the same time helping reduce company expenses. In addition, it also helps the company predict customer purchasing behavior. The customer goes to the Amazon website (PICTURE 1) and searches for the fantasy novel book such as Harry Potter. Next, they can see the sentence “Customers who bought this item also bought”. Amazon.com uses machine learning systems to show and recommend other items from other customers who have the same interest in Harry Potter. (Ayehu 2018; PerceptionBox 2018.)



PICTURE 1. Amazon website (Taken by the author from Amazon website 2019.)

Natural language processing (NLP) is a part of artificial intelligence consciousness that enables the machine to understand, translated and control human interaction. NLP draws from numerous controls, including software engineering and computational phonetics, in its interest to fill the hole between human correspondence and machine understanding. (SAS 2019.)

In business, chatbots are one of the newest practical application of natural language processing. Chatbots streamline usefulness by coordinating in projects like Slack, Skype, and Microsoft Teams. When they initially went ahead of the scene, chatbots were shopper confronting. For instance, when people type the word "pizza" into Google search, a Pizza's bot (Domino or Pizza online) would ask to receive your request (Bell 2017.)

Robotics is the field that includes the utilization of equipment and programming segments where both equipment and programming participate together as well as gives a framework that enables the client to play out their tasks. Robots are utilized these days in assembling ventures where the work is performed quicker, much precisely and much productively. (Duniya 2019.)

Amazon is popular for utilizing robots around 30,000 of them - inside its dissemination focuses, having gained mechanical autonomy organization Kiva in 2012. When robots get less expensive and progressively skilled, we can hope to see developing numbers go with the same pattern. The major duties these kinds of robots have are choosing products on racks, transporting them around stockrooms (which can signify many, numerous miles voyaged every day), pressing them into boxes and stacking them onto vans. (Jee 2016.)

Expert systems are the program of a computer that utilizes artificial intelligence advances to mimic the judgment and conduct of a human or an association that has master learning and involvement in a specific field. Furthermore, these systems have assumed an extensive job in numerous ventures incorporating into monetary administrations, social insurance, client benefit, broadcast communications, transportation, computer games, assembling, flight, and composed correspondence. (TechTarget 2018b.)

American Express Company as known as Amex is a good example for using expert systems. The company utilizes a specialist framework to help its credit approval staff sort through information from upwards of 13 information bases. A credit card from American Express has no set spending limit. That point is crucial for competing with other bank and financial companies. However, deciding the credit level for every client represents a difficult business challenge. Every time when the client makes a large number of buying products, the dealer phones AMEX to empower the charge. The AMEX worker at that point needs to make a

careful decision. Approval demands outside the typical purchasing behavior require a look of the information bases for more data. The assistant of authorizer will look for and suggest to the individual who settles on the approval choice. The whole procedure takes just seconds. The trading is still on the phone. (Harvard Business Review 2018.)

Computer vision is an area of software engineering that takes a shot at empowering computers to see, distinguish and process pictures similarly that human vision does, and afterward give proper yield. It resembles bestowing human knowledge and impulses to a computer. However, it is a troublesome assignment to empower computers to perceive pictures of various items. It is also firmly connected with computerized reasoning, as the computer must translate what it sees, and after that perform proper investigation or act as needs are. (Technopedia 2019.)

Mashgin-a startup company is working as a self-checkout store without checkout stations or cashiers by using computer vision, deep learning and 3D remaking to figure out and examine many products simultaneously with no barcodes. The company states that by using computer vision systems, they can save the checkout time by up to ten times. Their major clients are cafeterias and eating halls managed by Compass Group. (InData Lads 2018.)

Image processing and multimedia analysis are the ascents in information, user experience with content data as well as with mixed media information too which is as pictures, sound, recordings and considerably more. To comprehend this mixed media information, people have to use pictures for preparing and interactive media examination. The handling calculations process the information inside and endeavor to understand what the information may contain and what data it will pass on. By utilizing this and understanding what the interactive media information needs to state, they can make it helpful for some crucial purposes where a picture is checked. (Duniya 2019.)

Pinterest-phone app which is a highlight example for using image processing and multimedia analysis. This app is working by image recognition to help customers can buy things what they see in real life. The customers just take a picture by a Pinterest app on their phone and the Pinterest will show the buyers the items from their searching. For example, if customer snaps the chair from their friend's house, Pinterest will show

you many purchasing websites that have similar and correct with the item buyers are looking for. (Sterne 2017.)

### **2.3 World leaders of artificial intelligence**

There is no doubt that artificial intelligence is increasing quicker than ever. From 2010, artificial intelligence has developed with the rate of practically 60 percent in annual development. Due to the number of research papers published annually, there are five leading countries in artificial intelligence technology innovation as can be seen in figure 3.

The top country in the list is China, which is known as a huge manufacturing country. As indicated by the Times Higher Education website, in the year period from 2011 to 2015, China distributed papers and materials on artificial intelligence, which nearly twice as much as the US, more than 41000 papers. The Chinese government stands emphatically behind artificial intelligence selection. A year ago, they declared their expectation to wind up "a vital world focus of artificial intelligence advancement" by 2030. At that point, there are organizations like Alibaba, Tencent, and Baidu. From web-based business to self-driving vehicles or web indexes, artificial intelligence will be a successful key in their achievement. Totally, they are worth approximately 1 trillion US dollar as can be seen in figure 2. (Jacobsen 2018.)

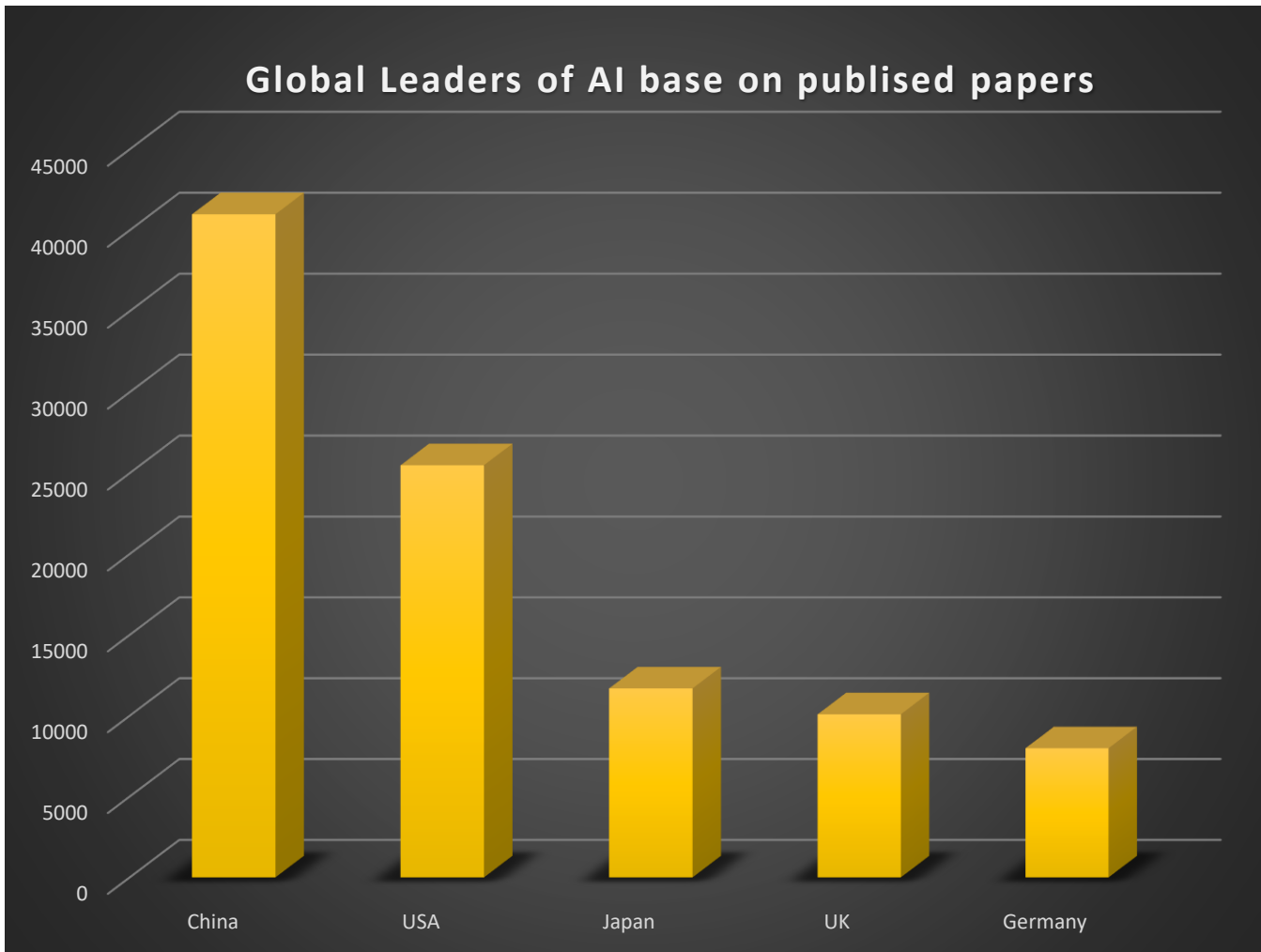


FIGURE 2. Global leaders of artificial intelligence based on published papers (Adapted from Jacobsen 2018.)

The second rank of artificial intelligence leading countries is the United States of America based on the aspect of papers distributed. In the period 2011 to 2015, according to The Times Higher Education, the US distributed right around 25,500 papers in artificial intelligence. In addition, the US positions as one of the best nations with the most artificial intelligence organizations, which more than 1000 organizations and US\$10 billion in investment, the US is probably going to end up an artificial intelligence superpower. They are also many popularity artificial intelligence companies like Amazon, Google, Facebook, Microsoft, and IBM. The US in the country that publish a large number of papers, materials as well as invest huge money in artificial intelligence. (Jacobsen 2018.)

Based on the Times Higher Education rankings, Japan is in the third position. There is no surprise that Japan published around 11700 papers and materials in artificial intelligence annually. Because of the going down of workers and facing with old population, therefore artificial intelligence is a crucial role in the Japanese economy. Indeed, more than 50 percent of work performances in Japan could be robotized and automated. (Jacobsen 2018.)

The United Kingdom and Germany are in the fourth and fifth position, with distributed research papers about 10100 and 8000 respectively. Like China, both countries the UK and Germany have plans for becoming a leading hub of artificial intelligence. Germany, similar to Japan, is additionally encountering a working populace decay. Also, it also has a high computerization potential, remaining at 47.9 percent. Its solid industry capacities joined with incredible organizations and great instruction make it a prolific ground for artificial intelligence. (Jacobsen 2018.)

#### **2.4 Artificial Intelligence in Finland**

The importance of artificial intelligence should not be underestimated because there is an increasing number of people are dealing with it. Therefore, Finland wants to become one of the leaders in artificial intelligence areas. Accordingly, an operational program is under the arrangement, with the point of transforming Finland into the main nation in the use of artificial intelligence.

In 2017, the Finnish government really took a solid, proactive job in sustaining artificial intelligence advancement in Finland. The government also has invested 160 million euro for artificial intelligence investment program in Finland. The Finnish Minister of Economic Affairs, Mika Lintilä, who selected a guiding gathering to set up a proposition for Finland's artificial intelligence program. The clergyman underlines that artificial intelligence consciousness has turned into a central component of digitalization, and Finland plans to be at the bleeding edge of this advancement in accordance with its Government Program. In October 2017, the Finnish Ministry of Financial Affairs and Employment distributed a manual on the best way to guarantee Finland turns into a remarkable rival in artificial intelligence usage, sketching out eight enter moves to make in making progress toward this yearning goal. (Microsoft and PwC 2018)



Furthermore, there are five duties that were indicated for the artificial intelligence program in Finland, commissioned by The Finnish Minister of Economic Affairs, Mika Lintilä. Firstly, creating a preview of the present status and prospects for artificial intelligence and apply autonomy around the globe and in Finland. Secondly, proposing an objective state, which Finland ought to endeavor to accomplish in the use of artificial intelligence as a team with organizations, investigate establishments, instructive foundations and open associations. Thirdly, entering a proposition on measures the usage of which is essential so as to accomplish the expressed targets. Extraordinary consideration must be given to the field's advancement exercises, readiness for changes to working life, expanding instruction and updating the capabilities of those in the work advertise. Next, draw up a model for the usage of the arrangement that will guarantee the proficient acknowledgment of the operational program. And finally, setting up a proposition for the extension of the working gathering's undertaking portrayal and piece, in order to enable it to build up the measures fundamental for the advancement of AI in the long haul and investigate the more expansive perused societal change identified with digitalization and give recommendations to answers for the Government. The Artificial Intelligence Program is foreseen to be finished in April 2019. (Tekoalyaika 2018.)

Besides, Finland has a plan for educating people about artificial intelligence program in the whole country with targeting 1 percent population around 54000 people from the age 20 to 75 years old to artificial intelligence knowledge. The University of Helsinki and Reaktor – a Technology Company have launched a free online course “Elements of AI”. This course for everybody keen on realizing what artificial intelligence is, what is conceivable (and unrealistic) with artificial intelligence, and how it influences our lives – with no convoluted math or programming required. Individuals in Finland can likewise gain 2 ECTS credits through the Open University. To build up this course is evaluated to cost around 200000 euros. (Elements of AI 2018.)

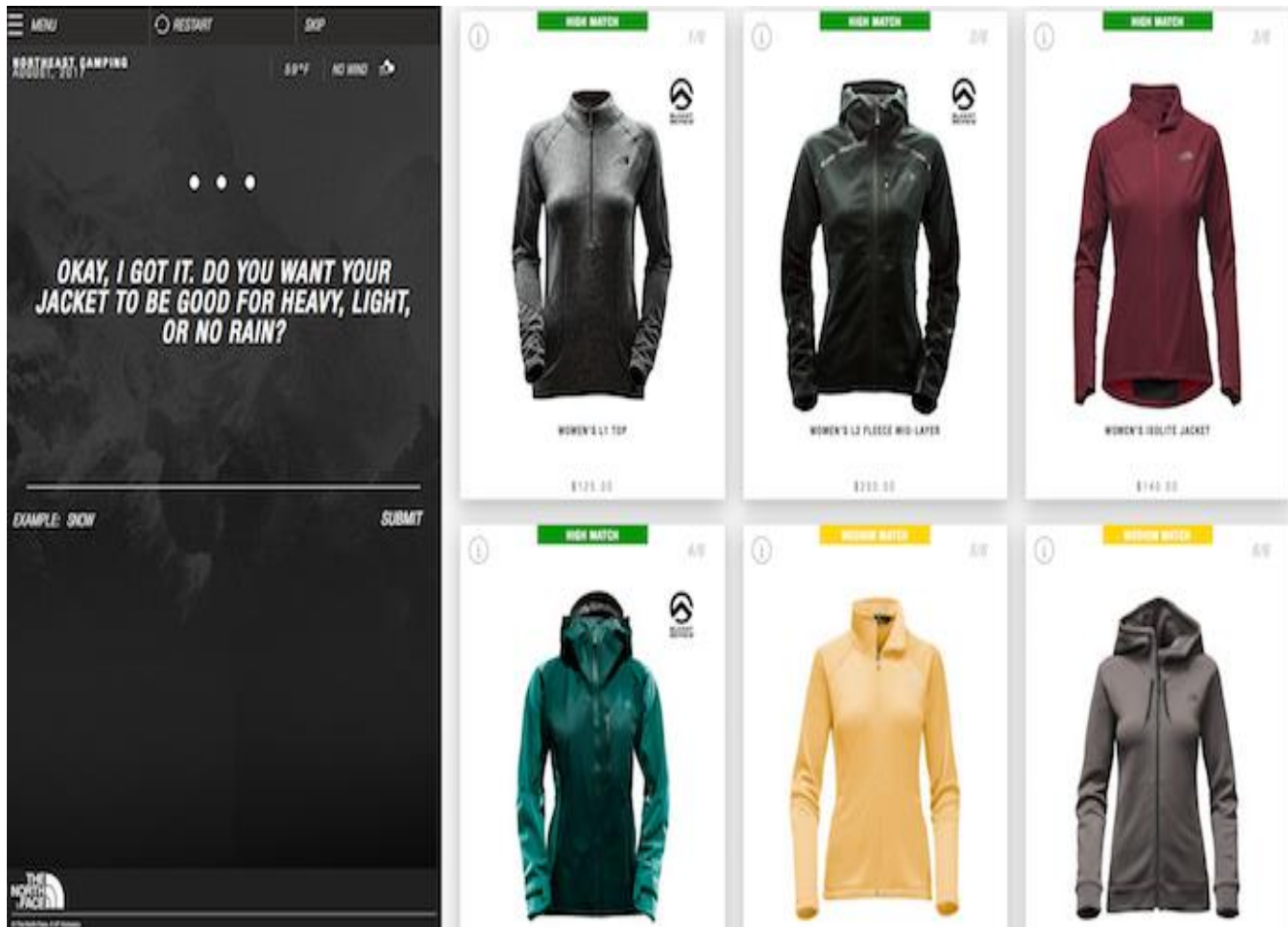
### **3 ARTIFICIAL INTELLIGENCE – NEW ELECTRICITY IN BUSINESS**

This chapter will show the benefits of artificial intelligence as well as its opportunities in business.

#### **3.1 The benefits of artificial intelligence in business**

Artificial Intelligence is presently being utilized to analyze and understand the clients base on their behavior and experience when purchasing products. Artificial intelligence examinations enormous measures of social purchasing behavior and the level of interesting in the products that can connect with the company and help them know more their customers and can predict the items they will buy in the future according to customers' performance and preference. (Raconteur 2017.)

Tony Maile, who is a European retail leader at IBM Watson, stated that Artificial Intelligence is a quick-moving field, which shows the better approaching for retailers to make shopping without any trouble. Modern Cognitive systems can interact, learn, and understand in the same way to an individual. The North Face – an outdoor clothing company, which is the employer of IBM Watson, now use cognitive computing service to enhance their virtual shopping associate (PICTURE 2). Artificial Intelligence helps their clients purchasing online with correct outfits, due to the series of questions when, where and what for the customers will use them. (Reed 2017.)



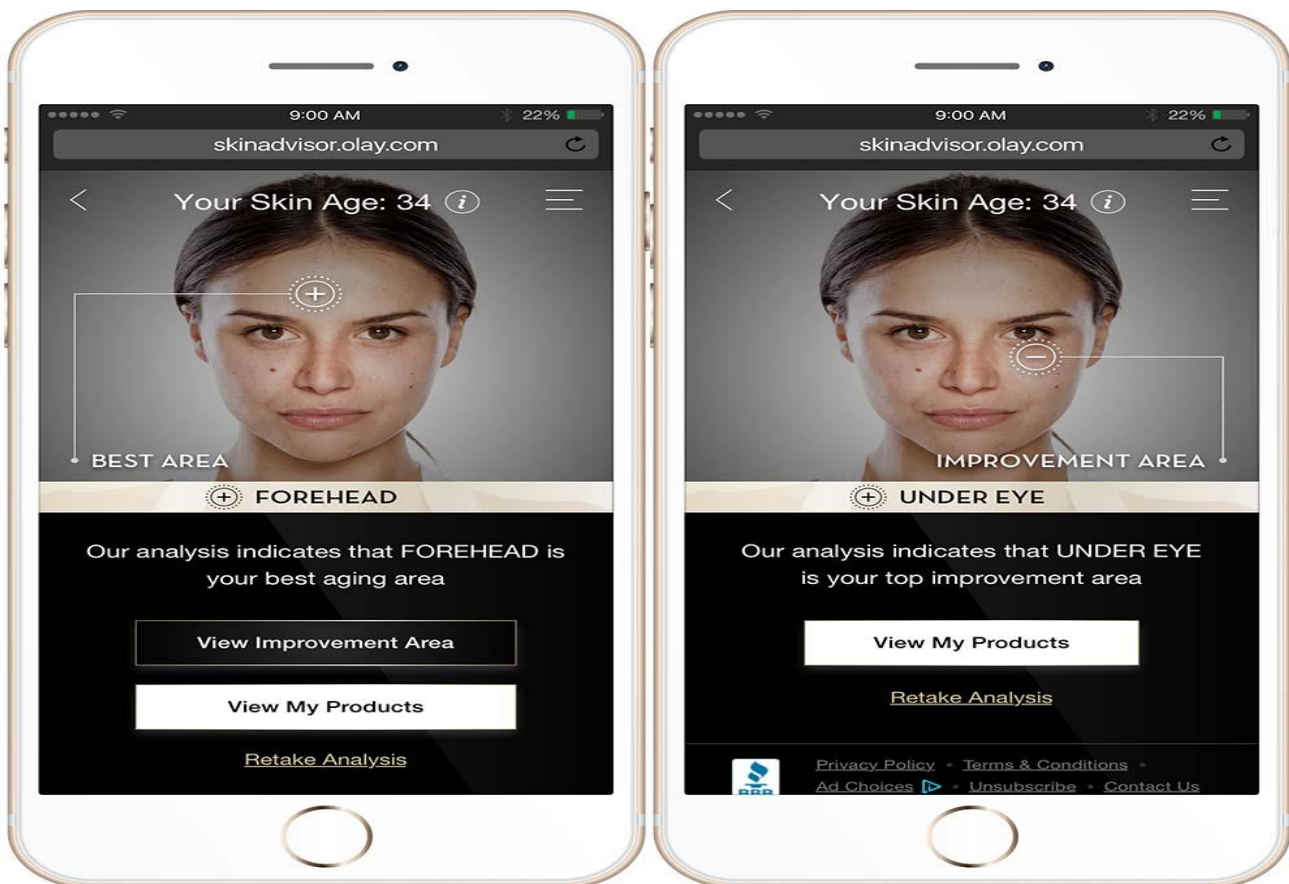
PICTURE 2. The North Face: using IBM Watson to find suitable items (Reed 2017.)

By using machine learning, Macy - a department store chain in America, has built up a shopping partner in smartphones. Therefore, the clients can shop and explore the store where they are in more convenient and easier, and they can also send questions, for example, the location of the store nearby them, when the products are in stock or which size of the items they have, etc. (Raconteur 2017.)

Artificial intelligence can be used not only selling items but also solving the problem for clients. Besides, artificial intelligence also helps to target advertising more accurately and effectively. Retailers can look at past standards of conduct and tailor offers in like manner. We are in a time where cognitive systems can be instructed by the most experienced workers and this information can be made accessible to all staff and clients straightforwardly.

It is functioning admirably for membership administrations, for example, Stitch Fix and Birchbox, which move and minister garments and excellence items separately. These web-based business stores have installed artificial intelligence techniques to be as a virtual individual for customers who do not have the time or tendency to shop.

CoverGirl - a makeup branch in America, is presenting the world's first influencer chatbot dependent on artificial intelligence, called the KalaniBot (PICTURE 3). When using KalaniBot, fans and customers can communicate in a chatbot adaptation of Kalani Hilliker, an American model and television character. As a result, she has more 14 times of discussions with the chatbot than with a normal post by Ms. Hilliker, 91 % positive assessment, about 17 messages for every discussion. In addition, KalaniBot will get more brilliant with utilizing and is intended to communicate conversationally like the genuine individual, learning about fans, asking a series of questions and giving CoverGirl coupon downloads. (Hall 2016.)



PICTURE 3. CoverGirl's Chatbot (Hall 2016.)

The next benefit of artificial intelligence is the concentration of personalization, where companies are selling items based on individual tastes. For example, Olay-a skincare brand of Procter & Gamble, (PICTURE 4) using deep-learning technology as their adviser to support and help clients discover the items most appropriate to their individual skincare needs. (Raconteur 2017.)



PICTURE 4. Olay's skin advisor (Srikanth 2018.)

### 3.2 The opportunities for using artificial intelligence applications in business

As indicated by PricewaterhouseCoopers (PwC), artificial intelligence will contribute over 15 trillion dollars to the worldwide economy by the year 2030. Therefore, the organizations can receive enormous advantages from invest resources into artificial intelligence. In 2017, according to the report of the MIT Sloan Management, artificial intelligence global executive research and study project found that over 80 percent of officials trust that artificial intelligence will make convincing and customized client encounters however above all, anticipate business results to drive more prominent gainfulness. There are some highlight practical applications of artificial intelligence that can lead the business to the way of development and achievement. (Dbrain 2018.)

Business decision-making will improve and get better by using artificial intelligence based-analytics. The enhancements in system and capacity innovation have realized the time of enormous information, the gathered information is futile without examination. Because of the extensive size, it is difficult to examine the information utilizing human knowledge. It is a region that artificial intelligence and profound learning calculations can help. Besides, in memory information stage of HANA and SAP that utilizes machine learning to break down and discover designs in enormous information, is helping Walmart with their information investigation. Walmart has over 245 million clients visiting their stores and sites everywhere throughout the world. Therefore, there is a colossal measure of information. Artificial intelligence algorithms of HANA are conveying the imperative information to the bleeding edge, so Walmart workers can settle on more information-driven choices. (Dbrain 2018.)

By using artificial intelligence chatbots, the marketing efficiency and sale profits will be enhanced in business. Artificial intelligence-based applications can begin taking care of routine errands. They can alter promoting and deals data for shoppers. Computer-based intelligence based Chatbots can run further and help with reacting to client administration solicitations to improve consumer loyalty and make proposals for upselling. In addition, machine learning can likewise help with value streamlining for different markets. RapidMiner, an information science stage, use information about contenders, providers, buyer inclinations, and dangers to make valuing models for individual market fragments consequently. This artificial intelligence-based methodology enables organizations to improve net revenues. (Dbrain 2018.)

Artificial intelligence algorithms can help retail and different organizations better deal with their stock. It can robotize refilling demands and advance supply chains. You can hand over your stock administration and inventory network choices to machine learning-based applications. Significant artificial intelligence players like IBM Watson are vigorously putting resources into the production network the executives. IBM's store network items help you computerize your request the board and satisfaction. Another organization TransVoyant is joining artificial intelligence and internet to make applications that anticipate store network developments. (Dbrain 2018.)

By using artificial intelligence, the equipment of business can be safety and maintenance. Machine learning can support the assembling and transportation segments to improve their maintenance plans. For instance,

the aircraft business endeavors to foresee the mileage on their armada's mechanical parts to anticipate downtimes. Computer-based intelligence based prescient investigation can improve this procedure significantly. It can help the aircraft business make more streamlined upkeep timetables to maintain a strategic distance from undesirable deferrals. The assembling business has been as of now utilizing artificial intelligence for security and maintenance. General Electric (GE) has built up the Predix stage that utilizes artificial intelligence to enhance and scale mechanical applications. (Dbrain 2018.)

Artificial Intelligence also helps the organization in finding and recruiting brilliant candidates. The new artificial intelligence-based facial acknowledgment applications that can talk with applicants and assess their execution utilizing passionate signs. It can enable organizations to streamline their enrollment procedure. Organizations like Unilever, IBM, Dunkin Donuts are now utilizing Artificial Intelligence to screen passage level workers. Unilever has announced it's artificial intelligence-helped employing an enormous achievement. Candidates can give a meeting utilizing the HireVue application on their cell phone. The application takes in the video and sound information from the meeting breaks down it and gives proposals to the subsequent stages to human spotters. (Dbrain 2018.)

The other opportunities for using artificial intelligence that companies can against fraud and avoid cyber-crimes. Organizations invest huge energy endeavoring to distinguish deceitful exchanges. Be that as it may, extortion location depends a great deal on example acknowledgment. As a result, machine learning devices can lift these errands up. Thus, digital security dangers are likewise a matter of distinguishing design oddities. Therefore, artificial intelligence-based applications can help here as well. The organization deepsense.ai is utilizing artificial intelligence procedures to create arrangements that can help organizations better identify misrepresentation. With guideline-based frameworks, there is a lot of false positives. Artificial intelligence algorithms can diminish these bogus alerts. (Dbrain 2018.)

Finally, companies can increase their business with self-driving technologies. Advances in self-driving autos are subject to artificial intelligence. Organizations that depend vigorously on transporting items can utilize self-driving trucks to bring down expenses and improve dependability. Assembling and different divisions can utilize independent vehicles to improve their operational proficiency. For example, Waymo has declared in the 2018 Google I/O gathering that it will begin self-driving cabs in Arizona before the finish of 2018. GM is planning to discharge self-driving vehicles one year from now. Starsky Robotics has tried a

completely unmanned truck in Florida and will begin pulling business cargo with unmanned trucks this year. These vehicles will create new chances for organizations to improve current procedures and make new business incomes. (Dbrain 2018.)



## **4 ARTIFICIAL INTELLIGENCE IN E-COMMERCE**

Artificial intelligence has been developed and executed in different areas, especially in e-commerce. The innovation of artificial intelligence has impressed everybody to get more attention to merchant online business. Amazon.com, one of the biggest international online retailers, that turned into a highlighted example of e-commerce.

This chapter will show how Amazon has used artificial intelligence in e-commerce; how Amazon's customers have achieved better experience and expectation when purchasing online through artificial intelligence in e-commerce techniques; and new changes of Amazon to carry out online business.

### **4.1 The growth of artificial intelligence in e-commerce: Amazon case**

The development of artificial intelligence is presently increasing significantly, and this innovation has improved the e-commerce industry with new advancements. More than 70 percent of business trust that artificial intelligence has brought more benefits for online markets from now to the future. Amazon.com is successful in using artificial intelligence in e-retail sales of electronics and other products. The company also offered computing services, user electronics, digital text, and local services in groceries and daily buying. The applications of artificial intelligence in e-commerce help Amazon boost its profits, improve productivities and enhance customers purchasing online performances. According to The Statistics Portal (FIGURE 3), in 2018, the yearly net sales of Amazon.com were over 230 billion dollars. (Statista 2018a.)

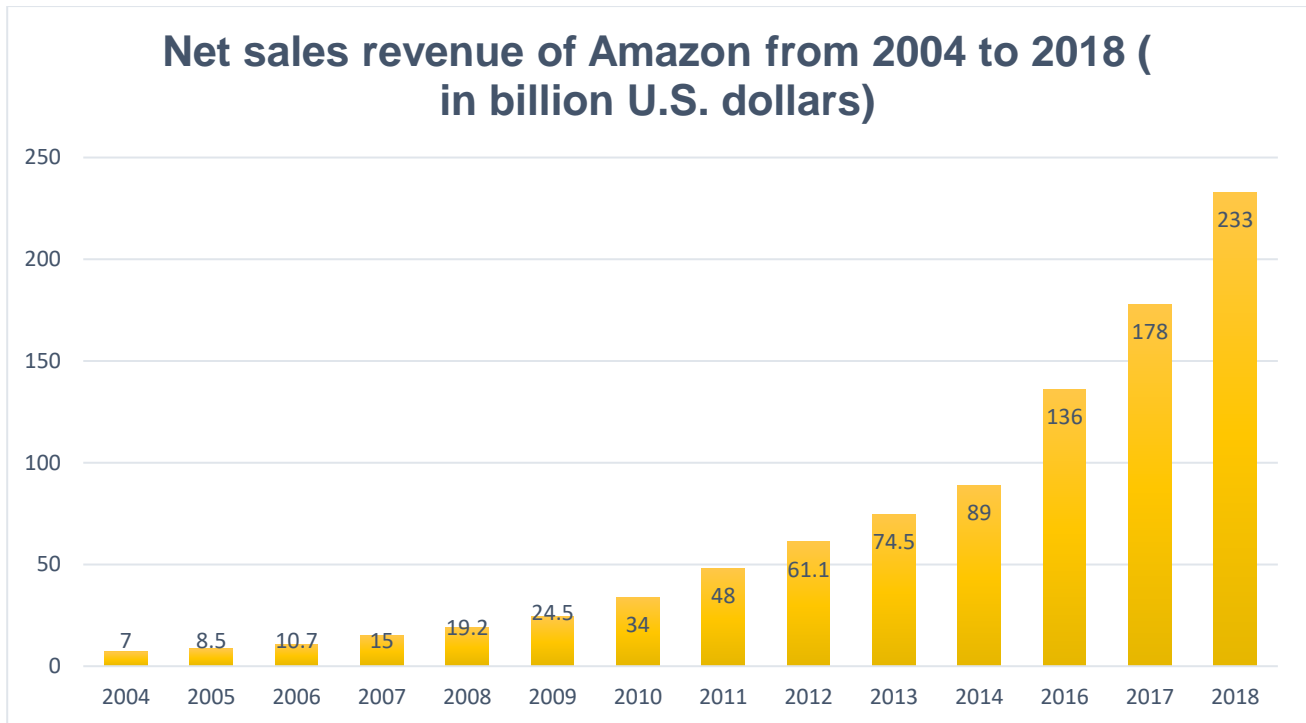


FIGURE 3. Net sales of Amazon between 2004 and 2018 (Adapted from Statista 2018b.)

## 4.2 The highlights of artificial intelligence in e-commerce

This part will present the most common usage of artificial intelligence in e-commerce to get better customer's merchant performance, more satisfying in purchasing goods and services, improve business competitiveness and customer loyalty. Some applications from Amazon.com – an international biggest retailer in online markets will be shown in this section too.

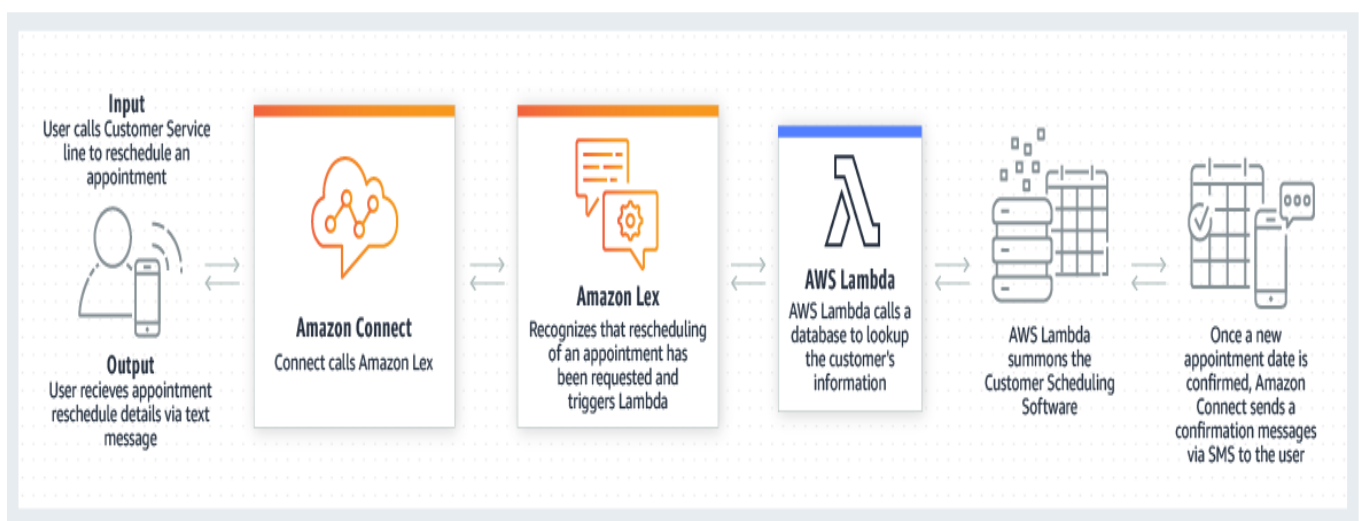
### 4.2.1 Chatbot

Chatbot is a computer program that allows conversational performances, engaging purchasing more highly by text and voice. It is popularly used in mobile phone, internet browsers, or internet chat rooms. Besides, by using deep learning systems like natural language processing systems, or automatic voice recognition,

chatbots can imitate people's interaction that can be found in virtual assistant systems, customer services, call center, etc. (Aws 2019.)

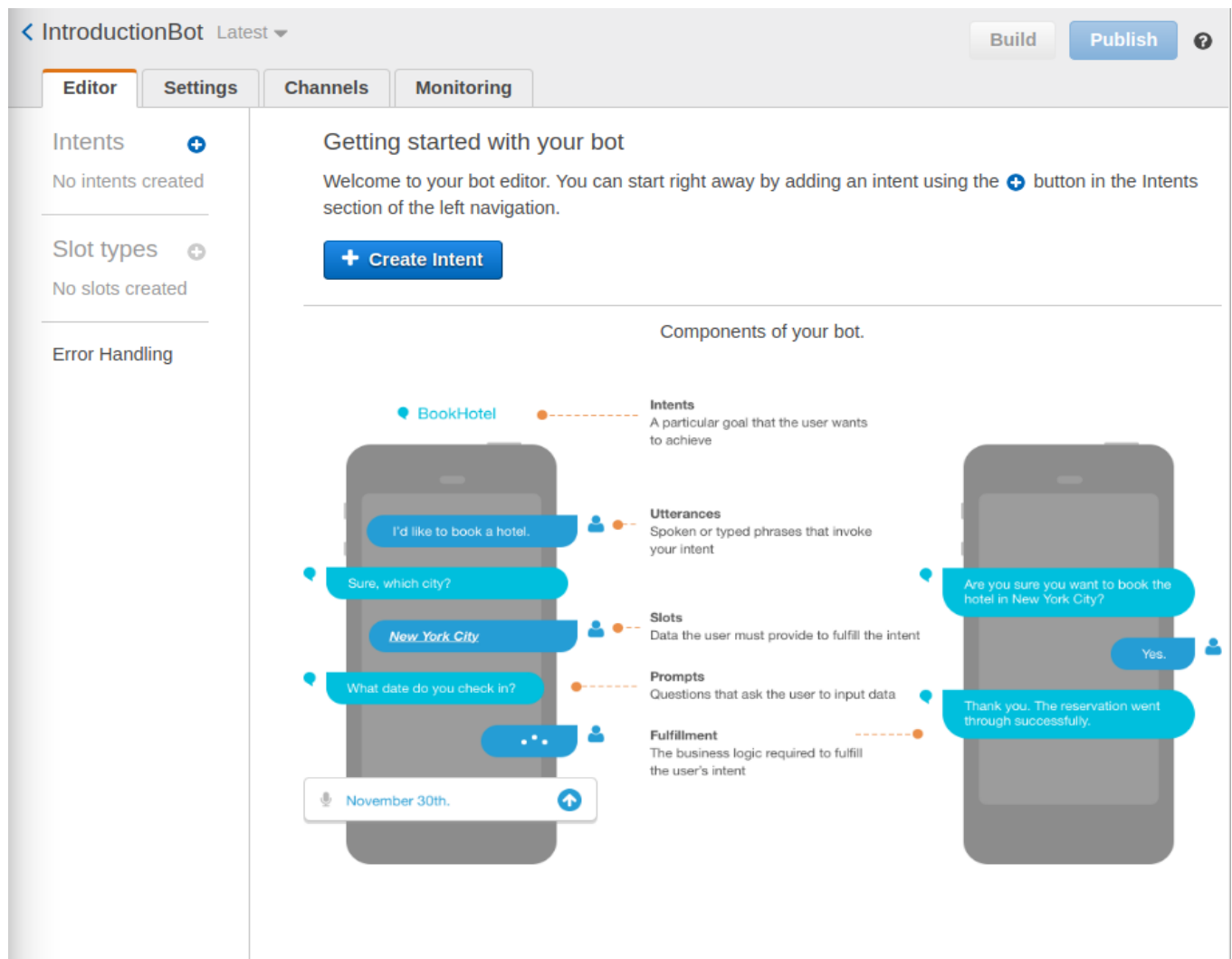
Chatbot also has many advantages for users such as improving customer engagement. A successful client experience can be a critical differentiator for a business. Chatbot can be sent into the channels that your clients and prospects are now connected with, like Facebook Messenger, so you can contact them in well-known conditions to react to their purchasing favorites quicker and catch up their needs and expectations. Next, chatbot is a very flexible function for the customer to buy products in the online market because it can respond to customers' voice and text by their language. They also help the company to reduce execution time and improve business efficiencies. (Aws 2019.)

Amazon Lex (PICTURE 5) is a highlight example of a chatbot service that is created by Amazon to help customers connect with call center. It is made for conversational equipment into any application which can use text and voice. Amazon Lex uses deep learning functions of automatic voice recognition in advanced for changing voice to text, and natural language understanding system to perceive the meaning of the text, to allow the customer to make applications with attracting user experiences. This system allows customers to clarify new types of items made through conversational interfaces. It can be used in different cases such as connect to enterprise applications to receive marketing data, or customer can read their banking information, or calling Amazon contact center.



PICTURE 5. Using Amazon Lex for calling center bots (Aws Amazon Lex 2019.)

When using Amazon Lex, the customer can plan for appointments, change name or password, and requesting purchasing history from Amazon account. (PICTURE 6) These chatbots can recognize customer's speech and comprehend customer's meaning without requesting customer answers any specific questions. In addition, it facilitates the procedure of daily individual activities, for example, booking hotel rooms or doctor appointments, order books or personal stuff from users 'mobile phones, internet browsers. (Aws Amazon Lex 2019.)



PICTURE 6. Amazon Lex Chatbots (William 2018.)

### **4.2.2 Recommendation engines**

A recommendation engine is a tool that filters the data by using algorithms and suggests popular products for customers. Based on the previous client purchasing performances, it will suggest items which the clients may probably purchase. (Sharma 2018.)

Amazon created Amazon Personalize as a recommendation engine system that can improve the suggestion items for customers based on their shopping online experiences. In Amazon Personalize, customers can give an activity stream from their performances such as purchasing information, page views and the products they want to suggest to the others like books, music, cosmetics or videos. Besides, buyers can also provide more information such as age, gender, geographic area, etc. The system will store, examine and identify customers' data, and then it will select correct algorithms. Finally, it will optimize a personalization template that is customized for customers' data. (Aws Amazon Personalize 2019.)

In Amazon.com page as can be seen in picture 7, by clicking on the link "Your Recommendations", it will lead the customers to a place where they can see the suggestions by items offering, ranking of items and which products are recommended. Besides, Amazon shopping cart recommendation which offers clients item recommendations dependent on the products in their shopping basket.

## Your recently viewed items and featured recommendations

Recommendations &amp; Popular Items

Page 1 of 2



Best Sellers

Page 2 of 8 | Start over

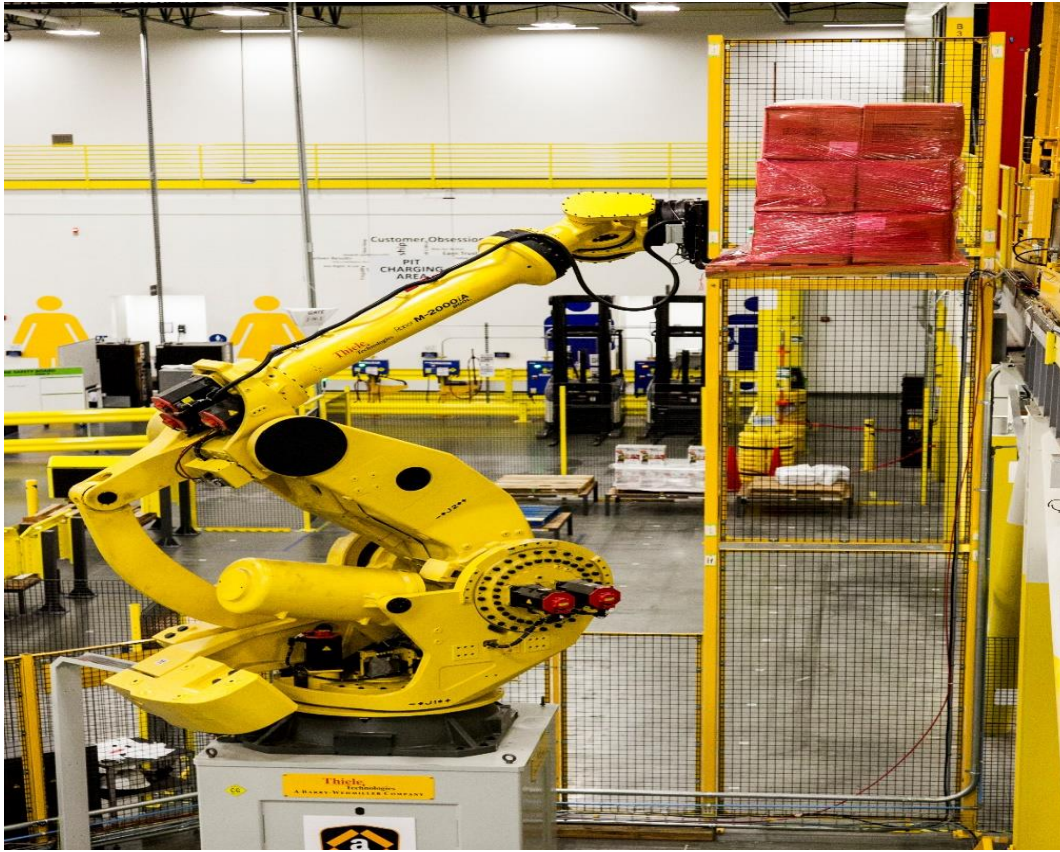


PICTURE 7. Amazon recommendation items (Aws Amazon 2018.)

### 4.2.3 Warehouse automation

Most of the organizations are presently concentrate on handling their warehouse operations for decreasing costs and increasing business efficiency. Automated warehouses are progressively effective, adaptable, quick and trustworthy as well. They help online shopping companies to adapt and handle the distribution of warehouse products, and to keep the best condition for material processing with such procedure it is simple on capacity, rearrange the products and recover the information automatically. (Magneto 2019.)

Amazon is not an exception. Amazon is one of the leaders of warehouse automation, the company has already found a new way of using robots in work placements once managed by workers. In 2014, Amazon started taking off robots to its distribution centers utilizing machines initially created by Kiva Systems, an organization Amazon purchased for \$775 million two years sooner and renamed Amazon Robotics. Amazon presently has about 100,000 robots in real life around the world. Automated robots (PICTURE 8) can run around with vertical racks packed with stock weighing up to 2000kg on their backs. All of them work autonomously inside a huge place, following one another however not impacting. (Wingfield 2017.)



PICTURE 8. A robot is working on Amazon automation warehouse (Schelmetic 2018.)

#### 4.2.4 Virtual shopping assistant

Virtual shopping assistant is a software application program that uses artificial intelligence to connect and can understand natural language voice from users. They also can concentrate on many tasks at the same time and can work in multiple areas. (Magneto 2019.)

Amazon Echo is a virtual shopping assistant tool as known as Alexa can provide the buyers with modern shopping performers and experiences and it only needs to identify users' voice to process the order. According to Statistic Portal, customers are more satisfied by using Alexa when shopping online and the skills of Alexa have developed from only 130 skills to upon over 80000 skills from 2016 to the end of 2018. (Statista 2018.)

Mona is the most well-known shopping colleague application, created by a group of previous Amazon workers. The teams used human expertise, big data and artificial intelligence to make Mona more useful and adaptable. Mona can learn and understand customers' behavior from their styles, preferences brands, and the favorite shopping points, and allows them to give feedback in its system. The more customers use Mona, the better suggestions they receive. (Masters blog 2017.)

It is clear that artificial intelligence is now helping e-commerce industry get closer and more understand their customers. With artificial technologies, most of the online shopping business currently can apply substantial data science and machine learning, they now on the way to increase customer services and have significant impacts to maintain and satisfy customers.

### **4.3 Future of Amazon Intelligence**

Amazon.com, an e-commerce giant company, which turned into the first one trillion dollars organization in 2018. The company is growing new parts with healthcare, artificial intelligence, and especially in expanding more convenience stores, which all includes on founder Bezos' important list as he goes on to broaden his giant company.

Amazon has announced that in 2019, the company will open eight Amazon Go stores in San Francisco and Chicago. Amazon Go is a physical store without require of checkout. Amazon Go stores use sensor fusion and deep learning and computer vision to monitor what has been added to the clients' shopping bag and charges them through the app when they leave the store. A Bloomberg reporter predicted that more 3000 Amazon Go stores will be opened in America in 2021. (Forsdick 2018.)

Amazon is also increasing investment money to Amazon virtual shopping assistant, Alexa. The company created an event that was called "Alexa Accelerator programme" in Seattle, US to help and support start-up companies that use voice to interact with technology. An examination by information and investigation firm Global Data has predicted the number of virtual voice assistants will achieve 100 million dollars at the end of 2019 and will double up to 200 million dollars in 2020. (Forsdick 2018.)



According to the Seattle Times report, Amazon has expanded its robots in warehouse automation from 2016 and added around 15000 robots annually. In 2017, the company had 45000 robots and will continue to increase in the future. A director of investors relations of Amazon, Phil Hardin said that using robotics helps to work in warehouse better and more productively in the upcoming future (Shead 2017.)

All in all, Amazon.com is an outstanding e-commerce retailer company due to its artificial intelligence applications. The future of Amazon seems so bright and if the company concentrates more on developing its current artificial intelligence applications, there is no doubt that the company is one of the most powerful competitors in the e-commerce market.

## 5 CONCLUSION

Through this thesis, people can understand the term of artificial intelligence easily and other terms connected with it. It is no doubt that artificial intelligence revolution is an important milestone in human life from the 20<sup>th</sup> century. Artificial intelligence is completely successful as a system to analyze, refine and derive huge amounts of data in human society. Its applications now appear everywhere, people can see them in their house, phone, the street, office, hospital, or shopping stores. In business industry, there are many advantages and opportunities for companies by using artificial intelligence techniques. For examples, measuring purchasing behavior of customers, understanding their level of interest in products, connect customers with the company, and predict the items they will buy in the future according to customers' purchasing performance and so on.

Especially in e-commerce industry, chatbots, recommendation engines, warehouse automation, robotics, and virtual shopping assistant are all excellent applications of artificial intelligence that changed customers' purchasing performance successfully. These applications are more used in Amazon company. Amazon is a successful e-commerce company that uses artificial intelligence techniques to manage their business. From now on to the future, the company continues to constantly invest and develop its artificial intelligence technologies with strategies and capitals to make artificial intelligence applications more productive and adaptable in healthcare, online shopping, customer services, and especially in expanding more convenience stores.

In my opinion, Amazon is now on the right way to become one of the leader companies e-commerce industry and is a powerful opponent in the business market. No one can predict exactly the future of artificial intelligence, but I believe that artificial intelligence is still important and affects positively in human life.

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