Assessing the Accuracy of Time-Series Forecasting Models on Meteorological Datasets

User Manual

Forecast Focus

Accurate Weather Forecasting

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1. Introduction

1.1 Project Overview

The accuracy of forecasting models is crucial for any business that relies on predicting future trends Our system ‘Forecast Focus’ was designed to test and analyse the accuracy of five different time-series forecasting models on 10 different datasets. The models used in our system include *ARIMA*, *SARIMAX*, *XGBoost*, *LSTM*, and *Holt Winters Exponential Smoothing*. The datasets we used to test the accuracy of the models were collected from multiple weather stations located in Serbia. Each of the datasets contained hourly recording which spanned over nine years. The following columns were included:

- HC Air temperature
- Dew Point
- HC Relative humidity
- Precipitation
- Leaf Wetness
- Battery voltage

2. Installation

2.1 Languages & Packages

To use our project, it is essential to have Python installed on your system. We also used several libraries and packages to implement different features of our project, all of which can be installed using the Python pip command.

Language / Package	***Usage***
Python	The primary programming language used for our project.
Scikit-learn (Sklearn)	Machine learning library used for computing and evaluating the metrics used to test the accuracy of our models.
Numpy	Used for calculating rolling mean and standard deviation in our time-series data.
MatPlotLib	A plotting library used for visualising data.
TensorFlow	A deep learning library used for implementing the LSTM model.

Statsmodels	A library used for statistical analysis such as the Augmented Dickey Fuller test.. It was also used to import the *ARIMA, SARIMAX* and *Holt Winters Exponential Smoothing* models.
XGBoost	It was used to import the *ARIMA, SARIMAX* and *Holt Winters Exponential Smoothing* models.
Flask	A web application framework written in Python.
HTML & CSS	Primary Language for front end application
Base64 and io	Used to Display Plot Images with Flask

2. Installation

2.1 Languages and Tools

2.2 Installation Steps

- Installing on an Android Device

You can download Flix on an Android Device by following these steps:

- Go to Settings → Security → Allow Unknown sources.
- Once this is done, download the APK and you will be prompted to install and

open it.

- Run it by clicking on the Flix icon in your apps.
- Installing on Emulator
- Download Android Studio
- Clone the Flix “src/Flix” folder on Gitlab.
- The user can then open the project in Android Studio from wherever it is saved

to.

- Select an emulator to run the application in the top right and hit the “Run”

button.

- The app will now run as if it were on a physical Android device.

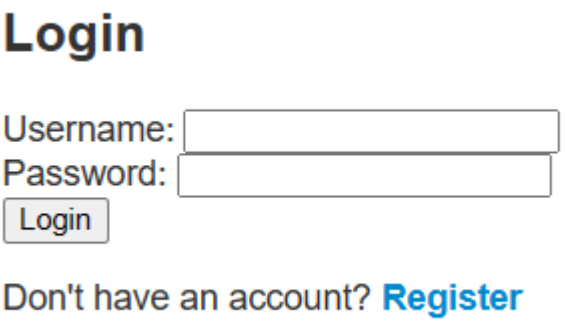
3. Feature Guide

Login/Create Account:

To Login simply enter your details,

If you are yet to make an account you can

Click register.



Register:

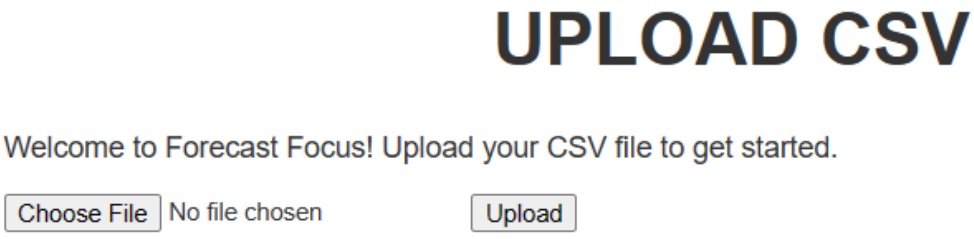
Here you can enter your username and password for registry, ensure that the username has not yet been used. By clicking register you have successfully created an account with us.

Profile:

To see your profile history, click on Profile on the navigation bar on the right. This page will allow you to see your history of files uploaded to our system and what time they were uploaded at.

Upload:

Once you have logged in or registered, you may use the Upload CSV function in the middle of the page. Here you Can upload your own CSV file from your system.



Selection Page:

Here is where you can enter any variables or

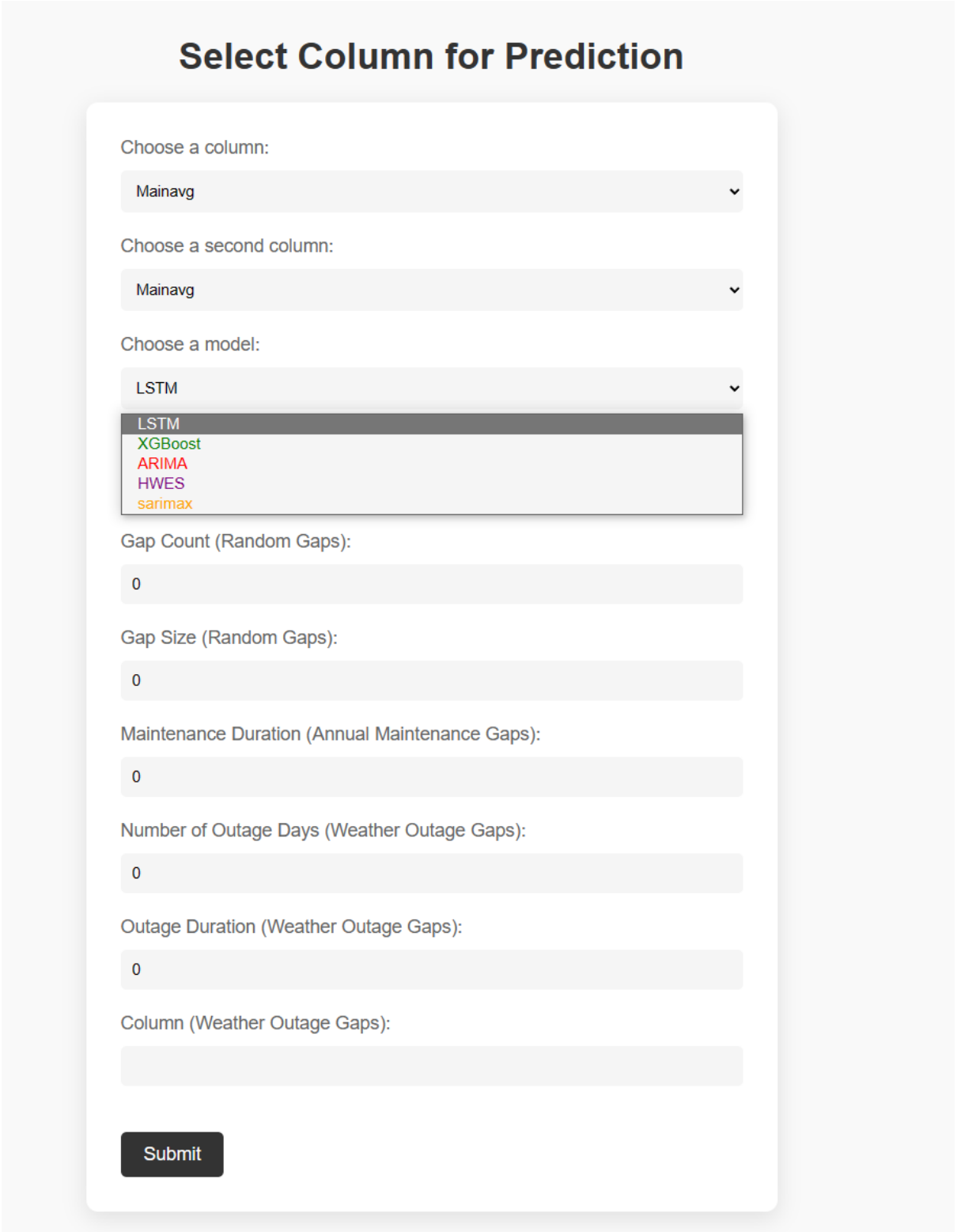
parameters that you wish to run the models on.

You can Randomly Insert Gaps using Gap rows/Size,

Specify the column we wish to forecast and of course

the model you wish to use. Note that the second column

Is intended for the Sarimax Model only.



Results Page:

The results page is where you can view all of the plots and results produced by the chosen model. Depending on what variables you provided, you will be shown a list of plots and results, including a plotted Model Results vs Real Results comparison. Below is an example of the result page for Holt-Winters Exponential Smoothing Model