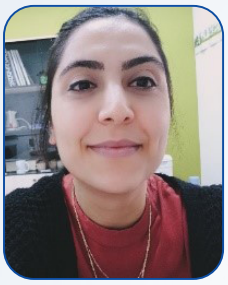

The Effectiveness of Knowledge Graph and Community Aware Sentiments on Stock Price Prediction with the help of Reinforcement Learning

Abstract

Price prediction of any investment tool has been an important topic for investors, researchers, and analysts. Because it is affected by so many factors, forecasting the value of it is a difficult task to handle. In this work, a novel method based on deep reinforcement learning methodology is introduced for the price prediction of stocks employing sentiments of community and knowledge graph. As a first, a social knowledge graph of users is constructed by analyzing relations between connections. After that, time series analysis of related stock and sentiment analysis is blended with deep reinforcement methodology. Turkish version of Bidirectional Encoder Representations from Transformers (BerTurk) is utilized to analyze the sentiments of the users while deep Q-learning methodology is used for the deep reinforcement learning side of the proposed model to construct the deep Q network. In order to indicate the efficieny of the model, Garanti Bank (GARAN), Akbank (AKBNK), Turkiye Is Bankasi (ISCTR) stocks in Istanbul Stock Exchange are employed as a case study. Experiment results demonstrate that the proposed novel model achieves remarkable results for stock market prediction task.

Biography

Zeynep Hilal Kilimci graduated from the Department of Computer Engineering, Doğuş University, in 2008, the M.Sc degree from the Department of Computer Engineering, Doğuş University, in 2013, and the Ph.D. degree from the Department of Computer Engineering, Kocaeli University, in 2018. From 2009 to 2011, she worked as a Software Engineer in CRM Department and the Data Warehouse Department in Deniz Bank. In 2011, she started to work as a Research Assistant at the Department of Computer Engineering in Doğuş University, where she also worked as an Assistant Professor, between 2018 and 2020. She is currently working as an Assistant Professor in Kocaeli University. Her research fields include text mining/processing, data mining, speech processing, machine learning, ensemble learning, deep learning, reinforcement learning, and artificial intelligence. She serves as a scientific referee for more than 50 journals such as Nature, Knowledge-Based Systems, Expert Systems with Applications, Journal of Experimental & Theoretical Artificial Intelligence, Soft Computing, IEEE Transactions on Cybernetics, IEEE Access, IEEE Transactions on Knowledge and Data Engineering, IEEE Transactions on Neural Networks and Learning Systems, Computational Intelligence and Neuroscience, Journal of Intelligent & Fuzzy Systems, Artificial Intelligence in Medicine, Data Technologies and Applications, and so on. She chaired the 2021 IEEE International Conference on Innovations in Intelligent Systems and Applications conference. She attended many well-known conferences in her field as a keynote speaker. She also served as a guest editor for Concurrency and Computation: Practice and Experience, Computer Science and Information Systems, Expert Systems, and special issues of MDPI journals.