

A Deep Neural Network Model for Stock Investment Recommendation by Considering the Stock Market as a Time Graph

Mustafa Mert Keskin
Computer Engineering
TOBB ETU
Ankara, Turkey
m.keskin@etu.edu.tr
ORCID: 0000-0001-6381-3111

Muhammed Yilmaz
Computer Engineering
TOBB ETU
Ankara, Turkey
muhyilmaz@etu.edu.tr
ORCID: 0000-0002-7398-2987

Ahmet Murat Ozbayoglu
Computer Engineering
TOBB ETU
Ankara, Turkey
mozbayoglu@etu.edu.tr
ORCID: 0000-0001-7998-5735

Abstract—Financial forecasting from raw time series data is one of the challenging problems in the literature for which satisfying results generally cannot be obtained even with deep learning methods. There is only limited information that can be extracted from the time series data. However, this can be compensated by using additional representations one of which is the graph representation. Graphs are better suited to represent relational data which can be essential for financial applications. Additionally, the stock market can be analyzed as a whole easily with graph representation which can unravel information that cannot be obtained with time series representation. We propose some graph representations that can be obtained from the financial data and show that using graph representation and time series representation together with deep neural networks (DNNs) improves the annual return significantly compared to using only time series data.

Index Terms—financial forecasting, stock market, graphs, deep learning, deep neural networks, convolutional neural networks