



T.C

ISTANBUL AYDIN UNIVERSITY

FACULTY OF ENGINEERING

SOFTWARE ENGINEERING

FINAL PROJECT REPORT

EARTHQUAKE PREDICTION PROJECT

CREATED BY

Kübra Nur TİRYAKİ

REPORT INSTRUCTOR

DOCTOR FACULTY MEMBER Atınç YILMAZ

DECEMBER 2022



T.C

ISTANBUL AYDIN UNIVERSITY

FACULTY OF ENGINEERING

SOFTWARE ENGINEERING

FINAL PROJECT REPORT

EARTHQUAKE PREDICTION PROJECT

CREATED BY

Kübra Nur TİRYAKİ

REPORT INSTRUCTOR

DOCTOR FACULTY MEMBER Atınç YILMAZ

DECEMBER 2022

ABSTRACT

Scientists expect earthquakes in the near future. But since there are so many factors, it is impossible to forecast an earthquake, as everyone is aware. I developed a model utilizing historical earthquake data to forecast potential future earthquakes within a few parameters that are essential to our project. My dataset was discovered using earthquakes that took place between 1910 and 2017. Then, I only included earthquakes that occurred in Turkey by limiting the countries in my data set. After that, I changed the date and time information to match my model.

I then eliminated information from my dataset that was not necessary for my model. I used the dataset to do out outlier detection. I then performed the required computations using the numbers in my data set.

Then I divided the data into the eigenvalues, which represented the remaining data, and the Richter scale, which represented the value I wished to forecast.

I then developed a linear regression model and used my eigenvalues to train the model.

In the end, when I asked my model to predict results based on the [39.21,41.40,14.0,4.7,4.7] data, it did so with a very low margin of error.

Keywords

Kübra Nur Tiryaki, Earthquake Prediction, Final Project, İstanbul, 2022

Earthquake, prediction, Turkey

CONTENTS

Title Page.....i

Abstract.....ii

Chapter 1	INTRODUCTION	1-2
------------------	---------------------	------------

1.1 Explanation of the Project1

1.2 Purpose of the Project2

1.3 Model.....21.4 Data Set.....2

Chapter 2 DEVELOPMENTS 3

2.1 Future Planned Developments of the Project.....3

Chapter 3 **CONCLUSION** **3**

3.1 References.....3

1. INTRODUCTION

1.1 EXPLANATION

For those of us who live in the earth and Turkey, particularly in and around Istanbul, earthquakes are a major source of anxiety. Scientists expect earthquakes in the near future. People want to be ready for future earthquakes, which are expected to occur. But since there are so many factors, it is impossible to forecast an earthquake, as everyone is aware.

I developed a model utilizing historical earthquake data to forecast potential future earthquakes within a few parameters that are essential to our project. My dataset was discovered using earthquakes that took place between 1910 and 2017. Then, I only included earthquakes that occurred in Turkey by limiting the countries in my data set. After that, I changed the date and time information to fit my model.

Then, using the richer scale as an illustration, it will be established when days, months, years, etc. the earthquakes with a value of 4 and higher occurred. I based my charts on the data they provided.

Because extremely minor damage might happen on a scale of 4.

I then eliminated information from my dataset that was not necessary for my model. I used the dataset to do out outlier data detection. I then performed the required computations using the numbers in my data set.

Then I divided the data into the eigenvalues, which represented the remaining data, and the Richter scale column, which represented the value I wished to forecast.

I then developed a Linear Legression model and used my eigenvalues to train the model.

In the end, when I asked my model to predict results based on the [39.21,41.40,14.0,4.7,4.7] data, it did so with a very low margin of error.

1.2 Purpose of the Project

Establishing a model suitable for the data set we have and predicting results with high accuracy.

1.3 Model

I used Linear Regression for my project. Other models could be used, such as Random Forest, K-Means Clustering, but I chose Linear Regression so I wouldn't have trouble learning to use the data in the project.

1.4 Data Set

lat = Latitude of the earthquake where it happened

long = Longitude of the earthquake

depth = The deepness of the earthquake where it happened

md = Time Dependent Magnitude -> How long the earthquake creates a vibration on the seismometer is measured and scaled with the distance from the earthquake center. This method is used for small ($M < 5.0$) and near (Distance < 300 km) earthquakes.

mb = Body wave magnitude. Body-waves consist of P-waves that are the first to arrive (see seismogram), or S-waves, or reflections of either. Body-waves travel through rock directly.

richter = a measure of the strength of earthquakes, developed by Charles Francis Richter.

2. DEVELOPMENTS

2.1 Future planned developments of the Project

- More graphics can be added.
- Apart from Linear Regression, new models can be created using Random Forest, Catboost Regressor, Support Vector Regressor, K Nearest Neighbor Classifier, K-Means Clustering etc.
- I'm thinking of transferring my project to Artificial Neural Networks and developing my project further.

3. CONCLUSION

3.1 References

- https://tr.wikipedia.org/wiki/Richter_%C3%B6l%C3%A7e%C4%9Fi
- <https://www.kaggle.com/datasets/alkoc/historical-earthquake-dataset-of-turkey>
- <https://docs.google.com/document/d/1dotkQrbiH5sX2crGxXntHArMJuYD0mMe/edit>
- <http://ieeeshutpages.s3-website-us-west-2.amazonaws.com/> # sorunlu, açamıyorum
- https://en.wikipedia.org/wiki/Body_wave_magnitude