Unit 1 – Theory of Science

Workbook Task

Describe the two empirical research paradigms in scientific practice (maximum one page) and describe two to three advantages and disadvantages of each in a table, using the table function in Word.

Hint:
There are two basic directions in empirical research, quantitative and qualitative. You should describe these two research directions, or paradigms, in more detail and work out how they differ from each other. Then list two or three advantages and disadvantages that can arise from these different empirical research methods.
Start on the next page.

Summary of quantitative and qualitative research

The scientific approach applied in research is an essential part of obtaining valid results. The approach has a direct influence on the whole process of the research and the accuracy of the results. With the main emphasis on empirical research, there are two basic directions, quantitative and qualitative (Oflazoglu, 2017).

Quantitative Research

According to Taylor (2005), the primary purpose of quantitative research is the objective and accurate description of phenomena. The research is about discovering principles and laws, which can be commonly regarded as truth and have little to no influence by the researcher itself. The researcher is only the observer and attempts to show that these phenomena can be controlled by manipulating variables and seeks to understand the relationship between them. Quantitative research approaches, such as correlation, causation, or development, result in numerical measurements, which can be statistically evaluated. (Taylor, 2005). These numerical measurements and analyses are then used to test the hypotheses of the researcher. Generally, methods are used that are more easily replicable to test if multiple researchers come to approximately the same results (Thomas, 2003).

Qualitative Research

Qualitative research focuses on interpretative approaches, exploring natural phenomena and different perspectives, to give an understanding of the social world (Oflazoglu, 2017). This means that researchers study matters in their natural settings and try to understand and interpret the researched data, which makes research results highly subjective. Some qualitative research methods are, for example, personal experiences, interviews, or life stories, which describe specific meanings in an individual's life, which helps the researcher gain a deeper understanding of the subject. Qualitative approaches are challenging to replicate, which means that results, as well as the interpretations, may vary between researchers, which gives a specific subject different solutions and opinions (Taylor, 2005).

Key differences between qualitative and quantitative research

Quantitative research methods focus on measurements and numerical data. The results from these approaches are objective and leave less room for interpretation (Thomas, 2003). Qualitative research is mostly conducted face-to-face, which makes the process and the results very dependent on the researcher and the questions. The data gained from these researches are always in a specific context, making the results subjective and leaves much room for interpretation (Taylor, 2005)

Advantages and disadvantages of qualitative and quantitative research

Each paradigm has a different approach, which has its advantages and disadvantages. The researcher must decide which of the research methods is best suited for conduction his research (Taylor, 2005). The table shows the advantages and disadvantages these paradigms have.

Quantitative Research			
Advantages	Easier to understand and interpret	Objective results	Easier to replicate
Disadvantages	Only analytical data	Less context of samples	
Qualitative Research			
Advantages	Rich and interesting data	More context of samples	
Disadvantages	Highly subjective results	Unknown reliability	Harder to replicate

References

Oflazoglu, S. (Ed.) (2017). *Qualitative versus quantitative research*. Rijeka: InTech.

Taylor, G. R. (2005). *Integrating quantitative and qualitative methods in research* (2. ed.). Lanham: University Press of America.

Thomas, R. M. (2003). *Blending qualitative & quantitative research methods in theses and dissertations*. Thousand Oaks: Corwin Press.

Unit 2 – Practical Application of Good Science

Workbook Task

Research two publications and describe their research methodology.

Hint:

For your research, consult the Internet first. Literature is available in databases such as Google Scholar, PubMed, Cochrane Library, Wiso-Net, or Springer Online. Some of these databases can be accessed freely by typing them directly into your browser; others can be accessed via the IUBH internal literature search. The topic of the publications found is not important for this task.

Now look to see whether they are reviews or empirical studies and if interviews or experiments were conducted. You might even be able to see whether the studies contain randomized experiments or meet other points from the evidence classes.

Begin on the next page.

How do Data Science Workers Collaborate? Roles, Workflows, and Tools (Zhang, Muller, & Wang, 2020)

The first analysis of research methodologies is about how data science workers collaborate with other fields of work. In this study, online surveys were conducted, with 183 participants, who work in different kinds of data science fields.

Analyzation of the research methodology

The study introduces the research with a summary of the data science field and shows the different kinds of programs, which are used by data scientists. The study also builds upon different kinds of literature with similar content and explains why the results do not give a sufficient answer for the following research question. At the same time, the study builds up the research question, "How do Data Science Workers Collaborate" and explains the specific goals of the research. Afterward, a detailed explanation of the survey is given, as well as further related work. For example, work practices, programs, and literature are reviewed, and information that supports the research is highlighted. In the next section and the introduction, the research gives us further insight into the methods. The conducted survey is divided into different parts and explained. This gives the reader information about the approach and conclusions to the resulting data can be made, which helps to identify the quality and type of data. In the following section, the results from the previously mentioned material and the survey are elaborated. The study explains all the research questions, which were stated in the introduction and its new findings.

Evidence class

The research methodology of this study consists of an online survey, where the evidence is based on the opinion of experts and a review of current literature and methods. According to the different evidence classes presented by Mehrholz (2010), the study can be considered evidence class IV (Mehrholz, 2010).

Explainable Artificial Intelligence (XAI): Concepts, taxonomies, opportunities and challenges toward responsible AI (Arrieta et al., 2020)

The second analysis of research methodologies is about a study that elaborates on the different aspects of "Explainable Artificial Intelligence (XAI)." The methodology in this study consists of literature reviews, from current studies about AI and the explainability of different models.

Analyzation of the research methodology

At the beginning of the study, the subject of Artificial Intelligence (AI) is introduced. In this introduction, the history of AI, as well as the growing use of it in the industry, is explained. Simultaneously the study explains the issues, which arise through this growing use. Not directly stating a research question, the study explains how the problem can be solved and the potential benefits of "eXplainable AI (XAI)" elaborated, introducing us to the main subject. The research question could be, "What is eXplainable AI? How can it improve the current AI methods and benefit the industry?". The following section answers many fundamental questions about the topic, where "how" is the most important. The study elaborates on how the different data and systems are categorized, giving further insight into the approach. The study then proceeds to review the literature and the different existing AI models to elaborate, how the previously mentioned XAI can further improve these methods.

Evidence class

The research methodology of this study consists of literature reviews and analyzation of different models. Since no own research approaches have been made and only existing literature is used, the evidence class system by Mehrholz (2010), does not apply.

References

Arrieta, A. B., Díaz-Rodríguez, N., Del Ser, J., Bennetot, A., Tabik, S., Barbado, A., . . . Herrera, F. (2020). *Explainable Artificial Intelligence (XAI): Concepts, Taxonomies, Opportunities and Challenges toward Responsible AI.*

Mehrholz, J. (2010). Wissenschaft erklärt: Evidenzstufen und Empfehlungsgrade – Was Studien wert sind. *Physiopraxis*, *8*(06), 20. https://doi.org/10.1055/s-0030-1262228

Zhang, A. X., Muller, M., & Wang, D. (2020, January 18). *How do Data Science Workers Collaborate? Roles, Workflows, and Tools*. Retrieved from http://arxiv.org/pdf/2001.06684v3

Unit 3 – Research Methods

Workbook Task

Work on any research questions for a research project in the subject area of your degree program. Consider whether this research question can be answered better qualitatively, quantitatively, or experimentally. Depending on the outcome of your decision, develop the appropriate methodical approach (maximum two pages). This means that you draft a survey via questionnaire, interview, participating observation, or experiment.

Begin on the next page.

Evaluation of current data mining techniques for social network hate speech

Elaboration of the topic and research question

The topic of this workbook is the evaluation of current data mining techniques for social network hate speech, where different types of newly found data mining techniques are researched and elaborated. The purpose of this study is to research how current data mining techniques could be used on different data sets from various social networks. The foundation and inspiration for this research is the study "A Survey of Data Mining Techniques for Social Network Analysis " (Adedoyin-Olowe, Gaber, & Stahl, 2013) and "A Data Mining-based Spam Detection System for Social Media Networks" (Xin Jin, Jiebo Luo, Flickr Internet, Jiawei Han, & The Pennsylvania State University CiteSeerX Archives, 2011). In the study "A Survey of Data Mining Techniques for Social Network Analysis," different data mining techniques are presented and elaborated, how they can be used for social networks. The author concludes the study with a summary of current methods and outlines future better-suited data mining techniques. The research question for this workbook could be "What is the best data mining technique for social network hate speech?".

Research methods and data type

At the beginning of the study, a literature review should be conducted. The literature review serves multiple purposes. First, a literature review compiles multiple different studies conducted on this topic. This gives an overview of the current state of this subject. Then, the information, which supports the research question, should be highlighted. It also gives further insight into the methods currently used (Ressing, Blettner, & Klug, 2009). For this research, I analyzed various studies and books, focusing on the aspect of current data mining techniques. Through the studies, I gained an overview of data mining itself, but also about different criteria data mining methods can be evaluated. It was also essential to analyze the subject of social networks and hate speech to understand which kind of data would be analyzed and evaluated. After the literature review, an experiment, with the previously mentioned methods, should be conducted. I chose the experimental approach because the various data mining techniques can be evaluated best by testing the models on various key parameters.

Definition of keywords

Before conducting the experiment, it is crucial to understand various critical factors of the research. Data mining uses data from large databases to extract hidden and essential information. This information can then be used for different kinds of methods. (Pujari, 2002). Since social networks have become increasingly popular over the years, hate speech has also increased tremendously. Many social networks have constructed various algorithms to filter hate speech. This leads to the question, what can be regarded as hate speech without restricting the freedom of speech? Hate speech can be considered the denigration or threat of an individual or group. The context of hate speech can vary. Hate speech can be made with or without the use of profanities, making it increasingly difficult to categorize (Malmasi & Zampieri, 2017).

Data mining techniques and data sources

For this experiment, I chose the approach of semi-supervised learning via clustering. In the case of supervised learning, data needs to be labeled for the technique to come to a result. For some use cases, this would be a better approach. However, for social networks, where an enormous scope of data needs to be analyzed, the semi-supervised learning method is better suited. It needs less human guidance because only a small portion of the data needs to be labeled. Semi-supervised learning methods are capable of finding their patterns, which accelerates the process of the experiment tremendously and are also able to find hidden patterns in the data, which may not be able in supervised learning (Lasko, Denny, & Levy, 2013). Data selection is also a crucial step since the success of a model is dependent on its training and testing data. Since social networks, data can vary significantly, and a large amount is needed for a sufficient representation, a web crawler would be best suited. Web crawlers are used for systematically downloading and storing vast sets of data (José L. V. Sobrinho, 2019). The web crawler should target websites, where much user activity occurs, for example, social media platforms. Another possibility is to download already labeled data sets from social media websites, like Facebook. The benefit is that a testing set does not need to be labeled anymore. However, it decreases the data freedom of the approach. Hate speech consists mostly of text

messages, which can be categorized as qualitative data (Del Olmo Pintado, 2020). Since the data type is quite similar, mostly text-based data, which have very subtle differences, the best-suited type of semi-supervised learning is artificial neural network (ANN) modeling. The artificial neural network method has various subgroups as well. The subgroups that are suited for this experiment are then selected and tested in the progress of the experiment. This experiment then leads to the result, which subgroup achieves the best results.

Experiment elaboration

The approach of the experiment undergoes different stages. At first, data must be selected through one of the previously mentioned methods. The data should consist of a variety of different text messages. This data is then split into the training set and the testing set. The data set should mostly remain in its original state, and only a small amount of text messages need to be labeled. This gives the model a direction, how the different text messages should be labeled. The testing set, however, will be labeled entirely, for the evaluation of the different methods. The labeling should consist of either "hate speech" or "no hate speech." The different artificial neural network methods are then tested on this set. The evaluation will be done by a confusion matrix, where the possible answers are either "yes" or "no." The methods should be evaluated multiple times, to create a mean, for a more representative result. These results are compared with each other to evaluate which of the methods has the highest success rate. The methods used are listed below.

Artificial neural network methods	
Methods	**Source**
Recursive Neural Network	(Lai Siwei, Xu Liheng, Liu Kang, & Zhao Jun, 2020)
Recurrent Neural Network	(Lai Siwei et al., 2020)
Convolutional Neural Network	(Lai Siwei et al., 2020)

Experiment approach and Testing of data mining techniques

The previously mentioned models are categorized into "Model A," "Model B," and "Model C." After training the models on the data set and evaluating them on the testing set, the precision, accuracy, and recall need to be calculated. These are essential parameters of the different models and give insight into their performance. A possible result could look like the following table.

Results of the experiment			
Models	**Precision**	**Accuracy**	**Recall**
Model A	97,23%	98,14%	95,14%
Model B	92,76%	90,21%	89,36%
Model C	93,27%	94,53%	93,84%

In this case, "Model A" is the best performing model of the experiment, since it has achieved the highest values of all the models.

References

Adedoyin-Olowe, M., Gaber, M. M., & Stahl, F. (2013). A Survey of Data Mining Techniques for Social Media Analysis. *Journal of Data Mining & Digital Humanities*. Retrieved from https://arxiv.org/pdf/1312.4617

Del Olmo Pintado, M. (2020). Bryman, Alan y Burgess, Robert G. (eds.): Analyzing Qualitative Data (London/New York: Routledge, 1994), 232 pp. Retrieved from http://dra.revistas.csic.es/index.php/dra/article/view/644

José L. V. Sobrinho (2019). WEB CRAWLER FOR SOCIAL NETWORK USER DATA PREDICTION USING SOFT COMPUTING METHODS. Advance online publication. https://doi.org/10.5281/zenodo.3129964

Lai Siwei, Xu Liheng, Liu Kang, & Zhao Jun (2020). *Recurrent Convolutional Neural Networks for Text Classification*. Retrieved from http://ir.ia.ac.cn/handle/173211/11477

Lasko, T. A., Denny, J. C., & Levy, M. A. (2013). Computational Phenotype Discovery Using Unsupervised Feature Learning over Noisy, Sparse, and Irregular Clinical Data. Advance online publication. https://doi.org/10.1371/journal.pone.0066341

Malmasi, S., & Zampieri, M. (2017). *Detecting Hate Speech in Social Media*. Retrieved from http://arxiv.org/pdf/1712.06427v2

Pujari, A. K. (2002). *Data mining techniques* (4th. impr). Hyderabad: Universities Press.

Ressing, M., Blettner, M., & Klug, S. J. (2009). Systematic literature reviews and meta-analyses: Part 6 of a series on evaluation of scientific publications. *Deutsches Arzteblatt International*, *106*(27), 456–463. https://doi.org/10.3238/arztebl.2009.0456

Xin Jin, Jiebo Luo, Flickr Internet, Jiawei Han, & The Pennsylvania State University CiteSeerX Archives (2011). A Data Mining-based Spam Detection System for Social Media Networks ABSTRACT. Retrieved from http://www.cs.uiuc.edu/~hanj/pdf/vldb11_xjin.pdf

Unit 4 – Academic Administration: Structure, Application, and Literature Management

Workbook Task

Develop a keyword search in English (five words each). You are welcome to pick up a topic that you have already worked on. List the keywords in a table.

Next, find suitable literature sources from your keyword search and create a bibliography with five sources in as many different source types as possible (e.g., book, anthology, internet source, newspaper article, legal text, etc.). Use the research accesses mentioned in Unit 4 (library catalogs, academic databases, etc.).

Begin on the next page.

Keyword search for evaluation of current data mining techniques for social network hate speech

The topic for this workbook is the same as in the last workbook, “evaluation of current data mining techniques for social network hate speech.” The five most relevant keywords for this research are listed in the following table.

Main keywords				
Data mining	Hate speech	Semi-supervised learning	Artificial neural network	Text classificiation

Results from different sources using these keywords are listed in the table below.

Search results		
Keywords	**Source type**	**Source**
Data mining	Book	(Berry & Linoff, 2004)
Hate speech	Thesis	(Oriol Sàbat, Universitat Politècnica de Catalunya. Departament de Teoria del Senyal i Comunicacions, Giró Nieto, & Canton Ferrer, 2020)
Semi-supervised learning	News	(Bortsova et al., 2020)
Artificial neural network	Report	(Mirkes, 2020)
Text classification	Academic journal	(Kuppili, Biswas, Edla, Prasad, & Suri, 2020)

References

Berry, M. J. A., & Linoff, G. S. (2004). *Data Mining Techniques : For Marketing, Sales, and Customer Relationship Management*. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=cat05114a&AN=ihb.1930&site=eds-live

Bortsova, G., Dubost, F., Hogeweg, L., Katramados, I., Bruijne, M. de, Shen, D., . . . Zhou, S. (2020). *Semi-supervised Medical Image Segmentation via Learning Consistency Under Transformations*. Retrieved from https://curis.ku.dk/portal/da/publications/semisupervised-medical-image-segmentation-via-learning-consistency-under-transformations(6e9ceb73-5c22-421a-a469-0f3864d83643).html

Kuppili, V., Biswas, M., Edla, D. R., Prasad, K.J.R., & Suri, J. S. (2020). A Mechanics-Based Similarity Measure for Text Classification in Machine Learning Paradigm. *IEEE Transactions on Emerging Topics in Computational Intelligence, Emerging Topics in Computational Intelligence, IEEE Transactions On, IEEE Trans. Emerg. Top. Comput. Intell.*, *4*(2), 180-180-200. https://doi.org/10.1109/TETCI.2018.2863728

Mirkes, E. M. (2020). *Artificial Neural Network Pruning to Extract Knowledge.*

Oriol Sàbat, B., Universitat Politècnica de Catalunya. Departament de Teoria del Senyal i Comunicacions, Giró Nieto, X., & Canton Ferrer, C. (2020). *Multimodal Hate Speech Detection in Memes ; Detección Multimodo del Discurso de Odio en Memes ; Detecció Multimodal de Discurs d'Odi als Mems*. Retrieved from http://hdl.handle.net/2117/165996

Unit 5 – Academic Work at IUBH: Written Assignments and Research Essays

Workbook Task

Formulate an introduction to a scientific paper (maximum one page) on a topic of your choosing (you are welcome to pick a topic you have already worked on). Note the contents that must be described in an introduction.

Begin on the next page.

Introduction to evaluation of current data mining techniques for social network hate speech

The subject of this workbook is the detailed introduction of a chosen topic. The topic for this workbook is the same, as in workbook 3, “Evaluation of current data mining techniques for social network hate speech.”

Introduction

For many years, social networks have grown a considerable amount. With millions of users per day, the data stream and user interaction have increased tremendously. This user interaction is not always from a positive nature. Often, the messages are negative in their context, even going so far as to be considered hate speech in some cases (Malmasi & Zampieri, 2017). Since social networks have a large data flow, different methods and approaches have been used over the years, like data mining, for example. These methods and approaches were further improved, and different subjects and topics are analyzed. This leads to gaining further insight and better results (Adedoyin-Olowe, Gaber, & Stahl, 2013). The objective is to evaluate current data mining techniques for social network hate speech, where the current data mining techniques are used to analyze and recognize hate speech messages on social networks. These techniques are then tested on key parameters and compared with each other, to conclude, which technique performs best. This test will be made in the form of an experiment. Before conducting the experiment, it is crucial to understand various prominent factors and keywords. The main focus of data is hate speech. Hate speech can be considered the denigration or threat of an individual or group. The context of hate speech can vary. Hate speech can be made with or without the use of profanities, which makes it increasingly difficult to categorize (Malmasi & Zampieri, 2017). The following study is structured as follows. First, an overview is given through a literature review, where past studies to different techniques and results are elaborated. Then the data is presented and explained. Next, the current and newly found techniques of data mining are elaborated and what techniques have been chosen, as well as the method of learning. After that, the experiment is elaborated, and the results presented. Finally, a conclusion based on the new findings is given, as well as future perspectives.

References

Adedoyin-Olowe, M., Gaber, M. M., & Stahl, F. (2013). A Survey of Data Mining Techniques for Social Media Analysis. *Journal of Data Mining & Digital Humanities*. Retrieved from https://arxiv.org/pdf/1312.4617

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Unit 6 – Academic Work at IUBH: The Project Report

Workbook Task

Sketch an initial outline for a project report on a topic of your choice (you are welcome to pick a topic you have already worked on). In addition, state the exact title of your project report and the questions that the project report deals with.

Begin on the next page.

Implementation of machine learning methods in wireless network placement

The topic chosen for this workbook is the implementation of machine learning methods in wireless network placement, where different machine learning techniques are used to evaluate the optimal placement for wireless network stations for maximum network connectivity. Inspiration and foundation of this topic is the study “Optimal Relay Placement in Multi-hop Wireless Networks” (Magán-Carrión, Rodríguez-Gómez, Camacho, & García-Teodoro, 2016).

Structure of the report

According to the course script, a project report should be oriented after the formal guidelines. The formal guidelines should be adapted to the project and the circumstances, to provide the maximum efficiency. The following project report outline is applied to a standard business type situation, with the intention to maximize efficiency and reduce costs. The report is structured after these factors.

Outline for the project report

At the beginning of the project report, an abstract would be best suited. It gives a short overview of the report. Followed by the table of contents, which gives the report a structure. After that, a list of abbreviations, figures, and tables. The next point is the introduction. The introduction defines the previous state of wireless network placement in the company. For instance, multiple employees have an issue with the connectivity of the network. The objective would be to find the ideal placement of network stations to provide the optimal connectivity, which leads to the scientific question for this report, "What is the best placement of wireless network stations, through machine learning methods?". An overview of the preparatory measures should also be given. The research, which was done on the various aspects of this topic, for example, connectivity, machine learning, and wireless network, needs to be elaborated. This gives insight into the report's key parameters and explains why the topic was approached this way. After an overview of the report follows the body, which is the central part of the report. The whole development of the project is written in the body. Beginning with the planning phase. Here the initial ideas to the project are stated, as well as the structure plan. For example, the network placement through a specific methodology, with appointed milestones, the project can use as a guide. Next comes the actual project phase. The development of the project is described here. For example, if the implementation of machine learning techniques has proven successful or another method needs to be implemented. How the approach has developed and what has changed compared to the initial planing. Project progress reports and time scheduling complement the project phase. Giving further insights into the procedure, for example, reaching initial milestones on time and documenting how challenges have impacted the project, for example, the research and implementation of another methodology. The last part of the body, consisting of the project resources, describes the initial estimated costs and the actual costs of the project. Another critical aspect, which determines if the project was a success. The conclusion comes after the body and is the evaluation of the whole project. This part, determines, through critical analysis and reflection if the project was a success. This evaluation can be obvious. For example, if the implementation of machine learning methods did not lead to better or did lead to worse network connectivity. However, the evaluation can be subtle as well, considering many smaller aspects, which makes the project a success or failure. For example, the implementation of machine learning did lead to better results, yet the business resources would have had more value on a different project. Interpreting and analyzing the conclusion can also help improve projects and procedures in the future. After the conclusion, a list of annexes, as well as the attachments, materials, and bibliography, follow.

References

Magán-Carrión, R., Rodríguez-Gómez, R. A., Camacho, J., & García-Teodoro, P. (2016). Optimal relay placement in multi-hop wireless networks. *Ad Hoc Networks*, *46*, 23–36. https://doi.org/10.1016/j.adhoc.2016.03.007

Unit 7 – Academic Work at IUBH: The Case Study

Workbook Task

For the “Tilda” case described at the beginning of this unit, develop a case study structure, i.e., a first rough draft. Write an introduction (half a page to a maximum of one page).

Begin on the next page.

Demotion of a 38-year-old mother after childbirth, despite eight years of successful management

The topic of this workbook is the case study “She” of the coursebook unit 7.

Case study structure

At the beginning of the case study, a title page should be made, followed by the table of contents. Following a list of abbreviations, figures, and tables, to give an overview and structure. The next section is the introduction. In the introduction first, the context of the case should be elaborated. The context gives an insight into the event, which is the topic of the case study. To give a further explanation of the event, a literature review should be conducted. The literature gives the case study a theoretical foundation, which can be transferred into the practical case. The body is the main part of the case study. In the body, the case, as well as the issues of the topic, are presented, for example, the unfair treatment against a woman in the workplace. The topic is then further elaborated. Through critical analyses and qualitative data, logical connections must then be concluded, to discover why this event occurred and draw conclusions. After analyzing the case, a logical solution should be presented. The next section is the conclusion. In conclusion, the case is further discussed, for example, the shortcoming of proper research material or the solution's interpretation. The case study can then be analyzed, and possible advice for further research can be elaborated. After the conclusion, a list of annexes follows, as well as attachments, materials, and a bibliography.

Introduction

The topic of the following case study is about the unfair treatment of a 38-year-old woman in her workplace. The 38-year-old woman was the head of the public relations department at an energy company and was eight years successful in this position. Despite this success, she was demoted from her management position, to only be in charge of the administration in her department. The reason for the demotion was because she became a mother. After the birth of her son, she was immediately removed from her position, because according to the company she is employed at, leadership positions can only be exercised on a full-time basis. She now has a 75 percent part-time position and struggles to speak out against the company because she is dependent on her income. She, however, is not the only woman who struggles with this kind of treatment. The female workforce has increased tremendously over the years and is still increasing to this day. The general attitude for a woman in the workplace has also changed over the years. Positions, like management, for example, have been denied for women decades ago and are now achievable. While a woman can now pursue such positions, and discrimination has lessened over the years, equality is still not fully achieved yet (Gregory, 2003). Mothers especially have it difficult in the workplace. While taking care of children is not exclusively the mother's task, this is often the case. Associating the position of caretaking with the mother, leads to a further distinction between male and female workforces (Kittay, 1999). Even though there is a pregnancy discrimination law in place that should prevent this kind of distinction, the sentiment of equality difference is still in the minds of many people. This kind of discrimination varies between employers and workplaces and is still a genuine obstacle that many women need to overcome (Grossman, 2010). Many different cases of this kind of equality difference have happened over the years. The following case study gives an insight into the perspective of a mother and the current state of equality through qualitative data.

References

Gregory, R. F. (2003). *Women and workplace discrimination: Overcoming barriers to gender equality*. New Brunswick, N.J: Rutgers University Press. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=104922

Grossman, J. L. (2010). Pregnancy, Work, and the Promise of Equal Citizenship. Retrieved from https://scholar.smu.edu/law_faculty/110

Kittay, E. F. (1999). *Love's labor: Essays on women, equality, and dependency*. *Thinking gender*. New York: Routledge. Retrieved from http://www.loc.gov/catdir/enhancements/fy0651/98018629-d.html

Unit 8 – Academic Work at IUBH: The Bachelor's Thesis

Workbook Task

Please prepare the following points as part of a small exposé for a topic of your choice from your field of study:

a. Topic and title of the work

b. Research question

c. First rough structure

d. Introduction (short)

e. Bibliography with five sources or literature references

Select a new topic here that you have not used before in the workbook tasks.

Begin on the next page.

Transforming freehand sketches into technical CAD drawings through autoencoder methodology

Topic overview and research question

The topic of this workbook is “transforming freehand sketches into technical CAD drawings through autoencoder methodology,” where hand-drawn sketches on paper are analyzed through an autoencoder and transformed into a digital technical drawing. This approach has several challenges, and since sketches are mostly disproportionate compared to the measurements written on the paper, the lines must be scaled correctly. The geometry of sketches can also be deformed, so the autoencoder must predict what kind of geometry the lines result in and, in the further step, categorize the geometry. The research question for this topic can be, “How can freehand sketches be transformed into technical CAD drawings through autoencoding?”.

Structure of the thesis

At the beginning of the thesis should be a title page, containing all mandatory information needed. After the title page comes the dedication and acknowledgments. Followed by the abstract, which summarises the thesis into one page for a quick overview. Next comes the table of contents, list of figures/tables, and abbreviations, this serves as a structure for the whole thesis. The next section is the body, which is the central part of the thesis. The first section in the body is the introduction. The introduction serves as a basic description of the topic, gives an overview, and elaborates on the thesis's objective. The next chapter is the literature analysis/review. It describes the current state of research and gives an understanding of the topic. The research methodology comes next, which elaborates on the approach of the thesis and why this methodology was chosen. After explaining how the approach was conducted, the findings resulting from the methodology must be presented, critically reviewed, and compared with the literature used for the thesis. At the end of the body comes the conclusion. The conclusion summarises the entire work and presents the recommendations, as well as limitations, which helps to conduct future research. At the end of the thesis, comes the appendix for information, which is too detailed for the body. At last, comes a glossary, if needed, and the affidavit.

Introduction

The art of sketching has been around for a long time, even dating back to classical antiquity. It is a drawing method that is less detailed than other art forms and can be created quickly. Even though sketches have this loss of detail, the context of the drawing can still be understood. For this exact reason, sketches are still widely used in the industry of the 21st century, since it conveys the key aspects of specific models, details, and situations in a matter of seconds. The sketches in the industry have shifted from the artistic approach to more commercial use. Sketches are then mostly used to flesh out ideas and projects in the form of technical drawings or other mediums (Harmon, 2017). The challenge here lies in creating technical drawings. Since sketches are disproportionate to their measurements, with a crude line drawing, the final technical drawing or CAD drawing, can look quite different. Converting the sketch to a CAD drawing is a time-consuming process but a necessary step to convert a drawing into a useable medium for machines and to create accurate representation. (Ablameyko & Pridmore, 2000). To reduce the mistakes made by manually creating the CAD drawings and to increase the efficiency of converting, the following thesis presents a way to transform freehand sketches into technical CAD drawings through current autoencoder methodology. The autoencoder methodology is a type of artificial neural network and is best suited for processing images. The autoencoder aims to copy the inputs provided and reconstructs them under the wanted results as output (Hubens, 2018). Similar research on this field has already be done and is an inspiration for this topic, but most of the studies focus on the reversed process of sketch to model or use the approach for a different field, like sketch to 3D-model (Berthelot, Schumm, & Metz, 2017) & (Pallavi, Sannidhan, Sudeepa, & Bhandary, 2018). This leads us to the research question of this topic “How can freehand sketches be transformed into technical CAD drawings through autoencoding?”. First, the thesis structure consists of a literature review, which elaborates on the current approaches and gives an overview of the subject. Then the autoencoders are explained. Why a particular method was chosen and how it affects the approach, as well as the data used to train the autoencoder. After the approach is elaborated, the results are discussed and critically reflected. At last, follows the conclusion, there the overall thesis is concluded, and future research is discussed.

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Ablameyko, S., & Pridmore, T. (2000). *Machine Interpretation of Line Drawing Images: Technical Drawings, Maps and Diagrams*. London: Springer. https://doi.org/10.1007/978-1-4471-0789-7

Berthelot, D., Schumm, T., & Metz, L. (2017, March 31). *BEGAN: Boundary Equilibrium Generative Adversarial Networks*. Retrieved from http://arxiv.org/pdf/1703.10717v4

Harmon, A. (2017). Sketch (rough drawing). *Salem Press Encyclopedia*. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=ers&AN=87324895&site=eds-live

Hubens, N. (2018, August 24). Build a simple Image Retrieval System with an Autoencoder. *Towards Data Science*. Retrieved from https://towardsdatascience.com/build-a-simple-image-retrieval-system-with-an-autoencoder-673a262b7921

Pallavi, S., Sannidhan, M. S., Sudeepa, K. B., & Bhandary, A. (2018). A Novel Approach for Generating Composite Sketches from Mugshot Photographs. In *2018 International Conference on Advances in Computing, Communications and Informatics (ICACCI), Advances in Computing, Communications and Informatics (ICACCI), 2018 International Conference on*. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=edseee&AN=edseee.8554564&site=eds-live

INTERNATIONALE HOCHSCHULE

Unit 9 – Academic Work at IUBH: Oral Assignments

Workbook Task

Create a short PowerPoint presentation (maximum of 8 slides) on the topic "The reasons for my choice of study." Pay special attention to the hints for a good visualization.

Begin on the next slide.

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The reason for the choice of data science as study field

Sandro Schweiss

What is Data Science?

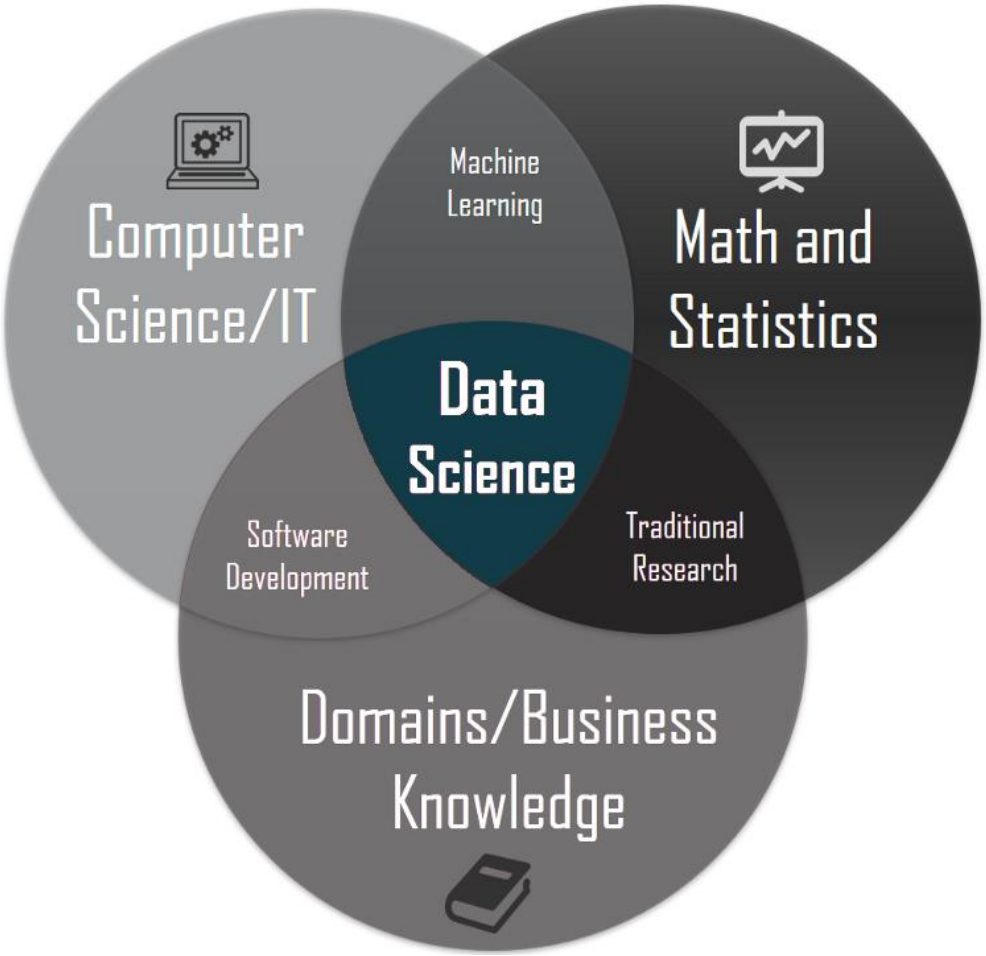

Figure 1. Different Data Science competencies (AI-United-Redaktion, 2019)

Table of contents

Area of data science application

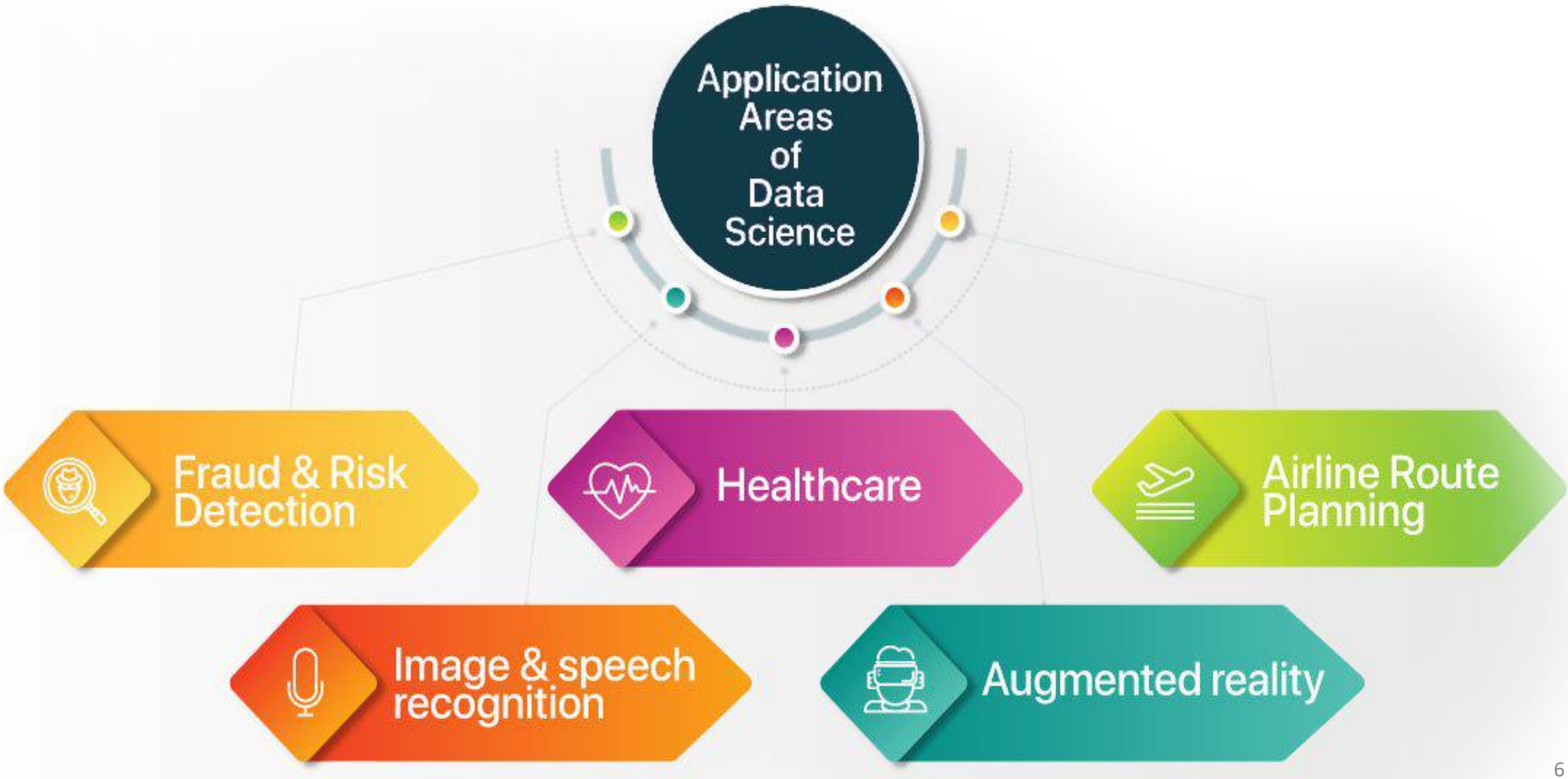

Figure 2. Example application areas of data science (““10xDS - Exponential Digital Solutions (@10xds) / Twitter,” 2020)

Career as data scientist

Figure 3. Rising career chances (“How is Data Science Career Path Profitable?,” 2019)

Future outlook on the industry

Figure 4. Future of data science (Team, 2017)

Conclusion

Figure 5. Overview of Data Science (“Data Science,” 2020)

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The reason for the choice of data science as study field

Sandro Schweiss

References

Figure 1. Different Data Science comepencies, AI-United-Redaktion (2019, January 17). Wie kommt man in die Datenwissenschaft rein? AI-United. Retrieved from https://www.ai-united.de/wie-kommt-man-in-die-datenwissenschaft-rein/

Figure 2. Example application areas of data science, 10xDS - Exponential Digital Solutions (@10xds) / Twitter (2020, June 11). Retrieved from https://twitter.com/10xds

Figure 3. Rising career chances, How is Data Science Career Path Profitable? (2019). Retrieved from https://www.digitalvidya.com/blog/data-science-career-path/

Figure 4. Future of data science, Team, D. (2017, December 2). Bright and Auspicious Future of Data Science – Learn it Before you Regret. *DataFlair*. Retrieved from https://data-flair.training/blogs/future-of-data-science/

Figure 5. Overview of Data Science, Data Science (2020, June 11). Retrieved from https://www.btelligent.com/themen/data-science/

INTERNATIONALE HOCHSCHULE

Unit 10 – Academic Work at IUBH: Oral Project Reports

Workbook Task

Consider this course as a project and create a short PowerPoint presentation for the implementation. Use a graphic to illustrate your approximate timeline from the course booking to the submission of the workbook. The individual workbook tasks are milestones and should be marked on your schedule. Be sure to create slides on at least four of the above aspects for structuring a project and visualize them.

Begin on the next slide.

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Overview of Introduction to Academic Work

Sandro Schweiss

Table of contents

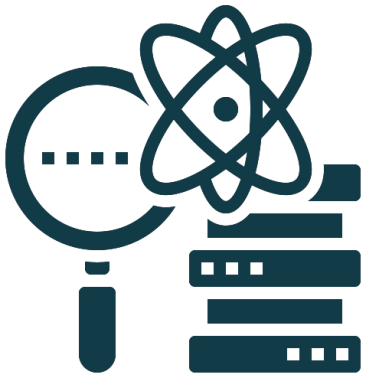
Course booking and preparation

Booking of the course

Overview of the guidelines

Using search engines (Google Scholar,…)

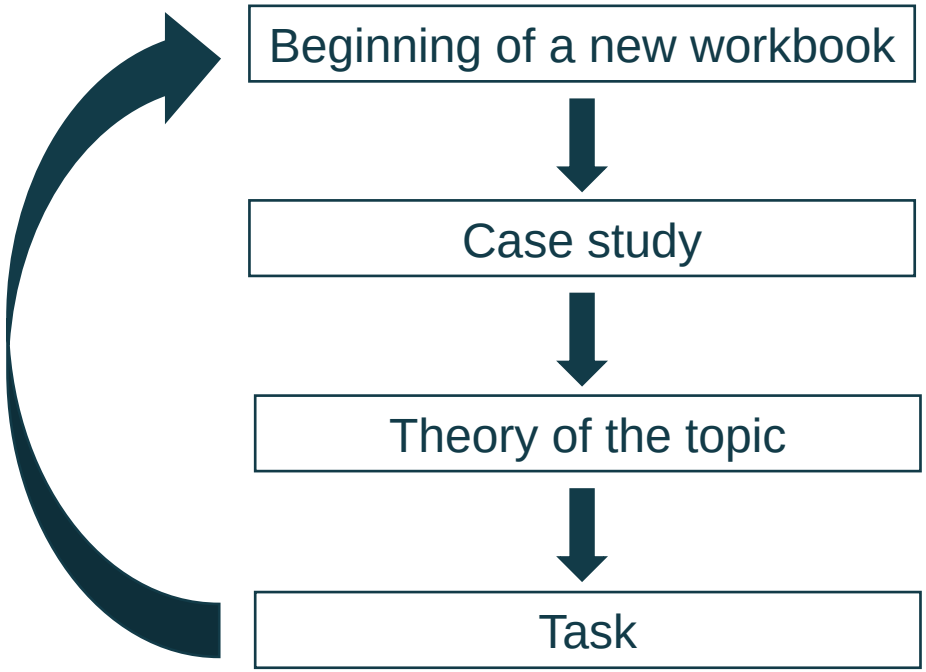
Studying of literature



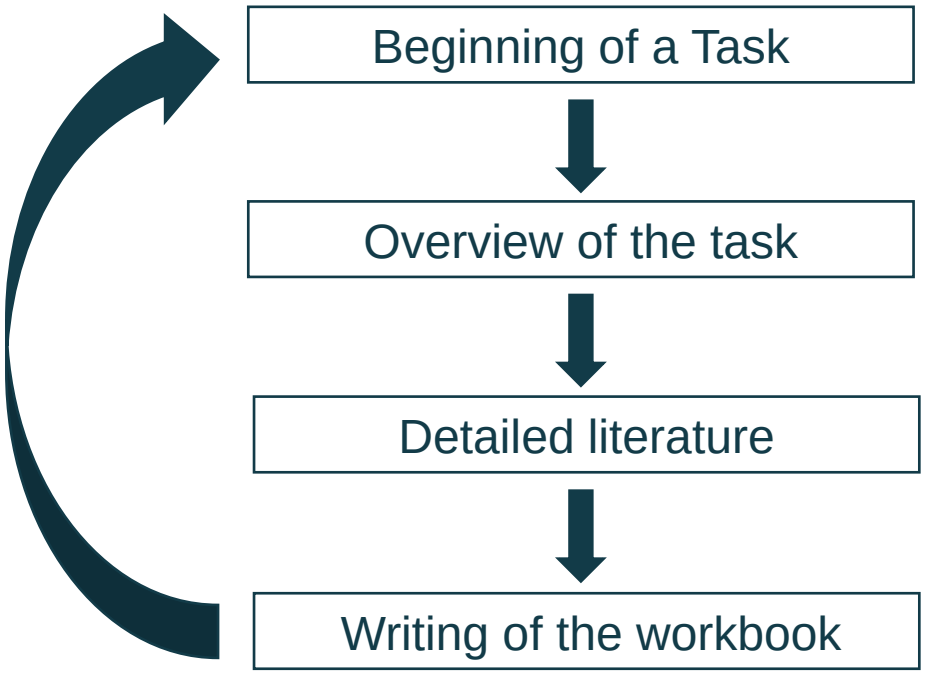
Using tools for writing

- Citavi
- Word
- Powerpoint

Structure of the course

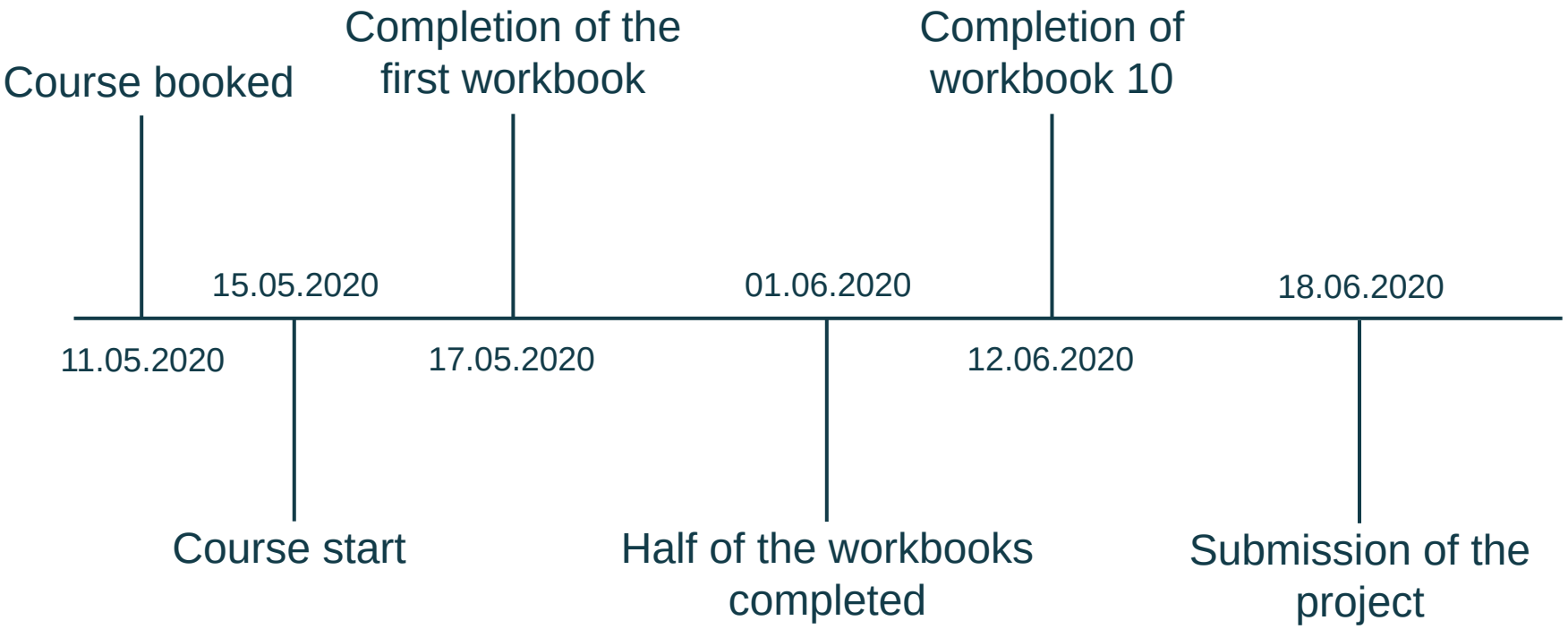


Individual workbooks



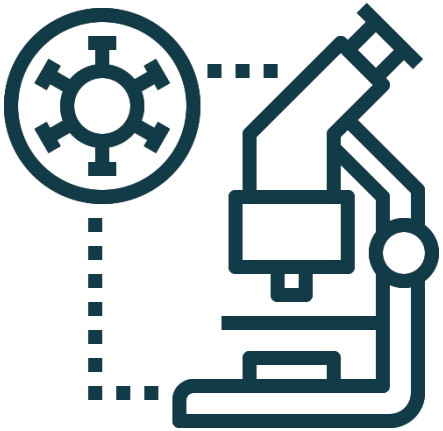
13 individual workbooks

Timeline of the course



Results

Increased knowledge of certain topics



Know how to conduct proper research

Able to write in academic guidelines

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Timeline of Introduction to Academic Work

Sandro Schweiss

References

Figures 1-7, Flaticon, the largest database of free vector icons (2020, June 12). Retrieved from https://www.flaticon.com/

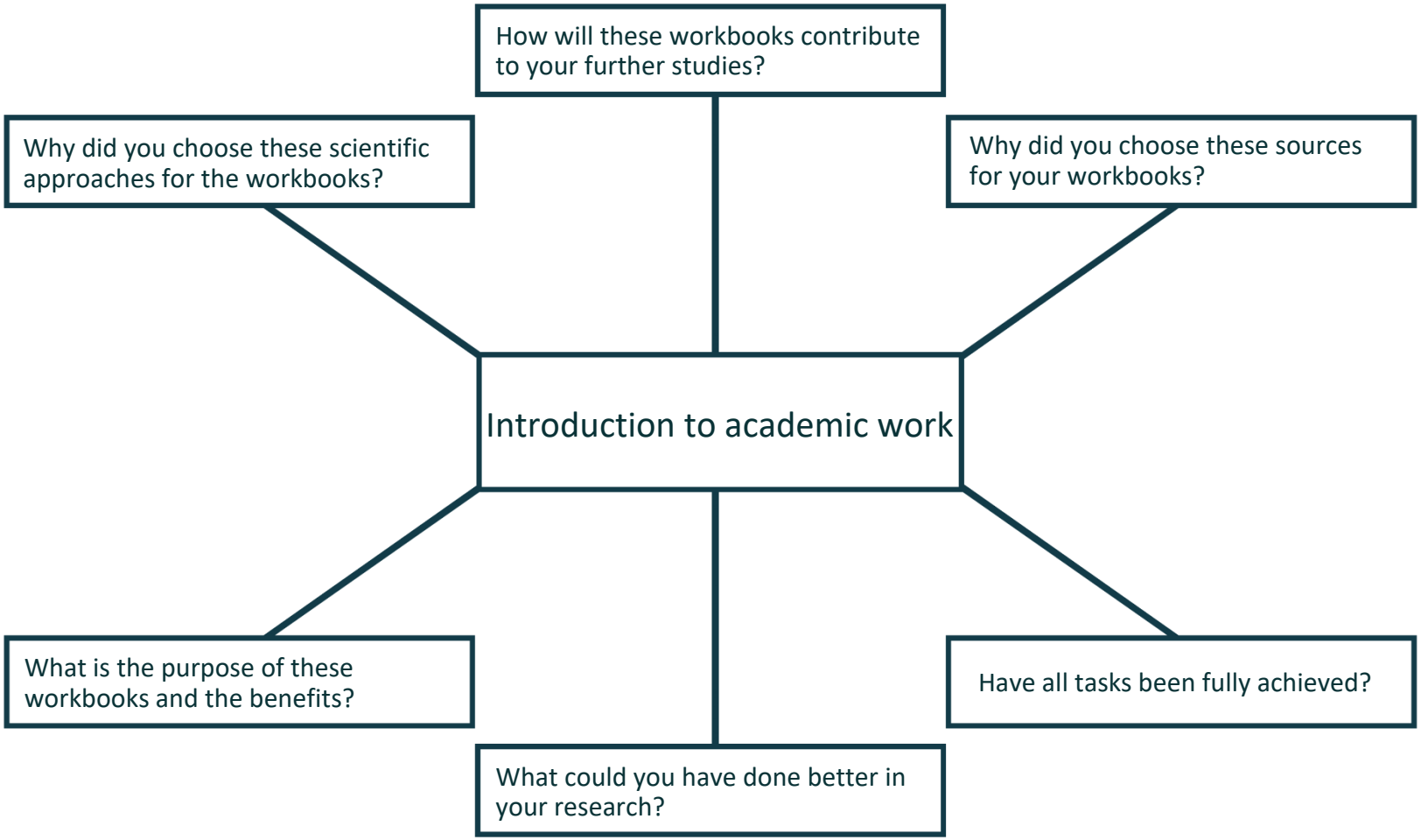
Unit 11 – Academic Work at IUBH: The Colloquium

Workbook Task

Imagine if you had to defend this lesson academically. Visualize at least six further questions in the form of a mind map in a Word document that could be asked in a defense.

Begin on the next page.

Mind map for possible questions



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Unit 12 – Academic Work at IUBH: The Portfolio

Workbook Task

Come up with an idea for a product within your area of study. Now use PowerPoint to create the slides within the framework of the defined milestones. The final scope of this exercise is a presentation with four examples of milestones and the formulated concept.

Begin on the next slide.

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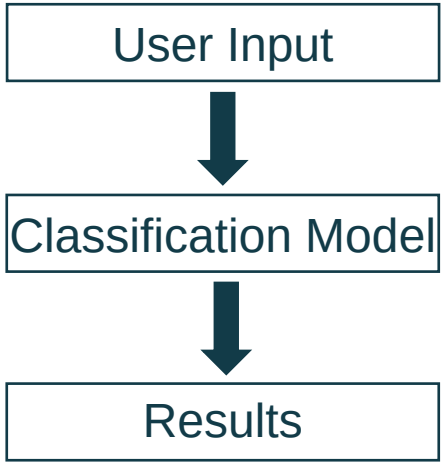
Implementation of a career assignment system

Sandro Schweiss

Table of contents

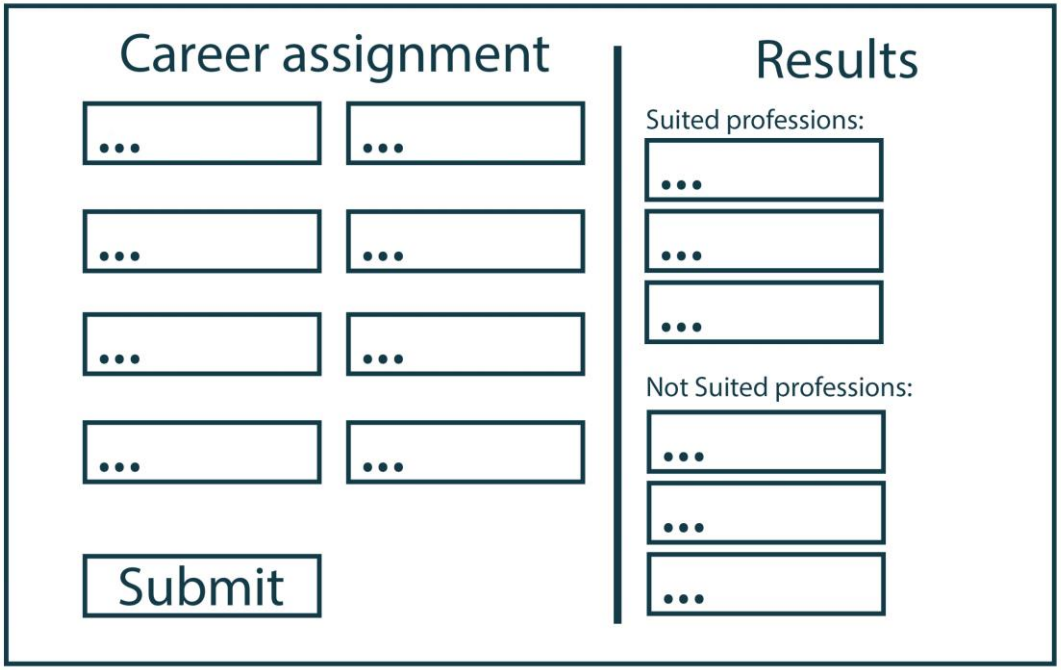
Concept of the career assignment system

The project for this workbook is the implementation of a career assignment system. In this tool, the user first submits their interests and personal preferences, the more detailed this description is, the more accurate the result. Then the user inputs are utilized through a classification model. The classification model is trained with labeled data, using various interests from people and the feedback, if the person likes the chosen profession or not. So that through keywords careers are shown, which similar people like and dislike, this helps not only to choose the suggested profession but also sort out those who may not be suited for the person. The keywords are then evaluated and shown as a result of the specific person. If the person chooses one of those professions, the data and the feedback from the said person is then used to polish the methodology further.



First milestone - Creating the user interface

This is a first rough draft for the user interface. At the left screen, the information from the user, as well as information for verification, is inserted. When the data is submitted, the information is processed, and the results are presented on the right side. In the results, suited and not-suited professions are shown.

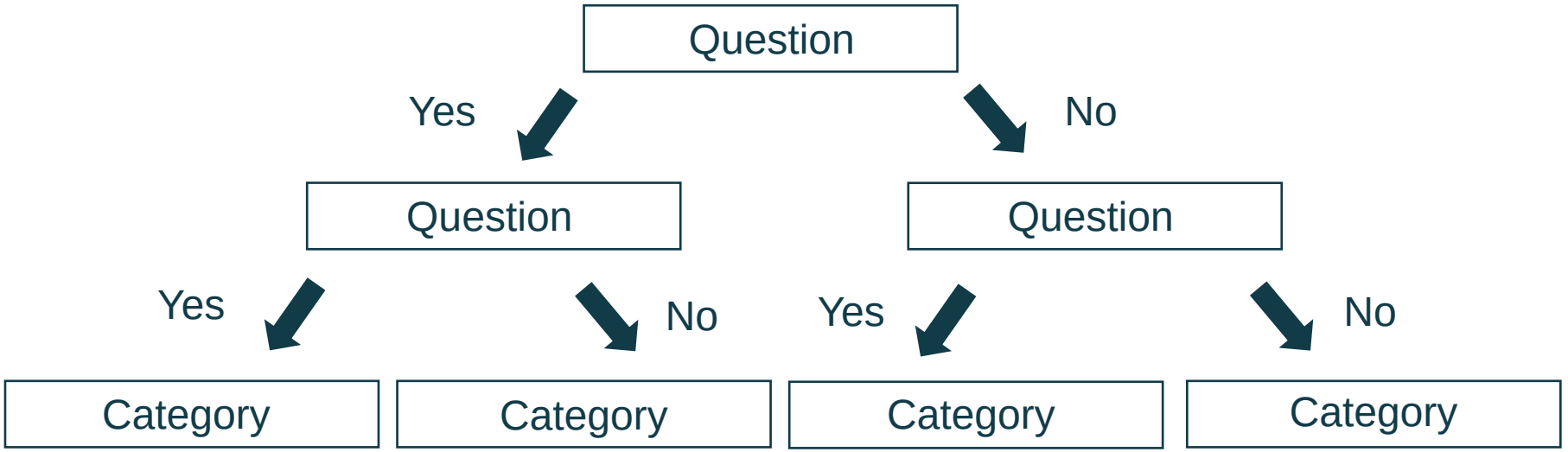


Second milestone - Prepartion of the data

For this project, the methodology of supervised learning has been chosen. To collect the data, anonymous surveys have been conducted. The surveys consisted of keywords for the profession, hobbies, and feedback on how much liked the chosen career path is. This data is then analyzed and labeled, which means that the data input has a defined output. After labeling, the data is then split into training and testing data for the classification model.

Third milestone - Training the classification model

The classification model for the career assignment system is a decision tree. A decision tree asks for one distinct attribute until a final leaf is reached. The information the user provides is worked through the decision tree, with simple yes or no questions, until the best options for a potential career have been reached (Ungvarsky, 2018).



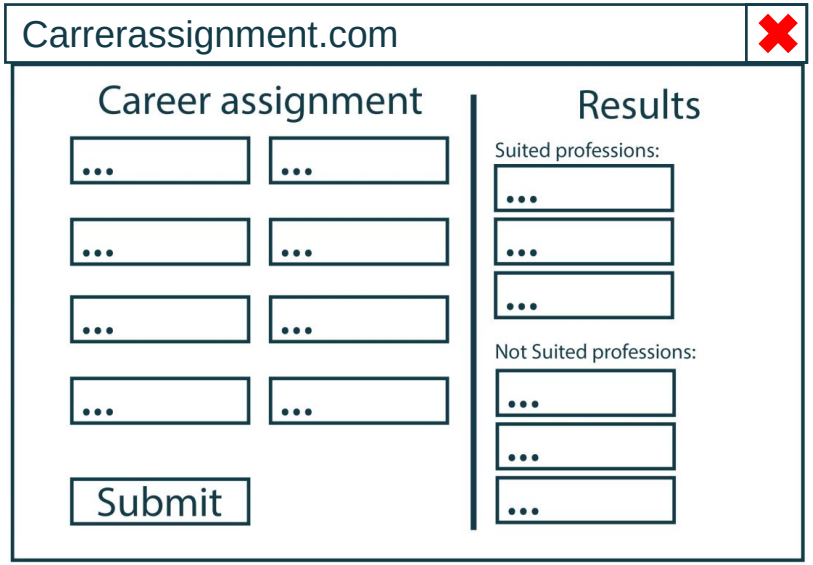
Fourth milestone – Final Product

For the final step, the classification model is then combined with the user interface. This step in development then needs to be tested to ensure that the data is correctly utilized. After the testing, the career assignment system needs to be worked into an application, so that the distribution and use of another person can happen easily.

Application

Career assignment system

Website



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Implementation of a career assignment system

Sandro Schweiss

References

Ungvarsky, J. (2018). Decision tree. *Salem Press Encyclopedia*. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=ers&AN=129815314&site=eds-live

Unit 13 – Academic Work at IUBH: The Exam

Workbook Task

Conduct a trial exam online with or without a proctor. Then write a reflection on your experience, weighing the advantages and disadvantages of an online exam (half a page to one page maximum).

Begin on the next page.

Important! You can only write a free trial exam with a proctor once. Please read the information about the online exam on CARE.

https://care-fs.iubh.de/en/study/information_for_students/information-online-exams.php?p_id=4284

The following link will take you directly to the trial exam with a proctor:

https://iubh-onlineexams.de/practiceexamwithproctoring

You can write the trial exam without a proctor as many times as you want. The following link will take you to the exam: https://iubh-onlineexams.de/practiceexamwithoutproctoring

The advantages and disadvantages of an online exam

The topic of the workbook is the reflection of taking an online exam. Here the advantages and disadvantages of this kind of exam are elaborated from my view. Beforehand I have taken the online exam without a proctor.

Advantages

The advantages of an online exam are quite versatile, and I thoroughly believe that these kinds of exams are becoming more popular and essential for the future. For me, this is one of the most important reasons I chose the IUBH since I believe that a physical presence limits your ability to learn. The first significant advantage is the ability to learn at your own pace. Schools and universities have the problem that exams have to take place at a set time. This discourages individuality and may be too early or too late for some students, but through online exams, the process gets individualized, and the person can take the exam if they are ready. The next advantage is that the exam takes place in a familiar environment. This helps not only for concentration since there is only one person taking the exam but also helps to ease the tension. Most of the time, exams are held in locations where the atmosphere is quite tense, so this helps to calm down and focus on the task at hand. Another benefit of not having to be at a specific location is that it saves a lot of time, especially if you are further away or not even being able to attend these tests if you don't move to another location. I am from Austria, and if online exams would not be held, I could not even attend this specific university, which limits the option of education for many people.

Disadvantages

The disadvantages are quite minor compared to the advantages. Online exams are not very common in the education system. This can give a feeling of unfamiliarity. If online exams are not handled correctly, this unfamiliarity can lead to anxiety since the exam strays far from the norm, and the sensation fo being watched from a screen can be quite nerve-wracking. However, the IUBH handles this situation exceptionally well, since online exams can be practiced with or without a tutor, where you can prepare yourself for the real test. The next disadvantage is technical issues. Before the exam starts, the equipment and the connection are checked to ensure that the exam runs smoothly, but nobody can predict technical malfunctions. Of course, the exam is then graded as failed, but the student is of no fault here, which can be quite frustrating if it happens and leads to a lost chance for an exam.