

MSc. in Computing Practicum Approval Form

Section 1: Student Details

Project Title:	Extracting Information from Images of Charts
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Chosen major:	Data Analytics
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Date of Submission	30/01/2022

Section 2: About your Practicum

What is the topic of your proposed practicum? (100 words)

The topic for our proposed practicum is: Extracting Information from Images of Charts. Under this topic we plan to analyse the possible methods and benefits of automatically extracting key information from images of various types of charts. We will critically research and review previously published journal papers by researchers who embarked upon a similar endeavour and implement our own system to extract information from images of charts.

Please provide details of the papers you have read on this topic (details of 5 papers expected).

1. Davila, K., Setlur, S., Doermann, D., Bhargava, U.K. and Govindaraju, V., 2020. Chart mining: a survey of methods for automated chart analysis. IEEE transactions on pattern analysis and machine intelligence.
2. Ganguly, P., Methani, N., Khapra, M.M. and Kumar, P., 2020. A Systematic Evaluation of Object Detection Networks for Scientific Plots. arXiv preprint arXiv:2007.02240.
3. Luo, J., Li, Z., Wang, J. and Lin, C.Y., 2021. ChartOCR: Data Extraction from Charts Images via a Deep Hybrid Framework. In Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (pp. 1917-1925).
4. Methani, N., Ganguly, P., Khapra, M.M. and Kumar, P., 2020. Plotqa: Reasoning over scientific plots. In Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (pp. 1527-1536).
5. Kafle, K., Price, B., Cohen, S. and Kanan, C., 2018. DVQA: Understanding data visualizations via question answering. In Proceedings of the IEEE conference on computer vision and pattern recognition (pp. 5648-5656).
6. Mathew, J., 2021, May. A Survey on Object Detection from Scientific Plots. In 2021 5th International Conference on Computer, Communication and Signal Processing (ICCCSP) (pp. 94-99). IEEE.
7. Shahira, K.C. and Lijiya, A., 2021. Towards Assisting the Visually Impaired: A Review on Techniques for Decoding the Visual Data from Chart Images. IEEE Access.

8. Zhou, F., Zhao, Y., Chen, W., Tan, Y., Xu, Y., Chen, Y., Liu, C. and Zhao, Y., 2021. Reverse-engineering bar charts using neural networks. Journal of Visualization, 24(2), pp.419-435.

We are currently in the process of reviewing 7 more shortlisted journal papers that would complete the cumulative literature review for this practicum.

How does your proposal relate to existing work on this topic described in these papers? (200 words)

We will closely examine the attempts made on this topic by past researchers. Our current research suggests the best results are obtained by using some form of neural network. Once we complete our review, we would like to conclusively provide the merits and demerits of the approaches used in these papers. We would also implement a strategic process based on our research to try and implement a system that can provide competitive accuracy in extracting correct information from images of charts.

What are the research questions that you will attempt to answer? (200 words)

- What is the social significance of automated extraction of information from images of charts?
- With all the ongoing advancements in computer vision, are researchers close to implementing a high accuracy model that can automatically extract information from images of charts in the real world?
- If not, what significant changes are required? What are the biggest challenges involved in extracting specific information from images of charts specifically?
- From an accessibility point of view, what level of accuracy can be considered satisfactory when it comes to extracting information from images of charts?

How will you explore these questions? (Please address the following points. Note that three or four sentences on each will suffice.)

- What software and programming environment will you use?

Our primary programming language would be Python owing to its superior ability to handle importing and analysing images. As we move along the implementation, we may decide to switch to some other programming language if need be.

- What coding/development will you do?

We would like to build a model that parses these images, annotations, and question-answer pairs to extract meaningful information from these images of charts.

- What data will be used for your investigations?

We will be using the PlotQA dataset which consists of over 28.9 million question-answer pairs based on over 224,377 plots on data from real-world sources. This dataset consists of 3 data files: Images of charts, their annotations, and Question-Answer pairs. The annotations file consists of detailed information about the images. The QA pairs file consists of some questions and their expected correct answers along with the corresponding image IDs. The dataset is also divided into 3 parts, one each for training, validation, and testing the implemented model.

- Is this data currently available, if not, where will it come from?

The PlotQA dataset is publicly available on their [GitHub page](#).

- What experiments do you expect to run?

Our primary experiment would be to run the test data in our implemented model to correctly answer some questions based on images of charts with a good percentage of accuracy.

- What output do you expect to gather?

Our desired output for this practicum is to perform solid research into this underappreciated implementation of computer vision and to implement a system that can accurately extract desired information from images of charts.

- How will the results be evaluated?

The results can be evaluated based on how accurately our implemented model extracts information from images of charts. We can also compare our accuracy percentage with the accuracy of other researchers to conclusively deduce the outcome of our implementation.