

# Final Project

## Deep Learning 1

Data Science for Business Masters Program (2024)

1. Data pre-processing
  - ◆ Load and preprocess the dataset. You may need to perform data cleaning before proceeding to the next steps.
  - ◆ Split the data into train, validation and test sets
2. Model Building
  - ◆ Define a neural network model with PyTorch
  - ◆ Use appropriate activation functions (implement the activation functions on your own).
  - ◆ Add dropout and batch normalisation layers.
3. Model Training
  - ◆ Define a loss function.
  - ◆ Choose an optimizer.
  - ◆ Write a training loop to train the model on the training data.
  - ◆ Validate the model on the validation set after each epoch and save the model with the best validation performance.
4. Hyperparameter Tuning
  - ◆ Experiment with different hyperparameters such as learning rate, batch size, number of epochs, optimizer type, and model architecture.
5. Model Evaluation
  - ◆ Evaluate the best model on the test set.
  - ◆ Calculate performance metrics such as accuracy, precision, recall, F1-score
  - ◆ Plot confusion matrix

### Final Jupyter notebook should contain

1. Code for model building, training, and evaluation using the custom implementations.
2. Inline comments explaining the purpose of each code block.
3. Plots and visualisations of training/validation loss, accuracy, confusion matrix.
4. Summary of hyperparameter tuning and the effects of regularisation.
5. Final evaluation metrics on the test set.

### Short report (1-2 pages) summarising

1. Dataset description.
2. Model architecture.
3. Hyperparameters explored and their impact on performance.
4. Regularisation techniques applied and their effects.
5. Final model performance.

You can download the dataset from this [link](#). For detailed information about the dataset, please refer to the dataset [description](#).