Final Project Presentation

This is a presentation in which I will provide the proposal for my final project that will conclude my study for a Masters in Computer Science. I will aim to provide information regarding the topic chosen, it's relevance to the field and the contributions that can be made to it within the real world. I will also endeavour to provide information about pre-existing works in the field and further information about exactly how and when this research will be completed.

Project Title

So of course, the first thing anyone will read regarding my project will be the title. After a long process of editing and consideration, I have settled on the title of "Machine Learning And It's Usage Within Curriculum And Revision Planning In Secondary Education". Whilst this title is potentially longer than I might have wanted it to be, it captures the full scope of the questions I want to answer and alludes to the artifact that I wish to make. I have chosen to complete this kind of research because I believe that there is scope for an exciting piece of work relating to machine learning and it's applications within education, as it does appear to be a prime candidate for this sector.

Significance/Contribution to the discipline/Research Problem

The project contributes to the discipline of computer science by looking at a real world scenario where it may be able to provide a benefit. It has been known for a considerable amount of time that the demands on staff in secondary education are exceptionally high, and there is scope for tools such as machine learning to potentially aid with this. It also touches upon the problem of a "one size fits all" model within education, as the research will look at whether it is possible to use machine learning to tailor the experience that students have to their own education needs without placing unnecessary burdens onto teacher and educational staff. Specifically from a computing point of view, the research contributes further knowledge and

applications of machine learning to embed the practical impacts of this that have already been explored.

Research Question

The specific research question at hand is whether it is possible to increase the experience of both students and teachers within secondary education through the utilisation of machine learning. While this is a direct question, it can be broken down into subparts relating to teachers and students, as well as the impact on curriculum and revision as separate entities. This question should hopefully produce a resolute answer as opposed to something that may be subject to interpretation. The questions at the centre of this research also allow me to explore two fields which I am incredibly passionate about, those being computer science and education, and will hopefully allow me to contribute in a meaningful way to both of these.

Aims and Objectives

With regards to the aims and objective of the project, these can be seen on the screen. The primary aim of the project is to identify whether machine learning can provide benefit to the secondary education sector. This is a high level aim with allows for a number of potentially discussions to take place. As for the objectives, these are to develop an application that meets the requirements within the research question and to analyse the results of this application to identify whether it is beneficial.

Key literature related to the project

There is already literature and research relating to the topic that has been published, however a lot of this pertains to the use of machine learning to predict test results, rather than using machine learning to shape the curriculum. Yousafai and their colleagues for example have built models that analyse the performance of students throughout their education to predict scores, as have Joshi and Kumar. They have identified that machine learning is an effective method for this, and as such we can

assume that similar kinds of data could be used with regards to shaping the curriculum and revision planning.

Forero-Corba and Bennesar have done research into how machine learning has been applied to the education sector as a whole, with a small amount of focus placed on academic performance and curriculum, expanding on previous work completed by Ahajjam with regards to neural networks and their applications within education.

It does appear however that there is a lack of meaningful research that already exists regarding the way machine learning can be applied to curriculum and revision planning in secondary education. While this could potentially be detrimental to the project as a whole, it does allow for scope to create something original and make a new contribution to the the field of computer science and its relevance to education.

Methodology/Development strategy/Research Design

The methodology and development strategy for the project will be split into two separate parts, those being the research development and the application development. Regarding the research development methodology, the main form of the research will involve identifying the needs of the secondary education sector, identifying how the work is currently completed by teaching staff and analysing the models that might be used with regards to Machine Learning. The intention is to find a real world case to apply the research to, this being a school class. However, if this is not able to take place, a theoretical set of data will be used to identify whether the model works or not.

From an application development standpoint, the software development life cycle will be used to ensure that a fully designed, developed and tested piece of software is created. The bulk of this work will be the training of the machine learning model and ensuring that this is tested to provide the results expected within the original hypothesis stage.

Ethical considerations and risk assessment

While the ethical consideration at hand for this research project are minimal, it is possible that any interactions with real world users could raise potential ethical questions. This is especially important with regards to any impact that this research might have on real world secondary students. As there would be some form of interaction with educational establishments during this research project, care will need to be taken regarding the use of the application and how this will be fed back to participants.

With respect to any form of risk assessing for the project, there are minimal risks related to the research and generation of an artefact for this. The artefact is intended to be built within a local environment, thus mitigating any potential risk relating to bad actors gaining access through a network or internet connection. The main risks relating to the project will be in the form of the data that is used. Personal data will need to be recorded as part of the learning process so that the model can be trained, and as such there is a certain level of risk relating to thing.

It is worth noting that both of these are subject to change and subject to full approval, and during their development will be fleshed out in considerably more detail than I have been able to explain today.

Description of artefact(s) that will be created

The main artefact generated as part of this project will be an application that allows the inputting of data relating to students and how they have performed within mock examinations, with the application then using a machine learning algorithm to analyse this and provide the teacher with individual strengths and weaknesses for each student. It will also use this algorithm to look at strengths and weaknesses for the entire class and will help inform the teacher of what topics and subjects should be focused on. The application is designed to be used frequently so that any changes in the strengths and weaknesses of both individual students and the entire class are captured and changed.

The application should allow teachers to log in, see their classes as a whole and pull data that has been analysed by the machine learning algorithm to identify where

their focus should be placed with regards to the individual sub-topics within their subject. There is also scope to allow students to log into the application too, with them being able to receive personalised schemes of work and revision that aim to pick up on their weaknesses. Data will be able to be added by both parties, with the machine learning algorithm using this to further learn about individual students and the class as a whole, altering the information it provides to those parties as time goes on.

Proposed timeline

The timeline of the project that I have developed should allow me to generate a competent piece of work, along with adequate time to test my artefact and proofread my research to ensure that it is coherent and beneficial. As can be seen, it is my intention to have the first draft of my dissertation completed by early June, giving me two months or so to fully proof read and edit this. As for the artefact, I intend on having the design of this completed by early March, with development completed by mid May and testing completed by early July, which will allow time for this to be use and feedback gathered. I aim to work in an agile manner, so that any potential issues that arise can be returned to with relative ease, however where possible I will aim to keep to deadlines so that I can make the most of my time.

Conclusion

To conclude this presentation, I believe I have created an interest proposal for my work that will allow me to show the product of my learning, as well as making a meaningful impact in areas which I have a deeply held passion for. It goes without saying that the information provided today is subject to change during the actual project module, and I will aim to seek guidance from my supervisor where needed to ensure that my work is of the highest standard.

Word Count: 1666

Works Referenced

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