

# Group Assignment: Deep Learning Applications in Bitcoin Market Trading

## Objective

The objective of this group assignment is to apply the concepts learned in the subject module "*Deep Learning Applications*" to solve a bitcoin market trading-related problem. Students will be tasked with finding a suitable bitcoin dataset, preprocessing the data, developing and training deep learning models (such as LSTM or Transformer), performing model selection, and evaluating the models' performance in terms of profitability and variability.

## Task Description

- **Dataset Selection:** Find a suitable bitcoin dataset for market trading analysis. The dataset should include relevant features such as price, volume, and any other indicators that could be useful for trading strategies. Provide the source URL or upload the dataset to a shared location accessible by all group members.
- **Preprocessing and Feature Engineering:** Preprocess the dataset to handle missing values, normalize the data, and engineer additional features if necessary. Utilize libraries like *talib* for generating technical indicators that could enhance trading strategies.
- **Model Development:** Develop deep learning models using techniques such as LSTM or Transformer. Experiment with different architectures, hyperparameters, and training strategies to optimize performance.
- **Model Selection:** Perform model selection by evaluating the trained models using appropriate metrics. Consider factors such as profitability, stability, and generalization ability. Choose the best-performing model(s) for further analysis.
- **Evaluation:** Evaluate the selected model(s) on a separate test dataset. Measure the profitability of the trading strategy implemented by the model over a given time period. Additionally, analyze the variability of profitability to assess the robustness of the model.

## Deliverables

- **Dataset:** Provide the selected bitcoin dataset along with its source URL or upload it to a shared location.
- **Notebook:** Submit a Jupyter notebook containing the following:
  - Data preprocessing steps and feature engineering techniques applied.
  - Deep learning model development, including architecture, hyperparameters, and training process.
  - Model selection methodology and results.
  - Evaluation metrics and analysis of the model's performance in terms of profitability and variability.
- **PDF Report of the Notebook:** Deliver a PDF version of the notebook for easy review.

- **Overall Report:** Prepare a concise report summarizing the key findings, methodology, and insights gained from the analysis.

### Evaluation Criteria

- Correctness of dataset selection and preprocessing techniques.
- Effectiveness of deep learning model development and selection process.
- Performance of the selected model(s) in terms of profitability and variability (will be given a higher proportion of marks).
- Clarity and organization of the notebook and reports.
- Ability to apply knowledge from the subject module and out of the subject module to solve real-world problems in bitcoin market trading.

### Additional Notes

- Make sure that all of your groups have 5 members except for a one group which consists of the remaining students.
- Get the contribution of all the members of the group to the assignment.
- Clearly indicate the index numbers and names of the members of your group.
- ONLY ONE member should submit the assignment from a group.