

Microsoft Azure - Machine Learning Process flow

For

Forecasting Rainfall

Prepared by:



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1. Problem Statement

Rainfall forecasting is an important exercise because heavy and irregular rainfall can have many impacts like destruction of crops and farms, damage of property, hence a better forecasting model is essential for an early warning that can minimize risks to life and property and managing the agricultural farms in better way. Rainfall prediction mainly helps farmers and water resources can be utilized efficiently.

Therefore, we have attempted to forecast District wise rainfall based on past data obtained from IMD (Year 1951 to 2015).

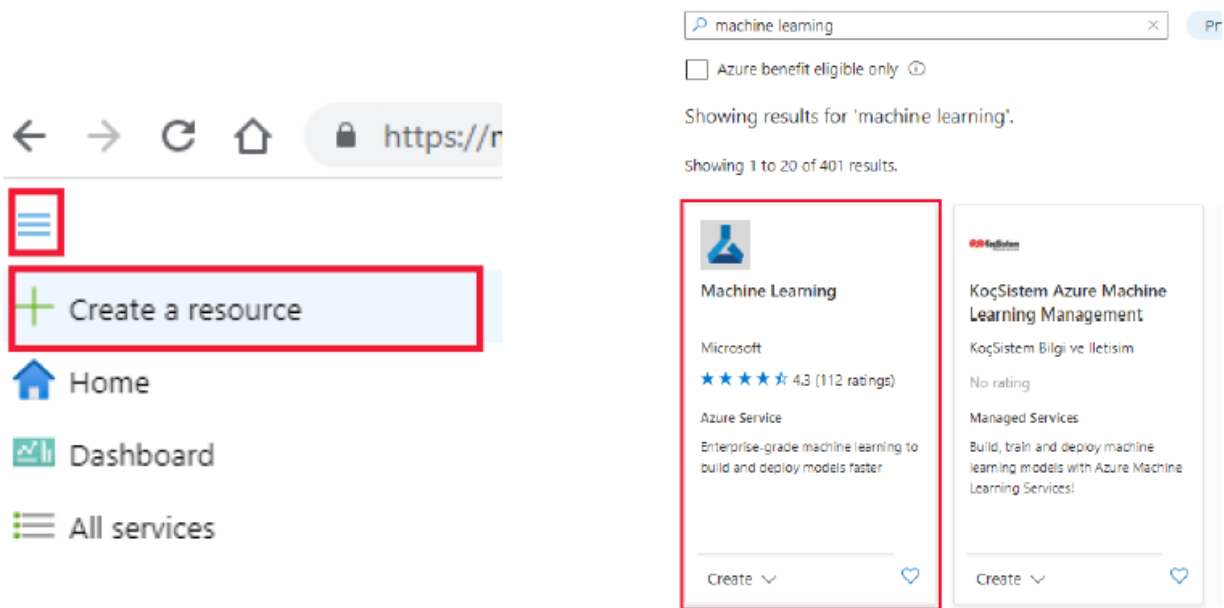
2. Data Source:

Rainfall Data from IMD

3. Process Workflow

3.1 CREATE A WORKSPACE

1. Sign into the Azure Portal using your Microsoft credentials.
2. Select **+ Create** a resource, search for Machine Learning, and create a new Machine Learning resource.



3. After configuring the Workspace, select Review + Create.
4. Select Create, to create Workspace.
5. To view new Workspace, select Go to Resource.
6. From Portal view of Workspace, Select Launch Studio to go to the Azure ML Studio.

3.2 CREATE COMPUTE RESOURCES:

1. Create Compute Targets: On the Compute Instances tab, add a new compute instance:
2. Virtual Machine type: CPU
3. Virtual Machine size: Standard_DS11_v2 (Choose Select from all options to search for and select this machine size)
4. Compute name: cmhelpline1
5. SSH access: Unselected

- While the compute instance is being created, switch to the Compute Clusters tab, and add a new compute cluster.

3.3 Import Data in Azure ML

| DISTRICT | Month | Date | Rainfall (mm) |
|-----------|-------|-------------|---------------|
| ALIRAJPUR | APR | 25-APR-1951 | 0 |
| ALIRAJPUR | APR | 25-APR-1952 | 0 |
| ALIRAJPUR | APR | 25-APR-1953 | 0 |
| ALIRAJPUR | APR | 25-APR-1954 | 0 |
| ALIRAJPUR | APR | 25-APR-1955 | 0 |
| ALIRAJPUR | APR | 25-APR-1956 | 0 |
| ALIRAJPUR | APR | 25-APR-1957 | 0 |
| ALIRAJPUR | APR | 25-APR-1958 | 14.9 |
| ALIRAJPUR | APR | 25-APR-1959 | 6.3 |
| ALIRAJPUR | APR | 25-APR-1960 | 0 |
| ALIRAJPUR | APR | 25-APR-1961 | 0 |
| ALIRAJPUR | APR | 25-APR-1962 | 0 |
| ALIRAJPUR | APR | 25-APR-1963 | 0 |
| ALIRAJPUR | APR | 25-APR-1964 | 0 |
| ALIRAJPUR | APR | 25-APR-1965 | 10.2 |

3.4 Data Manipulation (if any)

- Converted 'Rainfall' from 'String' to 'Numerical' variable

| DISTRICT | Month | Date | Rainfall (mm) |
|-----------|-------|---------------------|---------------|
| ALIRAJPUR | APR | 1951-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1952-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1953-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1954-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1955-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1956-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1957-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1958-04-25 00:00:00 | 14.9 |
| ALIRAJPUR | APR | 1959-04-25 00:00:00 | 6.3 |
| ALIRAJPUR | APR | 1960-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1961-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1962-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1963-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1964-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1965-04-25 00:00:00 | 10.2 |
| ALIRAJPUR | APR | 1966-04-25 00:00:00 | 0 |
| ALIRAJPUR | APR | 1967-04-25 00:00:00 | 0 |

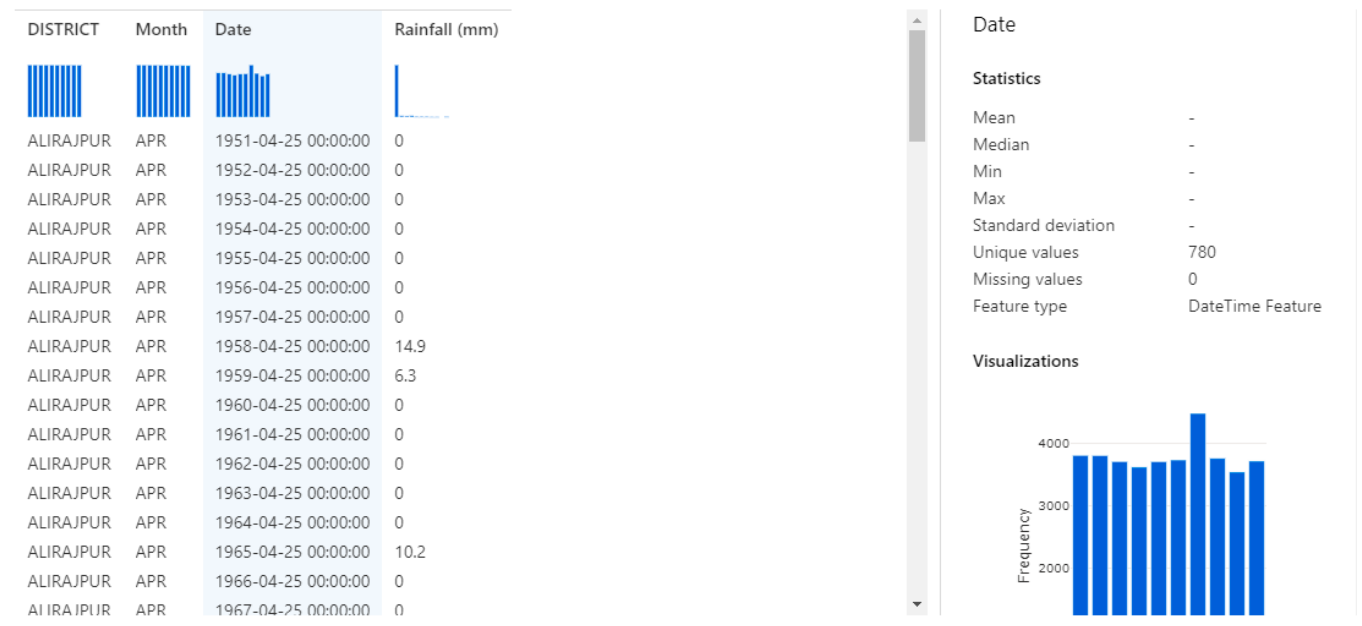
Rainfall (mm)

Statistics

| | |
|--------------------|-----------------|
| Mean | 85.2862 |
| Median | 10.1 |
| Min | 0 |
| Max | 1500 |
| Standard deviation | 140.382 |
| Unique values | 5057 |
| Missing values | 0 |
| Feature type | Numeric Feature |

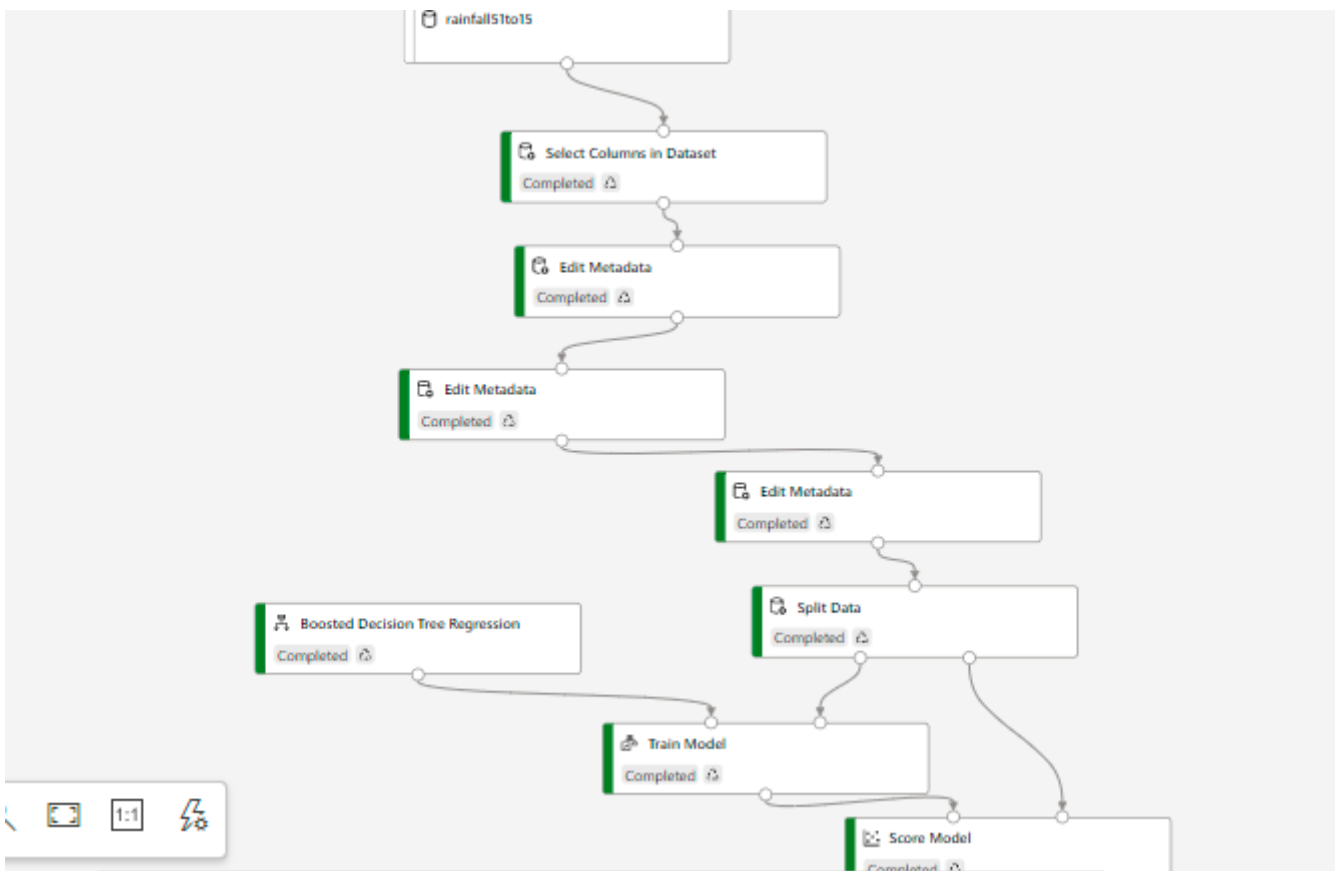
Visualizations

b) Convert 'Date' field from 'String' to 'Date type'



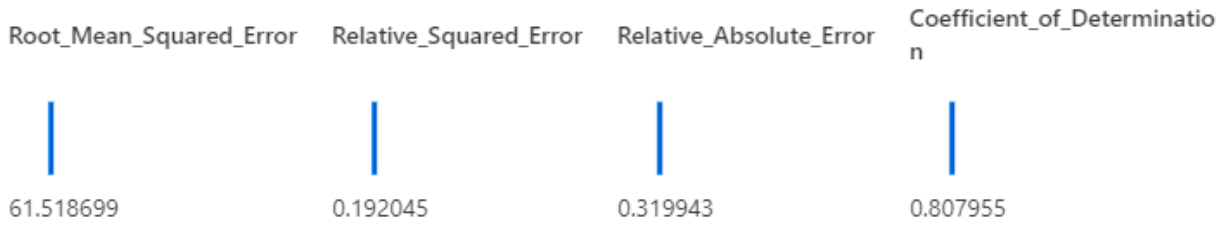
3.5 Machine Learning Algorithm used

We have used Boosted Decision Tree Regression method



4. Achievement/ Result

The coefficient of determination value is (0.807)



5. Model Deployment

Input data to test real-time endpoint

Test

WebServiceInput0



DISTRICT

BHOPAL

Month

JUL

Date

25-JUL-1921

Rainfall (mm)

0

Test result

parsed

raw

WebServiceOutput0

| key | value |
|----------------------|---------------------|
| DISTRICT | BHOPAL |
| Month | JUL |
| Date | 1921-07-25 00:00:00 |
| Rainfall (Predicted) | 301.3 |