International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 10 Issue 5 ǁ 2022 ǁ PP. 47-51

Rainfall Prediction Using Machine Learning/AI

Vimurthanandar S, Swetha S, Santhiya P, Indhuja A.
Vimurthanandar S: Department of CSE, SNS College of Technology, Coimbatore, India.
Swetha S: Department of CSE, SNS College of Technology, Coimbatore, India.
Santhiya P: Department of CSE, SNS College of Technology, Coimbatore, India.
Indhuja A: Department of CSE, SNS College of Technology, Coimbatore, India.

Abstract
The Rainfall prediction is important as heavy rainfall can lead to many disasters. The prediction helps people to take preventive measures and moreover the prediction should be accurate. The main challenge is to build a model for long term rainfall prediction. Heavy precipitation prediction could be a major drawback for earth science department because it is closely associated with the economy and lifetime of human. It's a cause for natural disasters like flood and drought that square measure encountered by individuals across the world each year.

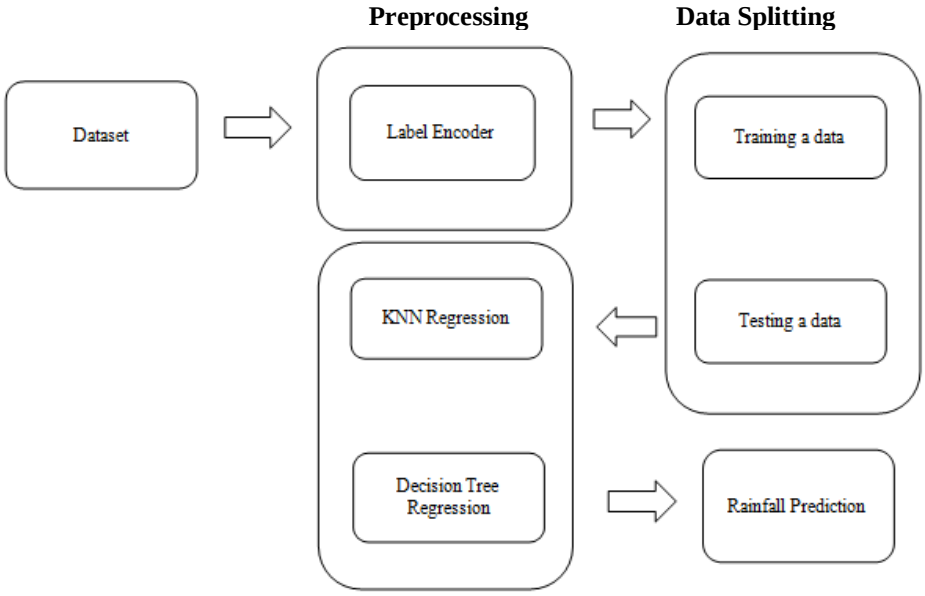
Date of Submission: 08-05-2022 Date of acceptance: 23-05-2022

I. Introduction

The Rainfall prediction is a challenging task and the results should be accurate. There are many hardware devices for predicting rainfall by using the weather conditions like temperature, humidity, pressure. These traditional methods cannot work in an efficient way so by using machine learning techniques we can produce accurate results. We can just do it by having the historical data analysis of rainfall and can predict the rainfall for future seasons.

II. Methods and Description

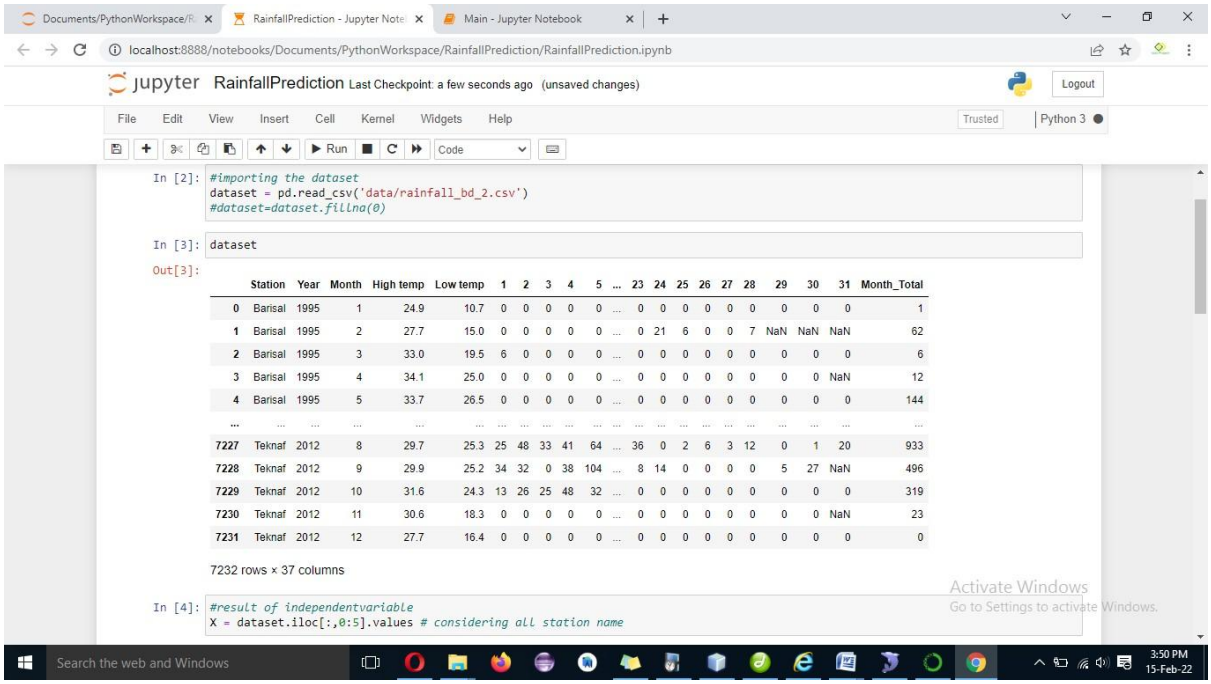
The system forecasts rainfall with two machine learning techniques: logistic regression and random forest, for a more precise solution. First, the system compares the procedure and provides the best algorithm to the output. Data entry, pre-processing of data, data division, algorithm training, data set checking, comparisons between both algorithms, prediction of the most reliable algorithm, and results at the end are the steps related to the proposed scheme. The collection of data included in this study consists of many parameters and the known class of output.



Architecture Diagram.

Displaying Dataset

Pandas is used to read dataset, input is given as csv file, and displaying the dataset below.



```
In [2]: #importing the dataset
        dataset = pd.read_csv('data/rainfall_bd_2.csv')
        #dataset=dataset.fillna(0)

In [3]: dataset
```

Out[3]:

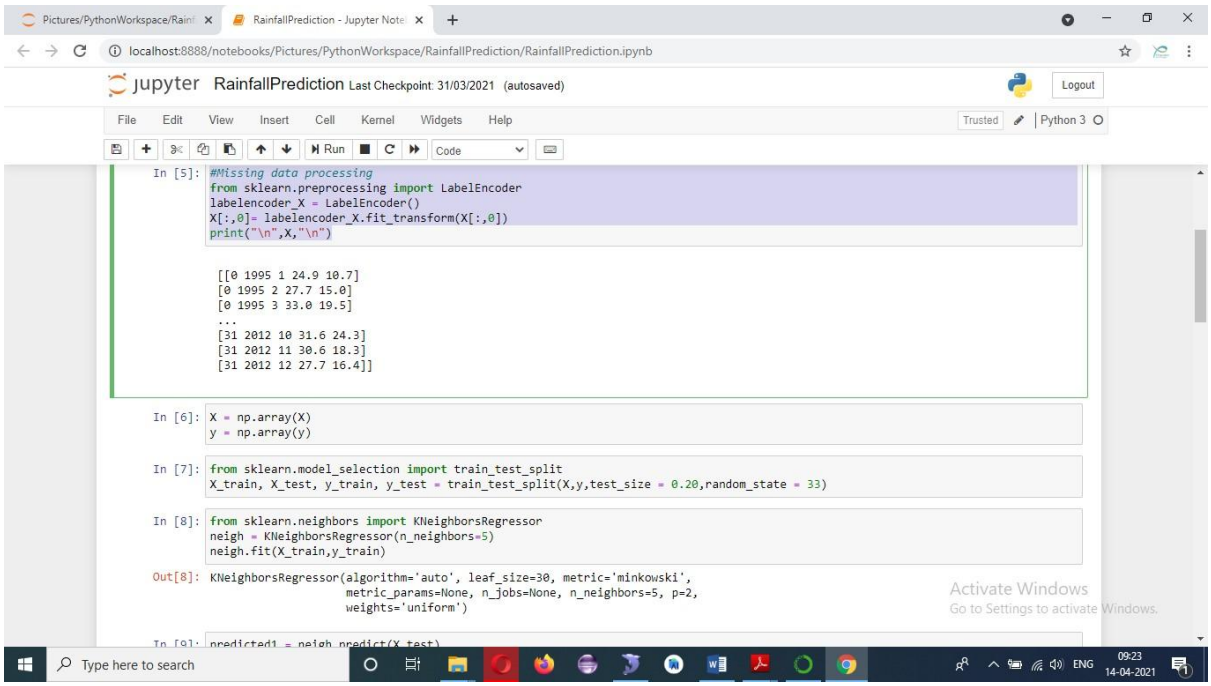
	Station	Year	Month	High temp	Low temp	1	2	3	4	5	...	23	24	25	26	27	28	29	30	31	Month_Total
0	Barisal	1995	1	24.9	10.7	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0	1
1	Barisal	1995	2	27.7	15.0	0	0	0	0	0	...	0	21	6	0	0	7	NaN	NaN	NaN	62
2	Barisal	1995	3	33.0	19.5	6	0	0	0	0	...	0	0	0	0	0	0	0	0	0	6
3	Barisal	1995	4	34.1	25.0	0	0	0	0	0	...	0	0	0	0	0	0	0	0	NaN	12
4	Barisal	1995	5	33.7	26.5	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0	144
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7227	Teknaf	2012	8	29.7	25.3	25	48	33	41	64	...	36	0	2	6	3	12	0	1	20	933
7228	Teknaf	2012	9	29.9	25.2	34	32	0	38	104	...	8	14	0	0	0	0	5	27	NaN	496
7229	Teknaf	2012	10	31.6	24.3	13	26	25	48	32	...	0	0	0	0	0	0	0	0	0	319
7230	Teknaf	2012	11	30.6	18.3	0	0	0	0	0	...	0	0	0	0	0	0	0	0	NaN	23
7231	Teknaf	2012	12	27.7	16.4	0	0	0	0	0	...	0	0	0	0	0	0	0	0	0	0

7232 rows × 37 columns

```
In [4]: #result of independentvariable
        X = dataset.iloc[:,0:5].values # considering all station name
```

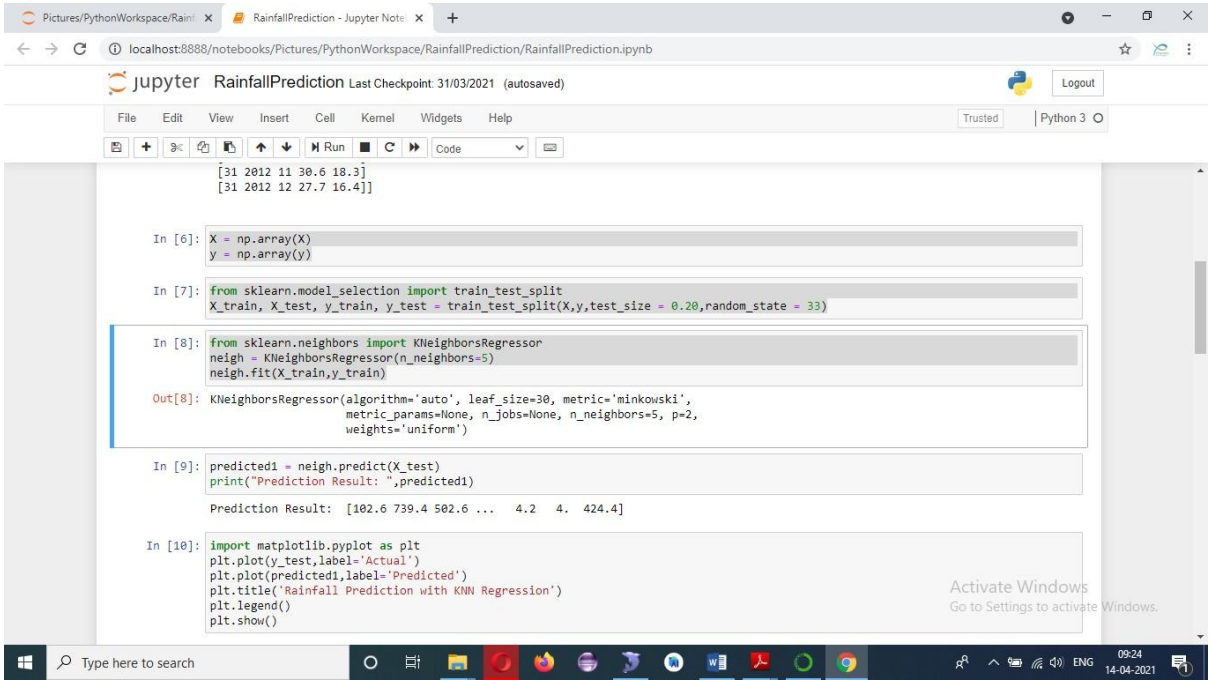
Preprocessing Result

Label Encoder is used for preprocessing, it converts the text input to categorical input, that is here Station is given as text or string, the algorithm receives input as only numerical values and we have to convert that station names. Here Label encoder converts the station names (Example : Barisal is convert to 1, and other stations convert to 2,3, etc) this result is shown below

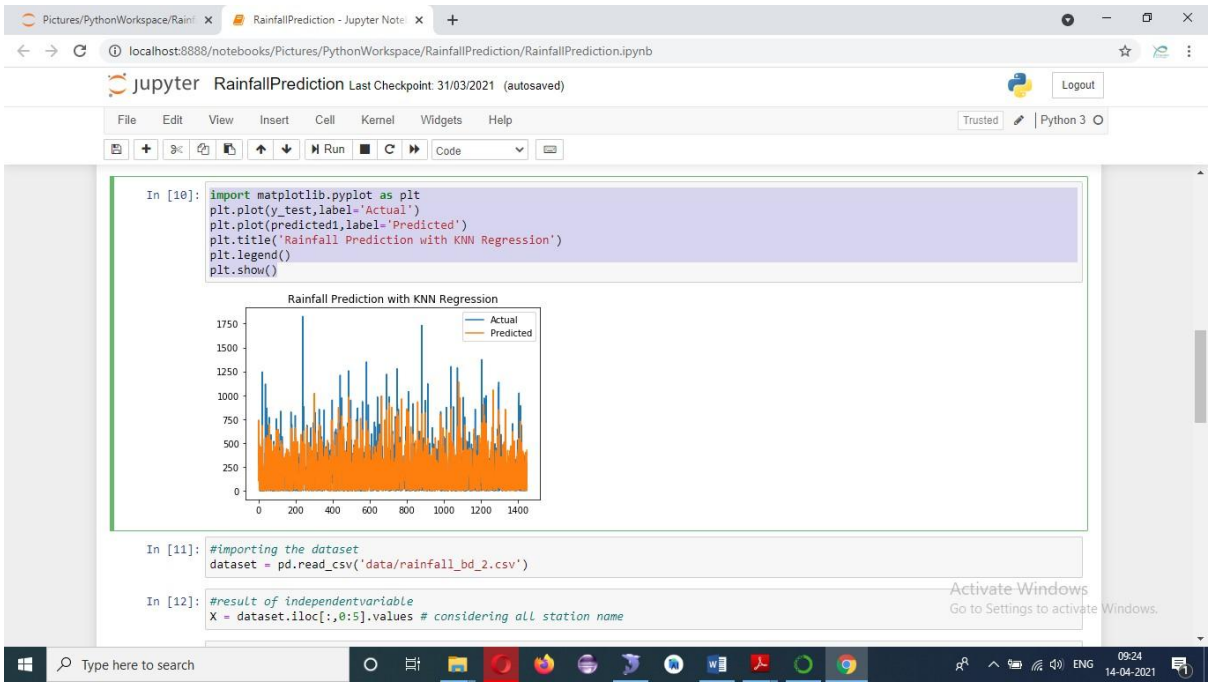


```
In [5]: #Missing data processing
        from sklearn.preprocessing import LabelEncoder
        labelencoder_X = LabelEncoder()
        X[:,0]= labelencoder_X.fit_transform(X[:,0])
        print("\n",X,"\n")

         [[0 1995 1 24.9 10.7]
         [0 1995 2 27.7 15.0]
         [0 1995 3 33.0 19.5]
         ...
         [31 2012 10 31.6 24.3]
         [31 2012 11 30.6 18.3]
         [31 2012 12 27.7 16.4]]

In [6]: X = np.array(X)
        y = np.array(y)

In [7]: from sklearn.model_selection import train_test_split
        X_train, X_test, y_train, y_test = train_test_split(X,y,test_size = 0.20,random_state = 33)

In [8]: from sklearn.neighbors import KNeighborsRegressor
        neigh = KNeighborsRegressor(n_neighbors=5)
        neigh.fit(X_train,y_train)

Out[8]: KNeighborsRegressor(algorithm='auto', leaf_size=30, metric='minkowski',
                            metric_params=None, n_jobs=None, n_neighbors=5, p=2,
                            weights='uniform')
```

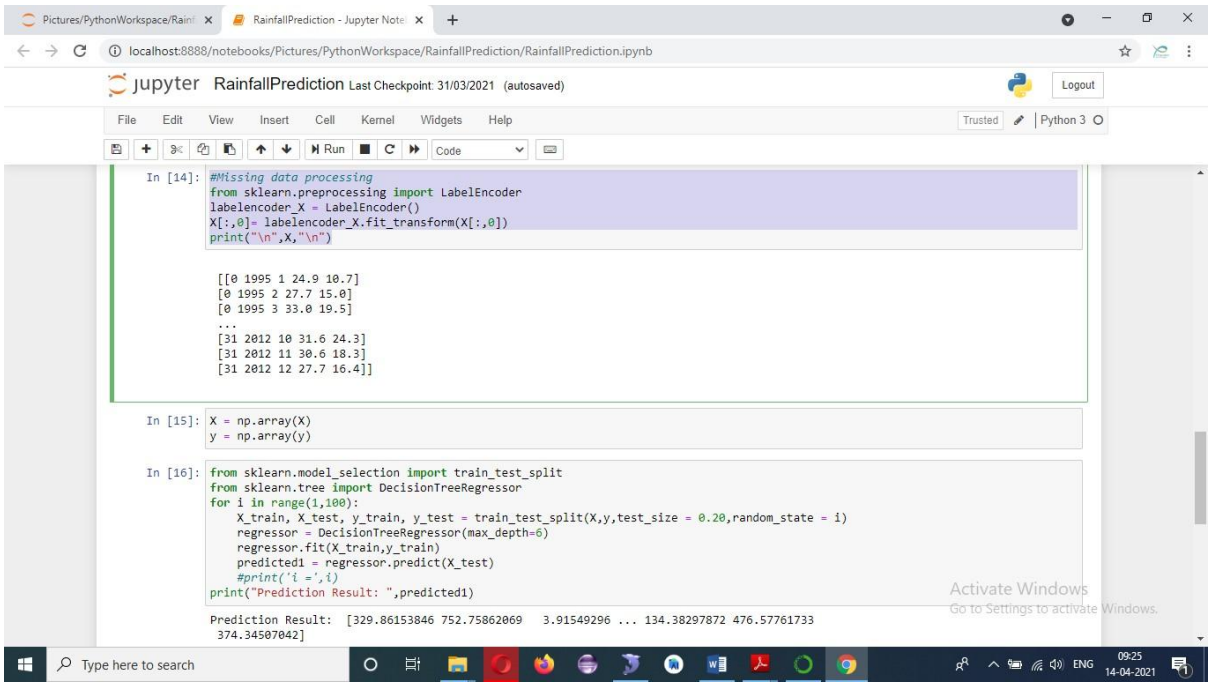
KNN Algorithm Implementation and Predicted Results



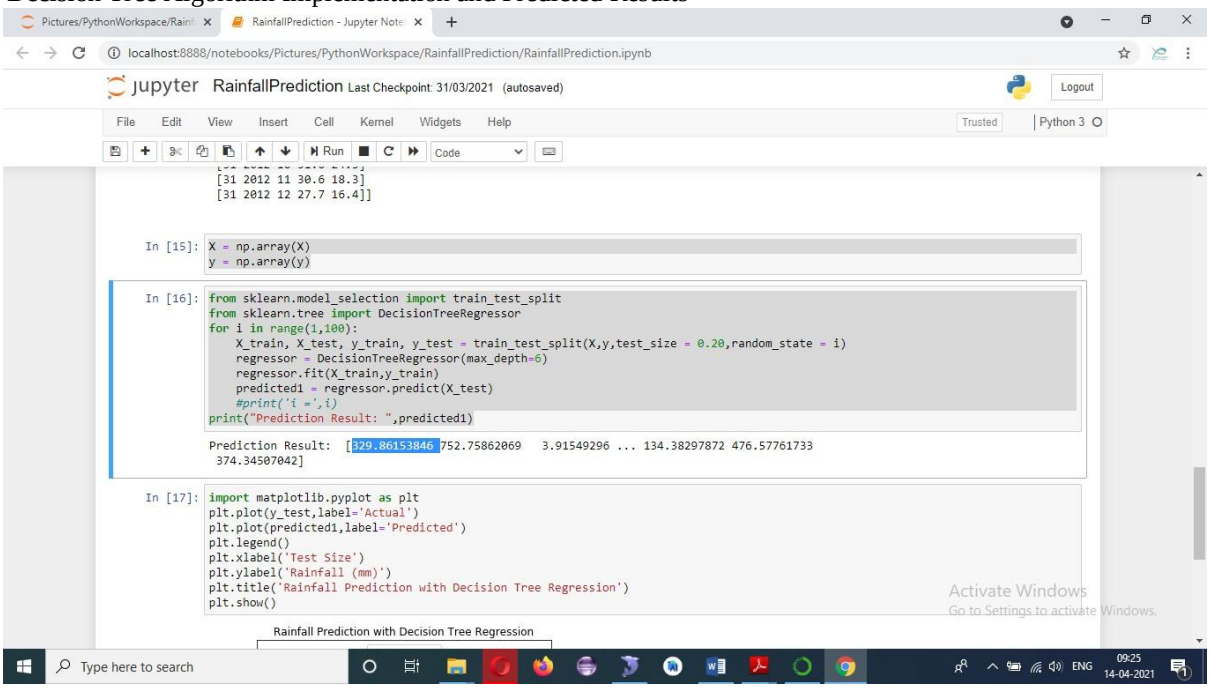
KNN - Rainfall Prediction results vs Actual values



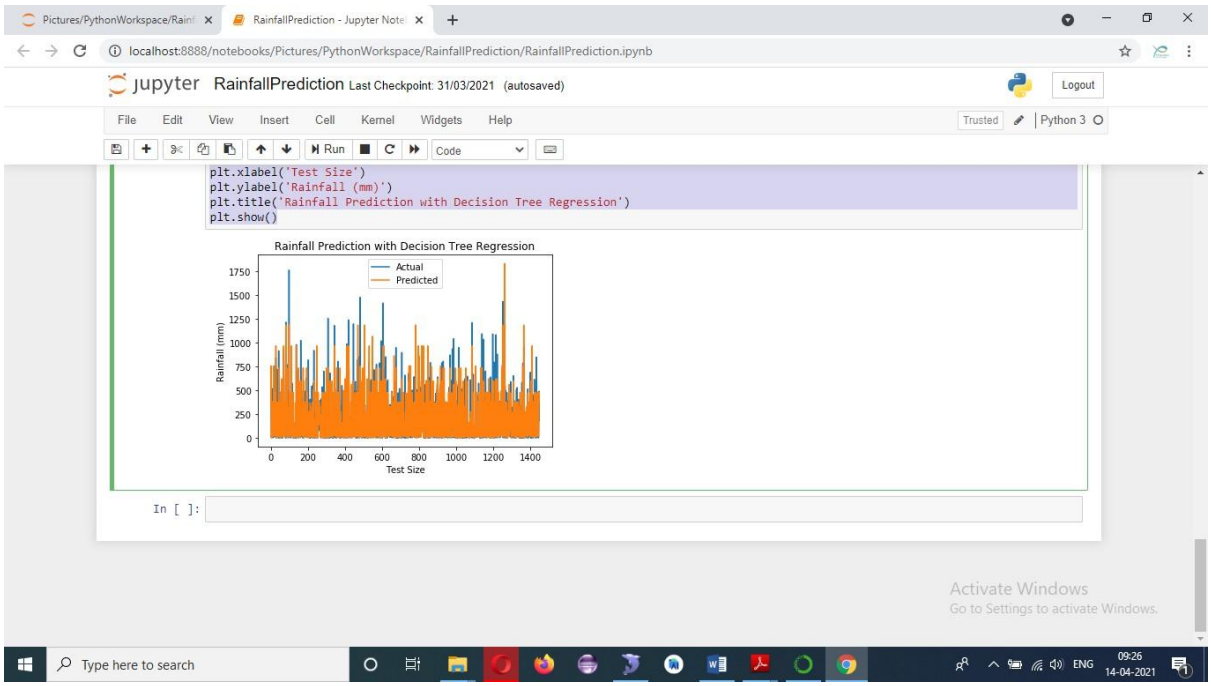
Preprocessing for Second Algorithm



Decision Tree Algorithm Implementation and Predicted Results



Decision Tree -Rainfall Prediction results vs Actual values



Representation of Rainfall Prediction with Decision Tree Regression

III. Conclusions

This project concentrated on estimation of rainfall and it is estimated that Decision Tree Regressor is a valuable and adaptable strategy, helping the client to manage the impediments relating to distributional properties of fundamental factors, geometry of the information and the normal issue of model over fitting.

Acknowledgments

Indhuja A and Janani S R provided guidance and help during the research and preparation of the manuscript.

References

[1]. M. D. Crown, "Validation of the NOAA space weather prediction center's solar flare forecasting lookup table and forecaster-issued probabilities," Space Weather, vol. 10, no. 6, pp. 1–4, 2012.

[2]. K. R. Moran, G. Fairchild, N. Generous, K. Hickmann, D. Osthus, R. Priedhorsky, J. Hyman, and S. Y. Del Valle, "Epidemic forecasting is messier than weather forecasting: The role of human behavior and internet data streams in epidemic forecast," The Journal of infectious diseases, vol. 214, no. suppl 4, pp. S404–S408, 2016.

[3]. C. W. Zheng, C. Y. Li, X. Chen, and J. Pan, "Numerical forecasting experiment of the wave energy resource in the China sea," vol. 2016, no. 3, pp. 1–12, 2016.

[4]. K. C. Luk, J. E. Ball, and A. Sharma, "An application of artificial neural networks for rainfall forecasting," Mathematical Computer Modelling, vol. 33, no. 6, pp. 683–693, 2001.

[5]. K. W. Appel, R. C. Gilliam, N. Davis, A. Zubrow, and S. C. Howard, "Overview of the atmospheric model evaluation tool (MET) v1.1 for evaluating meteorological and air quality models," Environmental Modelling & Software, vol. 26, no. 4, pp. 434–443, 2011.