**Automated Stock Price Prediction Using Machine Learning — Report Summary**

**Authors:** Mariam Moukalled, Wassim El-Hajj, Mohamad Jaber (American University of Beirut)  
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**Abstract**

The paper presents an automated trading system that integrates mathematical functions,  
 machine learning, and news sentiment analysis to predict end-of-day (EOD) stock price/trend  
 using only the first several trading hours. The study compares SVM, SVR, RNN, and DNN  
 models across AAPL, AMZN, GOOGL, and FB (2008–2017 Reuters tick data + news sentiments).  
 SVM achieves the best performance with up to 82.91% directional accuracy on AAPL.

**Introduction**

Stock movement is influenced by fundamentals (e.g., EPS, macroeconomy), technicals  
 (e.g., inflation/deflation, historical prices), and market sentiment (news, social media, events).  
 The authors argue that incorporating real-time news sentiment with intraday price features can  
 enhance predictive accuracy and inform automated trading decisions.

**Method (Data & Modeling)**

\*\*Data Sources\*\*: 10 years of tick data (Jan 1, 2008–Dec 31, 2017) and news sentiment from Reuters for AAPL, AMZN, GOOGL, FB.  
 \*\*Preprocessing\*\*: Fill missing ticks, aggregate to 1-minute bars, keep market hours only.  
 \*\*News Alignment\*\*: Three approaches — (S1) last sentiment before time, (S2) last sentiment in the selected interval,  
 (S3) average sentiment during the selected interval (ties broken using polarity sums; neutral if still tied).  
 \*\*Features per hour\*\* (window size n hours ⇒ 8n features): max, min, average, standard deviation, pseudo log return, trend slope, last tick price, sentiment.  
 \*\*Normalization\*\*: MinMax scaling per feature column.  
 \*\*Models\*\*: FFNN/DNN, RNN (Basic RNN/LSTM/GRU), SVM (linear/poly/RBF with GridSearchCV), SVR.  
 \*\*Target\*\*: Direction of today’s close vs. yesterday’s close (classification) and EOD price (regression for SVR/RNN).

**Results**

\*\*Directional Accuracy (best SVM results among tested settings)\*\*  
 - AAPL: 82.91%  
 - AMZN: 75.27%  
 - GOOGL: 80.34%  
 - FB: 75.00%  
  
 \*\*Overall comparison (Table 3)\*\*  
 - AAPL — SVM 82.91%, SVR 79.20%, DNN 81.32%, RNN 81.30%  
 - AMZN — SVM 75.27%, SVR 72.26%, DNN 74.03%, RNN 74.56%  
 - GOOGL — SVM 80.34%, SVR 66.38%, DNN 80.10%, RNN 68.38%  
 - FB — SVM 75.00%, SVR 68.71%, DNN 72.68%, RNN 72.39%  
  
 \*\*Takeaway\*\*: SVM consistently outperforms the other models on directional accuracy, with the highest reported  
 accuracy of ~83% for AAPL, exceeding prior literature benchmarks (≈60–71%).

**Contributions**

- Quantified the impact of \*\*news sentiment\*\* on intraday stock prediction.  
 - Identified effective \*\*time windows\*\* and \*\*sentiment scenarios\*\*.  
 - Delivered \*\*state-of-the-art\*\* directional accuracy on AAPL (~83%).  
 - Proposed a deployable framework usable by non-programmers to automate trade decisions.

**Conclusion & Future Work**

- Add more technical indicators.  
 - Explore alternative aggregation timeframes.  
 - Improve exact price regression.  
 - Integrate \*\*risk management & backtesting\*\* to translate accuracy into returns.