Objective: To develop a classical machine learning solution and a hybrid quantum-classical solution that improves on the classical one for a specific task in a 5-month client project.

Task: The task we have chosen is to build an automatic damage evaluation system for car insurance.

Plan of Actions:

Research and gather data:

Conduct a comprehensive study of competitive systems, available data sets and algorithms, their types, and their working.

Obtain the necessary data from the client, including customer car and damage images.

Identify the data cleaning and preprocessing techniques required to make the data suitable for machine learning models.

Develop classical machine learning models:

Analyze the preprocessed data and augment input images.

Choose suitable classical machine learning algorithms to build the recommendation system.

Develop and train the models using the chosen algorithms.

Optimize the models using hyperparameter tuning and cross-validation.

Evaluate the performance of the models and choose the best-performing one.

Integrate into a suitable interface for the customer, test and get feedback.

Build a hybrid quantum-classical solution:

Collaborate with quantum experts, such as Mo or Alexey, to understand the fundamentals of quantum computing and its application to machine learning.

Identify the parts of the ML system that can be accelerated using quantum computing, presumably the downstream of the classification similar to Terraquantum`s research paper on the classification of DNA.

Develop quantum algorithms and circuits for the identified parts and integrate them with the classical machine learning models.

Train and optimize the hybrid quantum-classical models and evaluate their performance.

Timeline:

Month 1:

- Research and gather data (2 weeks)
- Develop classical machine learning models (2 weeks)

Month 2:

- Optimize classical machine learning models (1 week)
- Collaborate with quantum experts (2 weeks)
- Identify the parts for quantum acceleration (1 week)

Month 3:

- Develop quantum algorithms and circuits (2 weeks)
- Integrate quantum algorithms with classical models (1 week)
- Train and optimize hybrid quantum-classical models (2 weeks)

Month 4:

- Develop web-based application (3 weeks)
- Test the application (1 week)

Month 5:

- Prepare final report and presentation (3 weeks)
- Present to the client (1 week)

Resources:

- Data analyst for data cleaning and preprocessing (2 weeks)
- Machine learning engineer for classical models development and optimization (4 weeks)
- Quantum expert for quantum algorithms and circuits development (4 weeks)
- Junior student for assisting in data preprocessing and classical model development (5 months)
- Python, TensorFlow, Qiskit, Flask, HTML, and CSS for software development

Level of programming:

- Data analyst: intermediate
- Machine learning engineer: advanced
- Quantum expert: advanced
- Junior student: beginner/intermediate

Note: The above plan is just a sample and may vary based on the specific task and client requirements.