1.Introduction
1.1 Background and Motivation
1.2 Research Objective
1.3 Contributions
a) Designing a threshold-based multi-class target variable
b) Feature engineering using technical indicators
c) Neural network model implementation and evaluation
d) Visualization comparing predicted vs actual trends

3. Data
3.1 Data Collection

3.2 Data Processing
Calculate Return = pct_change()

4. Model Design and Implementation
4.1 Neutral Network
(Mathematical)

4.2 Labeling Strategy
Follow something similar to the normal distribution
Threshold = ±0.3 * standard deviation
Classification into Down / Neutral / Up

4.3 Parameter Setup

Input layer: 4 features
Hidden layers: Dense, BatchNorm, LeakyReLU, Dropout
Output: Dense(3), softmax
Optimizer: Adam
Loss: sparse categorical crossentropy
Batch size and learning rate
Epochs

5. Experimental Results (Model Performance)
Accuracy, loss
Classification report (Precision, Recall, F1-score)

Color-Coded Actual Trend on Price Chart

Historical price plotted with red (Down), blue (Neutral), green (Up) based on real labels.

Visual Comparison Side-by-side or overlapping comparison of predicted vs actual trend trajectories.

7. Conclusion and Future Work
7.1 Key Findings
The model captures broad up/down trends well
Neutral state is difficult to classify correctly
7.2 Limitations
Labeling is sensitive to threshold
7.3 Future Work

References