

REFERENCES

- [1] C. A. Parlour and D. J. Seppi, "Limit order markets: A survey," *Handbook of financial intermediation and banking*, vol. 5, p. 63–95, 2008.
- [2] T. Preis, "Price-Time Priority and Pro Rata Matching in an Order Book Model of Financial Markets," in *Econophysics of Order-driven Markets*, Springer, Milano, 2011, pp. 65-72.
- [3] M. D. Gould, M. A. Porter, S. Williams, M. McDonald, D. J. Fenn and S. D. Howison, "Limit Order Books," *Quantitative Finance*, vol. 13, no. 11, p. 1709–1742, 2013.
- [4] A. Madhavan, "Market microstructure: A survey," *Journal of Financial Markets*, vol. 3, no. 3, pp. 205-258, 2000.
- [5] E. F. Fama, "Efficient Capital Markets: A Review of Theory and Empirical Work," *Papers and Proceedings of the Twenty-Eighth Annual Meeting of the American Finance Association New York, N.Y.*, vol. 25, no. 2, pp. 383-417, 1970.
- [6] B. G. Malkiel, "The Efficient Market Hypothesis and Its Critics," *Journal of Economic Perspectives*, vol. 17, no. 1, pp. 59-82, 2003.
- [7] J. Shen and M. O. Shafiq, "Short-term stock market price trend prediction using a comprehensive deep learning system," *Journal of Big Data*, vol. 7, p. 66, 2020.
- [8] P. Ghosh, A. Neufeld and J. K. Sahoo, "Forecasting directional movements of stock prices for intraday trading using LSTM and random forests," *arXiv.org*, 2020.
- [9] F. S. Alzazah and X. Cheng, "Recent Advances in Stock Market Prediction Using Text Mining: A Survey," 2020.
- [10] R. Sawhney, S. Agarwal, A. Wadhwa and R. R. Shah, "Deep Attentive Learning for Stock Movement Prediction From Social Media Text and Company Correlations," in *EMNLP*, 2020.
- [11] Y. Shynkevich, T. McGinnity, S. Coleman and A. Belatreche, "Predicting Stock Price Movements Based on Different Categories of News Articles," *IEEE Symposium Series on Computational Intelligence*, pp. 703-710, 2015.
- [12] A. Tsantekidis, . N. Passalis, A. Tefas and J. Kannian, "Using deep learning to detect price change indications in financial markets," in *2017 25th European Signal Processing Conference (EUSIPCO)*, Kos, Greece, 2017.
- [13] Z. Zhang, S. Zohren and S. Roberts, "DeepLOB: Deep Convolutional Neural Networks for Limit Order Books," *IEEE Transactions on Signal Processing*, vol. 69, no. 11, 2019.

- [14] S. Hochreiter and J. Schmidhuber, "LONG SHORT-TERM MEMORY," *Neural Computation*, vol. 9, no. 8, pp. 1735-1780, 1997.
- [15] K. Cho, B. van Merriënboer, C. Gulcehre, D. Bahdanau, F. Bougares, H. Schwenk and Y. Bengio, "Learning Phrase Representations using RNN Encoder–Decoder for Statistical Machine Translation," in *EMNLP 2014: Conference on Empirical Methods in Natural Language Processing*, Doha, Qatar, 2014.
- [16] H. Danijar, "Tips for Training Recurrent Neural Networks," [Online]. Available: <https://danijar.com/tips-for-training-recurrent-neural-networks/>. [Accessed 07 June 2021].
- [17] T. N. Sainath, O. Vinyals, A. Senior and H. Sak, "CONVOLUTIONAL, LONG SHORT-TERM MEMORY, FULLY CONNECTED DEEP NEURAL NETWORKS," in *2015 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Brisbane, QLD, Australia, 2015.
- [18] S. Kiranyaz, O. Avci, O. Abdeljaber, T. Ince, M. Gabbouj and D. J. Inman, "1D Convolutional Neural Networks and Applications: A Survey," *arXiv*, p. 1905.03554, May 2019.
- [19] T. Wen and R. Keyes, "Time Series Anomaly Detection Using Convolutional Neural Networks and Transfer Learning," *arXiv*, 2019.
- [20] M. Elbayad, L. Besacier and J. Verbeek, "Pervasive Attention: 2D Convolutional Neural Networks for Sequence-to-Sequence Prediction," *arXiv*, 2018.
- [21] A. Tsantekidis, N. Passalis, A. Tefas, J. Kannianen, M. Gabbouj and A. Iosifidis, "Forecasting Stock Prices from the Limit Order Book using Convolutional Neural Networks," in *2017 IEEE 19th Conference on Business Informatics (CBI)*, Thessaloniki, Greece, 2017.
- [22] A. Tsantekidis, N. Passalis, A. Tefas, J. Kannianen, M. Gabbouj and A. Iosifidis, "Using Deep Learning for price prediction by exploiting stationary limit order book features," *arXiv.org*, Oct 2018.
- [23] A. Ntakaris, M. Magris, J. Kannianen, M. Gabbouj and A. Iosifidis, "Benchmark Dataset for Mid-Price Forecasting of Limit Order Book Data with Machine Learning Methods," *Journal of Forecasting*, 2017.
- [24] S. Bai, J. Z. Kolter and V. Koltun, "An Empirical Evaluation of Generic Convolutional and Recurrent Networks for Sequence Modeling," *arXiv*, 2018.
- [25] W. Jiang, "Applications of deep learning in stock market prediction: recent progress," *arXiv.org*, Feb 2020.

- [26] X. Zhou, Z. Pan, G. Hu, S. Tang and C. Zhao, "Stock Market Prediction on High-Frequency Data Using Generative Adversarial Nets," *Computational Intelligence in Data-Driven Modelling and Its Engineering Applications*, vol. 2018, no. 4907423, 2018.
- [27] C. Stoean, W. Paja, R. Stoean and A. Sandita, "Deep architectures for long-term stock price prediction with a heuristic-based strategy for trading simulations," *PLOS ONE*, vol. 14, no. 10, 2019.
- [28] D. Bahdanau, K. Cho and Y. Bengio, "Neural Machine Translation by Jointly Learning to Align and Translate," *arXiv.org*, 2014.
- [29] Y. Wu, M. Schuster, Z. Chen, Q. V. Le and M. Norouzi, "Google's Neural Machine Translation System: Bridging the Gap between Human and Machine Translation," *arXiv*, 2016.
- [30] A. Vaswani, N. Shazeer, N. Parmar, J. Uszkoreit, L. Jones, A. N. Gomez, L. Kaiser and I. Polosukhin, "Attention Is All You Need," in *31st Conference on Neural Information Processing Systems (NIPS 2017)*, Long Beach, CA, USA, 2017.
- [31] J. Devlin, M.-W. Chang, K. Lee and K. Toutanova, "BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding," *arXiv.org*, 2019.
- [32] C. Raffel and D. P. W. Ellis, "Feed-Forward Networks with Attention Can Solve Some Long-Term Memory Problems," *arXiv.org*, 2015.
- [33] A. Brown, A. Tuor, B. Hutchinson and N. Nichols, "Recurrent Neural Network Attention Mechanisms for Interpretable System Log Anomaly Detection," *arXiv*, 2018.
- [34] D. T. Tran, A. Iosifidis, J. Kannianen and M. Gabbouj, "Temporal Attention augmented Bilinear Network for Financial Time-Series Data Analysis," *IEEE Transactions on Neural Networks and Learning Systems*, vol. 30, no. 5, pp. 1407 - 1418, 2019.
- [35] M. Zhu, K. Ye, Y. Wang and C.-Z. Xu, "A Deep Learning Approach for Network Anomaly Detection Based on AMF-LSTM," in *Network and Parallel Computing*, Cham, Springer International Publishing, 2018, pp. 137-141.
- [36] Z. Zhang and S. Zohren, *Multi-Horizon Forecasting for Limit Order Books: Novel Deep Learning Approaches and Hardware Acceleration using Intelligent Processing Units*, *arXiv*, 2021.
- [37] X. Shi, Z. Chen, H. Wang and D.-Y. Yeung, "Convolutional LSTM Network: A Machine Learning Approach for Precipitation Nowcasting," *arXiv*, 2015.
- [38] J. R. Medel and A. Savakis, "Anomaly Detection in Video Using Predictive Convolutional Long Short-Term Memory Networks," *arXiv*, 2016.

- [39] K. He, X. Zhang, S. Ren and J. Sun, "Deep Residual Learning for Image Recognition," arXiv.org, 2015.
- [40] J. Hu, L. Shen, S. Albanie, G. Sun and E. Wu, "Squeeze-and-Excitation Networks," in *CVPR 2018*, 2018.
- [41] V. Nair and G. E. Hinton, "Rectified linear units improve restricted boltzmann machines," *ICML'10: Proceedings of the 27th International Conference on International Conference on Machine Learning*, p. 807–814, 2010.
- [42] K. He, X. Zhang, S. Ren and J. Sun, "Delving Deep into Rectifiers: Surpassing Human-Level Performance on ImageNet Classification," in *2015 International Conference on Computer Vision*, Araucano Park, Las Condes, Chile, 2015.
- [43] N. Srivastava, G. Hinton, A. Krizhevsky, I. Sutskever and R. Salakhutdinov, "Dropout: A Simple Way to Prevent Neural Networks from Overfitting," *Journal of Machine Learning Research*, vol. 15, no. 56, p. 1929–1958, 2014.
- [44] D. P. Kingma and J. Ba, "Adam: A Method for Stochastic Optimization," in *3rd International Conference for Learning Representations*, San Diego, 2015.
- [45] M. T. Ribeiro, S. Singh and C. Guestrin, ""Why Should I Trust You?": Explaining the Predictions of Any Classifier," *arXiv.org*, 2016.
- [46] J. Sirignano and R. Cont, "Universal features of price formation in financial markets: perspectives from Deep Learning," 2018.