INTERPRETABLE MULTI-HORIZON TIME SERIES FORECASTING OF CRYPTOCURRENCIES BY LEVERAGE TEMPORAL FUSION

by

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Submitted in partial fulfillment of the requirements for the degree of MSDS (MS in Data Science)

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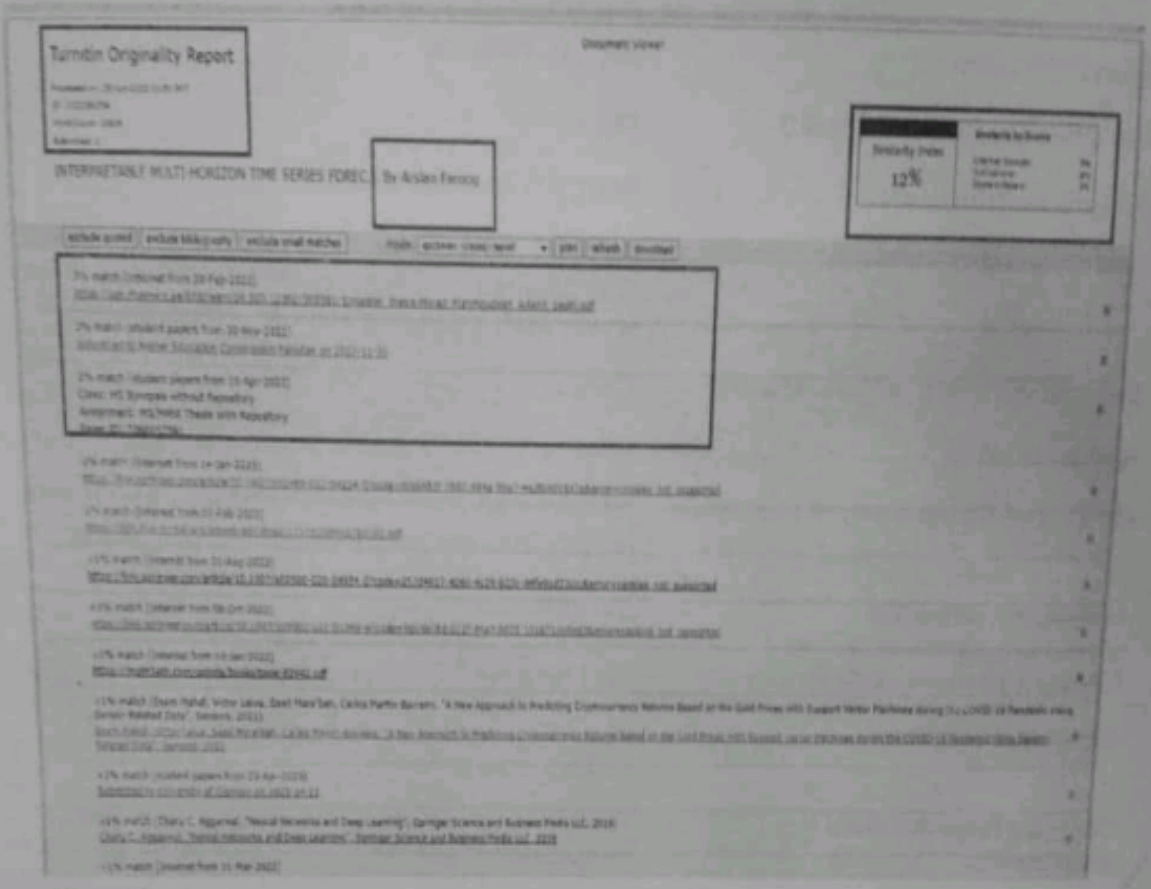

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Abstract

With the help of the study, a model named ADE-TFT will be created that will allow investors to forecast important developments in the cryptocurrency markets and make wise choices. To optimize hyperparameters and enhance prediction accuracy and stability, the model applies the Adaptive Differential Evolution (ADE) approach and Temporal Fusion Transformers (TFT) framework. Although Bitcoin's volatility has presented difficulties for investors, the suggested methodology has the potential for improving efficiency and accuracy in market predictions. The study's findings show that ADE-TFT produced favorable performance measures, including a Mean Absolute Percentage Error (MAPE) of 32.174 and a Root Mean Square Error (RMSE) of 32532, indicating its potential relevance in the decision-making process for bitcoin investments.

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List of Acronyms

AI	Artificial Intelligence
ANN	Artificial Neural Networks
ADE	Adaptive Differential Evolution
TFT	Temporal Fusion Transformers
CNN	Convolutional Neural Networks
CL	Computational Linguistic
DL	Deep Learning
KNN	K-Nearest Neighbors
LSTM	Long Short Term Memories
ML	Machine Learning
MT	Machine Translation
NN	Neural Networks
NLP	Natural Language Processing
NL	Natural Language
RNN	Recurrent Neural Networks
SVM	Support Vector Machine
TL	Transfer Learning

Chapter 1

Introduction

With the rise of global economic challenges in recent years, traditional currency values have fallen, stock markets are collapsing, and investors are losing wealth. Meeting costs and earning profit have changed the thinking of investors to focus on a digital currency. With the introduction of Bitcoin (BTC) in 2009, cryptocurrency trading started, bringing with it two key differences from conventional trading. Firstly, Cryptocurrency is one such application built on the blockchain that exists virtually and has a decentralized system to account for all transactions. Since individuals put everything on the ledger, those who own digital currencies can make global exchanges immediately rather than requiring a portion of a day wi[illegible]at wh[illegible]ter sys[illegible]he sys[illegible]ts, an[illegible]ter BT[illegible]w. In [illegible]be- cia[illegible]ud de[illegible]ec- tor because of its extreme volatility and uncertainty [1]. As a result, the efficiency of the market is impacted by reduced daily trading volume and less experienced investors. This thesis aims to use the proposed model for cryptocurrency markets to forecast significant events and make better-informed investment decisions.

The rest of the thesis .....

In this chapter, it is made clear how important the area of the subject is. The important difficulties are covered in detail, along with the recent techniques and developments. This chapter also includes a summary of our main research objectives and limitations.

1.1 Background

A significant number of academic works have already examined the prediction of financial time series. Financial asset managers are always attempting to develop investment strategies by identifying financial assets, such as stocks and commodities, that will outperform or lag the market. Small improvements in the financial