ChatGPT

Proposed Research Framework for DSE Stock Prediction

Data and Features

- **Dhaka Stock Exchange (DSE) Historical Data:** Use daily OHLC (Open, High, Low, Close) and volume data for Dhaka-listed stocks. Comprehensive DSE datasets (1999–2025) are publicly available (e.g. via Kaggle or the DSE CSV repository [1] [2]). This ensures rich training data in your local context.
- **External and Technical Indicators:** Augment raw price data with additional features. Calculate technical indicators (RSI, MACD, moving averages, etc.) and incorporate macroeconomic factors (inflation, GDP, interest rates) and market sentiment (e.g. news or social media sentiment) [3] [4]. Prior work on DSE shows that adding external features can significantly improve accuracy (e.g. one study found a ~24% accuracy gain when including macro and sentiment data) [5] [4].
- **Preprocessing:** Apply standard time-series preprocessing: synchronize timestamps, impute missing values, and normalize features (e.g. Z-score or min-max) to stabilize training. Use a sliding window approach (e.g. 60–100 days history) to form input sequences. Follow rigorous time-series train/test splits (e.g. rolling or blocked cross-validation) to avoid information leakage.

Model Architecture and Training

- **Regression Forecasting:** Frame this as a regression task (predict next-day closing price or return). Deep learning models like LSTM/GRU, Temporal Convolutional Networks, or Transformers are well-suited to capture temporal patterns [6] [7]. You might start with a bi-directional LSTM or a hybrid CNN–LSTM/GRU model (combining convolutional feature extraction with recurrent memory) as tested in related work. Attention-based models (e.g. Transformers or multi-head attention LSTM) are also promising for capturing long-range dependencies [8] [9].
- **Feature Selection and Optimization:** Use automated methods to select the most predictive features and tune hyperparameters. For example, metaheuristic optimizers (genetic algorithms, Bayesian optimization, etc.) can choose relevant features and optimize model parameters (as in prior studies [10] [11]). Tools like Weights & Biases (WandB) can help manage experiments and search. However, beware overfitting — ensure model complexity is justified by the data.
- **Training Process:** Train the model on historical data (e.g. 2010–2023) and reserve the most recent data for testing. Use a walk-forward validation scheme and appropriate loss (e.g. MSE). Employ regularization (dropout, early stopping) to mitigate overfitting. Monitor metrics such as RMSE, MAE, and directional accuracy on a held-out test set. Backtesting simulations (e.g. using Backtesting.py) can also be conducted to estimate trading profits from the predictions.

Explainable AI (XAI) and Interpretation

- **Integrate XAI Tools:** To address the “black box” nature of deep models, apply explainability methods. For example, compute SHAP values or LIME for your trained model to quantify each

feature's impact on the prediction [12]. Previous studies have used SHAP to reveal which technical indicators and price history points drive the forecasts, improving trust in the model [12].

- **Insight Generation:** Use global explanations (SHAP summary plots) to identify dominant drivers (e.g. recent momentum indicators or volume spikes) and local explanations (LIME on individual days) to see context-specific influences. This can uncover economic intuition (e.g. "inflation rate spike tends to predict market downturn" etc.) and make your results actionable. Incorporating XAI not only strengthens the paper's novelty but also aligns with calls in the literature for interpretable finance AI [12] [4].

Expected Contributions and Publication Path

- **Novelty:** This study will be among the first to apply an XAI-enhanced deep forecasting model specifically to Dhaka Stock Exchange data. By combining comprehensive DSE OHLC data with multi-source features (technical indicators, macro and sentiment factors) and interpretability analysis, the work fills gaps noted in recent surveys [4]. In particular, addressing data scarcity and model explainability makes the approach innovative for the Bangladesh context.
- **Performance Evaluation:** Expect to achieve better accuracy than simple models. For example, prior DSE studies showed LSTM outperforming baselines [6], and hybrid models with external features outperforming simple LSTM [5] [4]. Your model's performance should be evaluated against these benchmarks (LSTM, XGBoost, etc.) using metrics like RMSE, MAPE, and possibly directional accuracy.
- **Publishing Strategy:** Aim for journals or conferences at the intersection of AI and finance. Relevant venues include regional journals (e.g. *International Journal of Finance, Bangladesh Journal of Business and Finance*), AI/ML conferences with finance tracks, or open-access journals (e.g. *Applied Sciences, IEEE Access, or IJECE*). Highlighting the Dhaka Stock Exchange focus and XAI aspects will appeal to reviewers. Also consider workshops on AI in emerging markets or financial data science to reach interested audiences.

By following this plan—leveraging rich DSE data [1] [2], modern DL methods, and XAI tools—you will address many noted limitations (data scope, feature breadth, interpretability) and produce a publishable study on Bangladeshi stock prediction.

Sources: Historical DSE data is openly available [1] [2]. Similar DSE forecasting studies used LSTM successfully [6]. Including macro/sentiment features has been shown to boost accuracy [3] [5], and explainable AI (SHAP/LIME) is increasingly applied in financial prediction to illuminate model decisions [12]. These insights underpin the proposed approach.

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[1] Dhaka Stock Exchange Historical Data - Mendeley Data
https://data.mendeley.com/datasets/23553sm4tn/3

[2] DSE CSV Data | Dhaka Stock Exchange | DSE Stocks
https://dsestocks.com/dse-csv-data/

[3] [5] Stock market prediction of Bangladesh using multivariate long short-term memory with sentiment identification | Islam | International Journal of Electrical and Computer Engineering (IJECE)
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4 (PDF) Machine Learning Models for Stock Price Prediction: A Comprehensive Review of DSE Applications
https://www.researchgate.net/publication/388285072_Machine_Learning_Models_for_Stock_Price_Prediction_A_Comprehensive_Review_of_DSE_Applications

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7 8 9 10 12 Explainable-AI Powered stock price prediction using time series transformers: A Case Study on BIST100
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