**Project Objectives**

The use of AI in education has the potential to support pupils learning and help reduce teacher workload. The Department for Education (DfE) continues to commit heavily in the pursuit of artificial intelligence (AI) technologies to reduce teacher workload and improve student experience. Moreover, the DfE is embracing AI to enhance STEM education and streamline teaching practices. Generative AI tools are being integrated to reduce administrative burdens, like lesson planning and marking, enabling teachers to focus on student engagement. In the spirit of this endeavour, this project aims to create a prototype model to assist students in mathematical reasoning through use of comprehension math problems whereby students are asked tailored math questions and are offered a correct answer response. The aim is not to a create a fully interactive, production ready system, rather the intention is to produce the basis of a model capable of answering bespoke comprehension maths questions with a view to further development beyond the scope of this project. The core project objectives can be summarised as follows,

* Develop and appropriate model which is trained to respond correctly to math comprehensions questions;
* Develop a mechanism by which to automatically generate a dataset of comprehension maths questions;
* Employ relevant evaluation techniques to measure model performance;
* Iteratively improve the model based on evaluation feedback;
* Provide reasonable and justifiable conclusions concerning the performance of the final model;
* Provide recommendations for further development based on lessons learnt.

**Data Considerations**

Although we are not dealing with a prescribed dataset, we

Methods bywhich to template data and generate random questions

**Methodology and tooling**

The objectives of this project

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **AI and Machine Learning Final Project Plan** | | | | | | | | | | | | | | | | | | | | | | | | |  |  |
|  | Gateshead College |  | Project Start: | Thu, 3/27/2025 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Spencer O'Hegarty |  | Today: | Fri, 4/11/2025 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | Display Week: | 1 |  |  | Mar 24, 2025 | | | | | | | Mar 31, 2025 | | | | | | | Apr 7, 2025 | | | | | | |
|  |  |  |  |  |  |  | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|  | **TASK** |  | **PROGRESS** | **START** | **END** |  | M | T | W | T | F | S | S | M | T | W | T | F | S | S | M | T | W | T | F | S | S |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Phase 1 Research model and data requirements** | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Data Analysis |  | 100% | 3/27/25 | 3/27/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Model Analysis and Choice | | 100% | 3/28/25 | 3/28/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Model Prototyping |  | 100% | 3/29/25 | 3/31/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Phase 2 Model Development** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Initial data generation function | | 100% | 4/1/25 | 4/1/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Initial model development | | 100% | 4/2/25 | 4/4/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Phase 3 Evaluation and Model Iteration** | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Initial model evaluation | | 100% | 4/5/25 | 4/6/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Model Iteration |  | 100% | 4/7/25 | 4/7/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Revised model evaluation | | 100% | 4/8/25 | 4/9/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **Phase 4 project Report** | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Intro and objectives |  | 100% | 4/7/25 | 4/7/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Data Desc and EDA Findings | | 100% | 4/8/25 | 4/8/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Methodology |  | 100% | 4/9/25 | 4/9/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Results, Conclusions and Refs | | 100% | 4/10/25 | 4/10/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Review - report and code | | 100% | 4/11/25 | 4/11/25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |