Chapter 2:
Artificial Intelligence Concepts, Drivers, Major Technologies, and Business Applications

Learning Objectives for Chapter 2

1. Understand the concepts of artificial intelligence (AI)
2. Become familiar with the drivers, capabilities, and benefits of AI
3. Describe human and machine intelligence
4. Describe the major AI technologies and some derivatives
5. Discuss the manner in which AI supports decision making
6. Describe AI applications in accounting
7. Describe AI applications in banking and financial services
8. Describe AI in human resource management
9. Describe AI in marketing
10. Describe AI in production-operation management

CHAPTER OVERVIEW

Artificial intelligence (AI), which was a curiosity for generations, is rapidly developing into a major applied technology with many applications in a variety of fields. OpenAI's (an AI research institution described in Chapter 14) mission states that AI will be the most significant technology ever created by humans. AI appears in several shapes and has several definitions. In a crude way, it can be said that AI's aim is to make machines exhibit intelligence as close as possible to what people exhibit, hopefully for the benefit of humans. The latest developments in computing technologies drive AI to new levels and achievements. For example, IDC Spending Guide (March 22, 2018) forecasted that worldwide spending on AI will reach $19.1 billion in 2018. It also predicted annual double-digit spending growth for the near future. According to Sharma (2017), China expects to be the world leader in AI, with a spending of $60 billion in 2025. For the business value of AI, see Greig (2018). In this chapter, we provide the essentials of AI, its major technologies, its support for decision making, and a sample of its applications in the major business functional areas.

CHAPTER OUTLINE

ANSWERS FOR END OF SECTION REVIEW QUESTIONS

Section 2.1 Opening Vignette Review Questions

1. Explain why traffic may be down while congestion is up (see the London case at **inrix.com/uk-highways-agency/**).

   Congestion may be caused by other reasons such as accidents and weather.

2. How does this case relate to decision support?

   Information is provided to various types of decision makers, some in real time. The system also includes some automated decision making.

3. Identify the AI elements in this system.

   Data is collected, some automatically. AI algorithms process the data to make predictions and suggest routes. The system makes inferences based on past drivers' behavior.

4. Identify developments related to AI by viewing the company's press releases from the most recent four months at **inrix.com/press-releases**. Write a report.

Open-ended answers.

5. According to INRIX, the new mobile traffic app is a threat to Waze. Explain why.

    It provides similar recommendations but with more accuracy (more diversified data). It also provides recommendations for future dates. Waze does not.

6. Go **sitezeus.com/data/inrix** and describe the relationship between INRIX and Zeus. View the 2:07 min. video at **sitezeus.com/data/inrix/**. Why is the system in the video called a "decision helper"?

    The capabilities of INRIX and Zeus are compatible, so synergy is created. Note that both are improved with time.

Section 2.2 Review Questions

1. Define AI.

Machines that have human-like thought processes. Ability to immitate human behavior.

2. What are the major aims and goals of AI?

Study of human thought processes and understand what intelligence is so as to transfer them to machines. Perceive and properly read environmental changes make machines creative.

3. List some characteristics of AI.

Can facilitate human work, increase productivity, do not get tired, can work in risky environments. Machines that attempt to exhibit intelligent behavior.

4. List some AI drivers.

Cost savings, high speed, competition, capable technologies

5. List some benefits of AI applications.

Consistent quality, non-stop production, ever increasing funcionalities, ability to learn from experience.

6. List some AI limitations.

Lack of human touch and feel, ignoring non-tasks surroundings, can cause damage.

7. Describe the artificial brain.

Machine that is desired to be intelligent, creative and self-aware as humans.

8. List the three flavors of AI and describe augmentation.

Assisted, autonomous, and augmented. Augmented refers to combining different levels and types of AI solutions.

Section 2.3 Review Questions

1. What is intelligence?

   It is composed of complex concepts such as reasoning, logic, ability to learn and solve problems.

2. What are the major capabilities of human intelligence? Which are superior to that of AI machines?

   Make sense of ambiguous information, respond quickly to new situations, prioritize information, and reason. Express emotions and solve problems.

3. How intelligent is AI?

   AI is not yet as intelligent as humans. But it is getting more and more intelligent and in certain areas is even more successful (e.g., complex games, diagnosis). AI's goal is in solving structured problems.

4. How can we measure AI's intelligence?

   Use Turing Tests. Compare computer generated answers to those made by humans and to standards.

5. What is the Turing Test and what are its limitations?

Given same tasks to human and computers with knowing which is which. Try to determine which is which. The test measures only Q&A. It measures only some parts of intelligence.

6. How can one measure the intelligence level of a vacuum cleaner?

You need to set criteria of performance (e.g., ability to recognize objects) and determine the ability of the machine to make appropriate decisions when the cleaner discovers obstacles.

Section 2.4 Review Questions

1. Define *intelligent agents* and list some of their capabilities.

Autonomous small computer programs for conducting routine tasks. For example, spelling checker, price discovery. They are quick, inexpensive, consistent, and reduce the information overload burden.

2. Prepare a list of applications of intelligent agents.

Approvs small loans, match people to jobs, assist people with computer work, match supply and demand.

3. What is machine learning? How can it be used in business?

Ability to identify pattern by learning from experience. Monitor sense and analyze data in the computing environment. Self adjust to changes by learning from example. The lessons learned are used for diagnosis and predictions in business areas, medicine, etc.

4. Define *deep learning*.

Ability to learn 'deeper' than regular machine learning and thus solve more complex problems. Uses most powerful learning algorithms. Supports machine vision, robotics and voice understanding.

5. Define *robotics* and explain its importance for manufacturing and transportation.

Robotics combines several AI technologies (e.g., machine vision, voice recognition) to make autonomous decisions and performing mechanical tasks. Thus, they can speed up many tasks

ranging from assembly to welding to transporting things. Robots also play a role in self driving vehicles.

6. What is NLP? What are its two major formats?

Natural language processing is the capability of a computer to analyze human language so that the computer can understand its meaning (voice or speech understanding) and able to generate human language (speech generation) after data processing by the computer.

7. Describe machine translation of languages. Why it is important in business?

Once a human language is understood, it can be translated into other languages (e.g., use Google Translate). This enables people to understand messages and websites written in other languages. This can support global trade and communication and collaboration.

8. What are knowledge systems?

Knowledge systems are used for autonomous decisions and in providing answers to queries (e.g., Alexa). They provide advice based on stored knowledge.

9. What is cognitive computing?

In order to study the human thought process (an AI goal) scientist uses the knowledge about the human brain to create, for example, self-learning machines. In addition, such knowledge is used for teaching machines to reason.

10. What is augmented reality?

Real time integration of digital information and the user's environment (e.g., vision voice). Such integration enables to catch information from the environment (e.g. photos) and then learn about related characteristics, as well as process it in other ways.

Section 2.5 Review Questions

1. Distinguish between fully automated and supported decision making.

Fully automated decisions do not require human colaboration, the computer does it all. In decision support, the computer provides help in some steps of the decision making process (e.g., in generative alternatives, predicting consequences).

2. List the benefits of AI for decision support.

   Enable quicker decisions, predict potential results of alternatives, consolidate relevant data, enable collaboration of group decision makers.

3. What factors influence the use of AI for decision support?

   Type of decision, cost, urgency of getting a solution, possibility of matching of AI tool to type of problem.

4. Relate AI to the steps in the classical decision-making process.

   1) AI is used in diagnosing problems and in comparing performance to standards.
   2) AI assists in generating alternatives. AI predicts consequences of alternatives.
   3) Solutions are compared, and the best one is selected.
   4) Finally, AI can assist in implementation.

5. What are the necessary conditions for AI to be able to automate decision making?

   Structured situations, possibility of significant cost and or time saving, chance of acceptance of the AI solution, fairly routine situations, lack of human experts on site, and strong management support.

6. Describe Schrage's four models.

   1) Autonomous advisor provides suggestions on best courses of action, and strategies which must be approved by humans.
   2) Autonomous outsource makes outsourcing decisions. In this case, all data must be clear and include decision rules (e.g., If-Then must be provided to the machines).
   3) People-machine collaboration requires two partners. The machine makes the entire decisions. However, humans need to deal with the constraints. Training of people for the collaboration is needed.
   4) Complete machine autonomy. Here, the entire processes are fully automated.

Section 2.6 Review Questions

1. What are the major reasons for using AI in accounting?

   Increase productivity and speed of routine activities. Reduce elapsed time and increasing consistency. Total cost reduction. Provide competitive advantage.

2. List some applications big accounting firms use.

   Improving auditing, tax calculation, fraud detection, verifications, claims verifications, compliance verification, projects' evaluations, predictions, and quality assessment.

3. Why do big accounting firms lead the use of applied AI?

   To attract more business, to increase their productivity and to gain a competitive edge. Also, they have large R&D budgets.

4. What are some of the advantages of using AI cited by the ICAEW report?

   Solve difficult accounting problems, provide inexpensive and better data support for decision making, generating insights from analysis, free time of accountants, detect fraud, task verifications, checking accuracy of contracts.

5. How may the job of the accountant be impacted by AI?

   The accountant will have more time to innovate and perform complex tasks. Some accountants will lose their jobs (if they do routine, repetitive tasks).

Section 2.7 Review Questions

1. What are the new ways that banks interact with customers by using AI?

   Interaction via chatbots (e.g., offer real time online conversation). Make real time offers online. Banks offer machine advisory services. Facial recognition in branches, so bankers know who the customers are when they see them (they do not have to ask).

2. It is said that financial services are more personalized with AI support. Explain.

   Computer vision can recognize the customer in the physical bank. No need to ask. There may be a better match when replying to customers' queries.

3. What back-office activities in banks are facilitated by AI?

   Processing large amounts of data (e.g., claims), processing payments, and doing the bookeeping.

4. How can AI contribute to security and safety?

By predicting security breaches and discovering fraud cases quickly.

5. Wha are the role of chatbots and virtual assistants in financial services?

Chatbots can provide assistance to customers (e.g., answer queries, direct where to go next). Personal virtual assistants can suggest investment activities.

6. How can IBM Watson help banking services?

Watson can analyze big data and provide suggestions for strategy and for problem solving. Also, it can facilitate compliance.

7. Relate Salesforce Einstein to CRM in financial services.

Customer relativity is critical in dealing with claims. Salesforce Einstein is discussed in Section 2.6.

8. How can AI help in processing insurance claims?

AI can expedite claims processing. It also can predict accident-prone drivers. Computer vision can facilitate the reporting of accident damages. Also, accuracy increased. Also, accidents can be simulated and analyzed.

Section 2.8 Review Questions

1. List the activities in recruiting and explain the support provided by AI to each.

Finding candidates by evaluating resumes is quickly done. Also, assigning applications to positions and conducting testing. Screen resumes posted on the Web. Create model resumes that can be compared to resumes of applicants. Chatbots help with information delivery, save time for recruiters.

2. What are the benefits rewarded to recruiters by AI?

Easier to find talents and do so faster. Better market for jobs and applicants, identify the best employees internally (in-house).

3. What are the benefits to job seekers?

   Easier to be discovered. A best match of applicants to positions. Shorter wait time for appointment decisions.

4. How does AI facilitate training?

   One way is to use chatbots as tutors. Also, chatbots can be used for personalized paced learning.

5. How is performance evaluation of employees improved by AI?

   By breaking tasks into small portions, and using AI, it is more accurate and faster to evaluate perfomance and treat areas that need improvements.

6. How can companies increase retention and reduce attrition with AI?

   AI can discover what makes employees happier. Also, AI can be used to figure out why employees are not happy. AI can predict tendencies to leave and find remedies.

7. Describe the role of chatbots in supporting HRM.

   Provide information to new and existent employees. Help in recruiting and training. Some day it may be used to comfort sad employees.

Section 2.9 Review Questions

1. List 5 of the 15 applications of Davis (2016). Comment on each.

   Product recommendation - using recommenders (Chapter 12) is popular
   Fraud detection - done extensively by credit card issuers
   Producer pricing – AI helps in checking and changing prices based on supply and demand and on competition
   Speech recognition – helps to provide customer service and sell in natural languages
   Image recognition – used in market research and in defect detection

2. Which of the 15 applications relate to sales?

   Product recommendation

Smart sales engine
Language translation
Sales forecast
Chatbot advisors

3. Which of the 15 applications relate to advertising?

Social semantics for learning about customers' needs. Target one-to-one ads. Customer segmentation. Content generation.

4. Which of the 15 applications relate to customer service and CRM?

Product recommendation
Smart search
Social semantics
Website design
Predictive customer services (the effectiveness of)

5. For what are the prediction capabilities of AI used?

Determine pricing and advertisement stragies. Help in new product design. Predict the success of certain ads. Predict consumers' attitudes towards new products. Predict consumer behavior (e.g., towards ads, prices). Predict sales volume.

6. What is Salesforce's Einstein?

AI-based personal advisor for customers and vendors. Has powerful analytical and prediction capabilities. Improves customer engagement and interaction.

7. How can AI be used to improve CRM?

Predicting the impact of different CRM options. Providing assistance via chatbots. Enables discussions among customers and with the vendors. Provides voice communication which is preferred by customers.

Section 2.10 Review Questions

1. Describe the role of robots in manufacturing.

Robots are used in assembly lines (e,g., cars), for material handling, can do welding. They also work in toxic environments and improve the supply chain.

2. Why use AI in manufacturing?

   It saves time and permits work to be done in hazardous environments. Provides competitive edge. Minimizes interruptions, and people-related problems. Can do certain tasks much better than humans (e.g., inspection).

3. Describe the Bollard et al. implementation model.

   It is a five step model that begins with business process improvement. Then, certain processes are outsourced. Deploys AI and analytics to support decision making, automates as much as possible. Digitizes the customers' experiences.

4. What is an intelligent factory?

   Highly automated factory where machines make most of the work in an integrated fashion and can make many decisions. Can produce large volumes quickly.

5. How are a company's internal and external logistics supported by AI technologies?

   To begin with, robots can do material handling (Amazon's internal order fulfillment). Partners' activities are better coordinated, and transportation can be better managed and controlled. External transports are controlled by IoT (e.g., at DHL). Machine learning helps optimizing shipments. Finally, logistics may include optimal inventory management and automatic replenishment.

ANSWERS TO APPLICATION CASES

Answers to Case 2.2

1. Discuss the benefits of combining machine learning with other AI technologies.

   They used 100 variables and defined intelligent performance levels in each. Then, they compared these to the performance of the machine.

2. How can machine learning improve marketing?

   It is able to self-clean floors. Not able to deal with unforseen obstacles such as a dog.

3. Discuss the opportunities of improving human resource management.

   Deep learning can increase the learning capabilities overtime. For example, dealing with rarely seen obstacles and dealing with multifactor environments.

4. Discuss the benefits for customer service.

Open-ended answer.

Answers to Case 2.3

1. Why use machine learning for predictions?

One can get more accurate predictions that can be changed quickly; predictions are used extensively in decision making in many areas.

2. Why use machine learning for detections?

Detecting fraud, maintenance problems, health issues, etc. are difficult and must be done quickly. Detecting in real time (e.g., computer security breach, illness) can be very useful.

3. What specific decisions were supported in the five cases?

a) Predict which drivers are more likely to be involved in accidents (insurance issue)
b) Improving satellite image quickly (for several purposes)
c) Detecting illegal overfishing (compliance issue)
d) Deteching fraud in using credit cards (finance issue)
e) Detecting defects in food processing. (manufacturing issue)

Answers to Case 2.4

1. What are the characteristics of the tasks for which AI is used?

Tasks that require processing of very large amounts of structured data that take a long time to complete. Also, tasks that do report generation which is fairly standard, but tedious. Tasks that require huge amounts of different data (e.g., legal, tax preparation, and auditing tasks).

2. Why do the big accounting firms use different implementation strategies?

They may have different clients, tasks, and strategies. Since work is paid by the clients, the firms try to make the clients happy. Also, they may have different constructs. Finally, all this is new, so the firms experiment with different implementation strategies.

Answers to Case 2.5

1. What are Einstein's advantages to US Bank?

   The bank needs superb customer service and one-to-one advertisement and customer service. The identificaiton of customers and matching offers of services were provided by Einstein CRM. The machine also helped in matching customers and services.

2. What are its advantages to customers?

   Customer receive more and better attention. They wait less in line and they can get quick explanations and answers to queries. Customers feel more satisfied when bankers understand their needs.

3. What are the benefits of voice communication?

   It is more natural than typed communication and faster to ask and get a reply.

Answers to Case 2.6

1. What types of decisions are supported?

   Screening applicants and their resumes. Creating profiles of desired jobs and matching them with applicants. So recruitment decisions can be made faster and better. AI can also help in performance evaluation and in promotion decisions.

2. Comment on the human–machine collaboration.

   Human-machine collaboration, as will be seen in Chapter 13 and 14, can be very beneficial. The HRM employees can use the machines for decision support and for answering questions made by employees.

3. What are the benefits to recruiters? To applicants?

   Recruiters can save time and be more consistent. Also, they can do a more accurate and unbiased performance evaluation. Advanced AI can assist in identifying incorrect information provided by applicants. Appropriate applicants can be discovered among the many on the Web. Applicants face an unbiased evaluation and a usually quicker turnaround.

4. Which tasks in the recruiting process can be fully automated?

   Screening large numbers of resumes online can be fully automated. Also, providing information by chatbots.

5. What are the benefits of such automation?

   Saving time and money. Also, the accuracy of information provided by chatbots is consistent andt is less subject to legal cases if innacurate information has been provided.

Answers to Case 2.7

1. Identify all AI technologies used in the Food Assistant.

   Chatbots, computer vision, personal assistant, machine learning recommender.

2. List the benefits to the customers.

   Make customers happy, provide immediate answers while shopping in supermarkets. Get advice about food use.

3. List the benefits to Kraft Foods.

   Make customers happy. Can learn about consumers' behavior and loyalty. Expand mobile marketing, vendors can better assess customers' reaction to promotions. Finally, vendors can better influence consumers to buy their products via targeted ads and the personalized advice provided.

4. How is advertising done?

   Via targeted ads and the personalized advice provided.

5. What role is "behavioral pattern recognition" playing?

   AI makes inferences about what specific customers like, and then recommends promotions. One method of AI is *collaborative filtering*.

6. Compare Kraft's Food Assistant to Amazon.com and Netflix recommendation systems.

   Amazon uses an algorithm to tell shoppers what other shoppers that bought the same item bought in addition. Netflix suggests what videos to watch, based also on what smilar customers watched. Kraft's Assistant interacts with customers and evaluates their response. Also, Kraft uses voice communication.

ANSWERS TO TECHNOLOGY INSIGHT CASES

Questions for Discussion: 2.1 Technology Insight

1. What is the basic premise of augmented intelligence?

Improve assisted AI by extending human cognitive capabilities.

2. List the major differences between augmented intelligence and assisted AI applications.

Assisted AI works only in narrow, well-defined domains (structured), augmented combine machines, and people intelligence. Dealing with more complex situations.

3. What are some benefits of augmented intelligence?

Generates better predictions and recommendations, works faster, and is more accurate.

4. How does the technology relate to cognitive computing?

Assists in solving complex problems. Extending human cognitive capabilities.

Questions for Discussion: 2.2 Technology Insight

1. Differentiate between the autonomous advisor and the people–machine collaboration models.

The autonomous advisor is based on data-driven management. The algorithm generates strategies and makes recommendations. Actions must be approved by humans. In people-machine collaboration, people not only approve the recommendations of the algorithms, but are also involved in implementation.

2. In all four models, there are some degrees of people–machine interaction. Discuss.

While machines can make decisions, humans need to design them, supervise execution, interpret results, and improve them over time. The least involvement of humans is in model #4.

3. Why it is easier to use model #4 for investment decisions than, for example, marketing strategies?

There are less variables in investment decisions and they are usually more structured. Also, most of the information in investment decisions is quantitative and can decoded.

4. Why is it important for data scientists to work with top management in autonomous AI machines?

    Data scientists provide the analysis whose results managers view for making decisions. Using autonomous machines requires full understanding by the scientists of the decision making process and also the use of the autonomous machines.

ANSWERS TO QUESTION FOR DISCUSSION (End of Chapter)

1. Discuss the difficulties in measuring the intelligence of machines.

    There are several variables that need to be measured against standards which may difficult to establish. With many variables, it is necessary to give each of them a weight, and this may be difficult. Some of these may be impacted by the physical enviroment and the skills of the employees that work with the machines.

2. Discuss the process that generates the power of AI.

    The power of AI is provided by the method used and the technology and algorithms applied. For example, what knowledge is used and how it is extracted, stored and applied. Also, in learning-based AI, the process includes the sources of knowledge and the learning mechanisms, algorithms and procedures.

3. Discuss the differences between machine learning and deep learning.

    Machine learning is done by examining examples by parsing the data in examples and then learning from the new data and applying them to make decisions such as pattern recognition. The machines can adjust their capabilities to changes in the environment. Deep learning can be viewed as a subset of machine learning. Deep learning tries to mimic the human brain. It uses fresh data to learn, so it can use self-direction to solve difficult problems so it is useful in autonomous vehicles. Its key motto is continous learning.

4. Describe the difference between machine vision and computer vision.

    Machine vision is based on what cameras "see." It then provides images of automated processes (e.g., inspection). It is important in processes of robotics and autonomous vehicles. It is an engineering subfield. Computer vision is a computer subfield that processes digital information from images and videos. It also deals with 3D images. Analysis of the images is used for decision making.

5. How can a vacuum cleaner be as intelligent as a six-year-old child?

    The machine can handle certain situations (e.g., deal with obstacles) as well as the child. Of course the comparison is related only to limited tasks (such as dealing with obstacles).

6. Why are NLP and machine vision so prevalent in industry?

The knowledge about both technologies is abundant. There are many applications that are easy to justify (cost benefit). Also, they are easy to implement. Machine and computer vision components are fairly simple. Voice recognition is fairly mature technology which has been in use for decades.

7. Why are chatbots becoming very popular?

Chatbots can look like small people and they use natural language. When they have a large knowledge base (such as Alexa and Google Assistant), they can provide fairly accurate advice at a reasonable cost per usage. Chatbots can be used for both general purposes (like Alexa) or for specialized knowledge in a narrow domain (e.g., guide people in airports). Finally, people like them.

8. Discuss the advantages and disadvantages of the Turing Test.

It is a logical and simple test. Its results can be easily measured (e.g., in percents, or levels). It is inexpensive.
However, it is good only to Q&A dialog and it requires a large database as well as an intelligent human expert. It does not cover all aspects of intelligence.

9. Why is augmented reality related to AI?

Augmented reality integrates digital information with the users' environment in real time (e.g., vision and voice). The technology uses scene recognition, machine learning, NLP and even gesture recognition. It is available on some smart phones. It is used extensively in architectural design of furniture and building and in their sales.

10. Discuss the support that AI can provide to decision makers.

AI can support the individual steps in decision making as well as in automating the entire process. Steps such as problem (task) identification, brainstorming of finding alternative solutions, and selecting appropriate action to changes in the environment may be complex. AI can partially or fully automate these steps. Executing these steps may require expertise or complex data manipulation and analysis.

11. Discuss the benefits of automatic and autonomous decision making.

The two major benefits are cost reduction and fast execution. Cost reduction comes from either use of less people, or use of lower skilled employees. Also, employees working 24/7 are inexpensive. Finally, the decisions are consistent. For example, self-driving vehicles cause little or almost no accidents.

12. Why is general (strong) AI considered to be "the most significant technology ever created by humans"?

Strong AI can result in highly intelligent technologies that will enable machines to do many tasks that can benefit humans. Ultimately, people will have to work very little, served by robots. Also, strong AI will improve medical research, making people healthier and live longer. Also, more diversed entertainment will be delivered so quality of life will be drastically improved.

13. Why is the cost of labor increasing, whereas the cost of AI is declining?

The cost of labor rises with inflation and in areas of shortage of skilled labor. Workers demand higher wages. Cost of AI declines due to innovations, competition among producers, cheaper designs, and better knowledge.

14. If an artificial brain someday contains as many neurons as the human brain, will it be as smart as a human brain? (students need to do extra research)

Probably not. While more neurons can improve several machine activities, it may nor be enough to increase creativity, show emotions and exhibit other human capabilities. However, in certain areas, machines will be able to be smart or even smarter than humans.

15. Distinguish between dumb robots and intelligent ones.

Dumb robots are trained to execute one or a few tasks (e.g., move materials, weld a point). They cannot handle complex tasks or deal with malfunctions in processes which intelligent robots can do. Intelligent robots can deal with changing environments by stopping work or providing a solution to fix a problem (e.g., watch the *Bumblebee* movie, 2018).

16. Discuss why applications of natural language processing and computer vision are popular and have many uses.

Refer to question #6. In addition, both technologies have been around for long time. Machine vision has been extended to computer vision where even more applications exist. Both technologies are easy to explain and usually they support employees by making their job easier. However, recent applications, especially computer vision, may

replace humans.

ANSWERS TO EXERCISES (End of Chapter)

1. Go to **itunes.apple.com/us/app/public-transit-app-moovit/id498477945?mt=8**. Compare Moovit operations to the operation of INRIX.

   Moovit works for travel by bus or train. It is a geolocation tool that tells you, for example, when to exit a bus. You must have cellular data service for your cell phone. It is similar to Waze and INRIX, but it is not as sophisticated. Yet, it is good for public transportation. It is a free app. It is also tells you how to get from where you are to desired locations in many big cities by using public transportation.

2. Go to **sitezeus.com** and view the 2:07 min. video. Explain how the technology works as a decision helper.

   The site provides "location intelligence" which is the process of driving meaningful insights from geospatial data relationships in order to solve related problems. It assists in making location-related decisions. You can also create 3D terrain maps of many locations in the world. The SiteZeus technology works with machine learning. The technology provides retailers' and brands' capabilities for improving decision making (e.g., predictive power).

3. Go to Investopedia and learn about *investors' tolerance*. Then, find out how AI can be used to contain this risk, and write a report.

   Known as *risk tolerance*, it is the risk investors are willing to withstand. Solutions depend on the degree of risk tolerance. One way is to optimize portfolios by combining AI and risk methods. All the Big Accounting firms provide advice and tools.

4. In 2017, McKinsey & Company created a five-part video titled "Ask the AI Experts: What Advice Would You Give to Executives About AI?" View the video and summarize the advice given to the major issues discussed. (Note: This is a large class project.)

   This is a class project. Different videos can be allocated to different groups.

5. Watch the McKinsey & Company video (3:06 min.) on today's drivers of AI at **youtube.com/watch?v=yv0IG1D-OdU** and identify the major AI drivers. Write a report.

The power of technology, the ability to collect data and advancement in machine learning and deep learning are major drivers.

6. Go to the Web site of the Association for the Advancement of Artificial Intelligence **aaai.org/home.html** and describe its content. Compare it to that of **ai.sri.com** and **csail.mit.edu**/.

   The content of sites keep changing. So the answers will depend on when this exercise is assigned. Instructors could give guidelines.

7. Go to **crosschx.com** and find information about Olive. Explain how it works, what are its limitations and advantages and which types of decisions it automates and which it only supports.

   Olive is an AI assistant for different management tasks in the healthcare industry (e.g., check prior authorization, appointment reminder). Go to oliveai.com/meetolive/. The answer keeps changing with time. It can automate many tasks in front and back office tasks. The name of the company has been changed from Crosshx to Olive.

8. Go to **waze.com** and **moovitapp.com** and find their capabilities. Summarize the help they can provide users.

   The capabilities are improving with time. Waze is now a global app that helps drivers to navigate while moovit allows directions for public transportation users.

9. Go to **sentient.ai**. Find its products that facilitate e-commerce. Write a report.

   Scientists can build powerful distributed AI software platforms to create solutions for complex problems. It is based on sentient theory of perceiving and responding to changes in the environment (e.g., noise, light). .

10. Go to **artificialbrain.org** and report the latest progress there.

The answers depend on when the students will access the site. It is a very comprehensive site and the instructor should provide guidelines of how to organize the answers.

11. Find recent information on research that is aimed to measure artificial intelligence. Write a report.

The answers depend on the timing when the students will access sites. It is a very comprehensive site and the instructor should provide a guideline of how to organize the answers.

12. Go to **salesforce.com** and find recent developments in AI Einstein. Why it is so popular?

The answers depend on when the students will work on this assignment. The capabilities of the software are improving with time.

13. Find the latest information on IBM Watson's advising activities. Write a report.

IBM Watson's capabilites are ever increasing so the answers depend on when the assignment is made. (Check ibm.com/watson). Concentrate on health. Watch YouTube videos.

14. Find information on the use of AI in iPhones. Explore the role of Edge AI. Write a report.

The usage of AI in iPhones is constatnly increasing (e.g., see Simonte, *Wired* Magazine August 12, 2018). Several dozen applications exist and more are growing (Perez, et.al., *Tech Crunch*, July 6, 2018). For Edge AI, see **edgeaisummit.com**.

15. Explore the AI-related products and services of Nuance Inc. (**nuance.com**). Explore the Dragon voice recognition product.

Nuance's products and services keep changing. In general, it is a voice technology provider. The products of this company can understand, analyze, anticipate, reason, and resolve. Dragon voice recognition is a leading product. Well known in the medical field (dictating by physicians), it is good for training.

16. Go to Netradyne report at **cs_netradyne.com/**

and read about the use of its product for road safety. Write a report.

Netradyne provides 'our story.' The company combines computer vision, IoT, and machine learning. Applicants are related to self-driving of commercial vehicles. For how the company's product improves safety, see News provided by Netradyne in December 2017. Then, the product was called "Driver Assistance System."

17. Go to **salesforce.com** and investigate the capabilities of Gecko HRM. Relate it to Salesforce Einstein. Provide examples of two applications.

    Gecko HRM capabilities are ever changing. It is a social collaboration site. It replaces spreadsheets, providing intuitive, friendly and modular HRM applications. It can be combined with Einstein (from the same company) to extend applications to include analysis and predictions. Examples of applications are: managing travel orders and costs, performance management, and recruitment and onboarding.

18. Enter "**McKinsey.com/quarterly/the-five-fifty**". Scroll to find "Real world AI". Then click on view edition.What do you see?

There is a list of potential impacts on   by AI organized in 19 global sectors. Biggest impact is on retail and banking.

19. Find material on the impact of AI on advertising. Write a report. Go to **strategicsourceror.com/2018/03/giant-scale-supply-chains-can-make.html**. Summarize the use of AI.

    The areas covered are marketing and sales (up to $200 billion; customer service and risk management ($100 billion)); fraud and analysis and use of analytics.
    In similar reports and discussion papers from McKinsey Institute, one can find more examples and discussions.

20. Find material on the impact of AI on advertising.

    The impact of AI on advertising is a diversified topic covered by dozens of articles (e.g., in Forbes.com, clickz.com, ogilvy.com). the impact is ever changing. Instructors may use this as a class project, dividing the assignment to subtopics.

21. Go to **strategicsourceror.com/2018/03/giant-scale-supply-chains-can-make.html**. Summarize the use of AI.

   Strategic sourceror (News, March 16, 2018) claims that AI can improve decision making (procurement and sourcing) by expediting the movements along the supply chains. Sourcing opportunities are discovered quickly. Machine learning is a major AI technology for this purpose. Application areas include hotel and manufacturing.