BTP Evaluation III

By: Abhishek Bansal
Aman Rai
Mandar Gondhalekar

Overview Of Work Done

An overview of work done so far

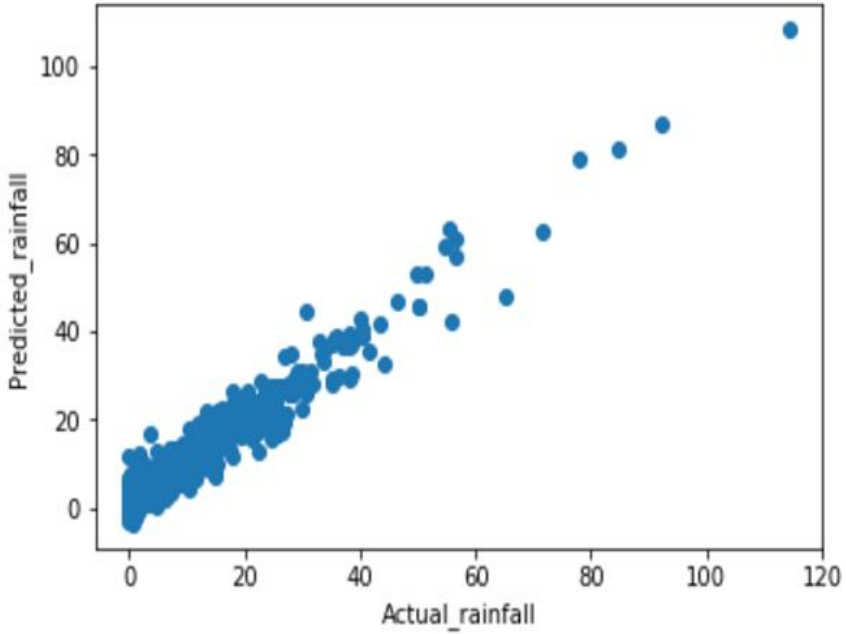
Linear Regression on Nearest Neighbours

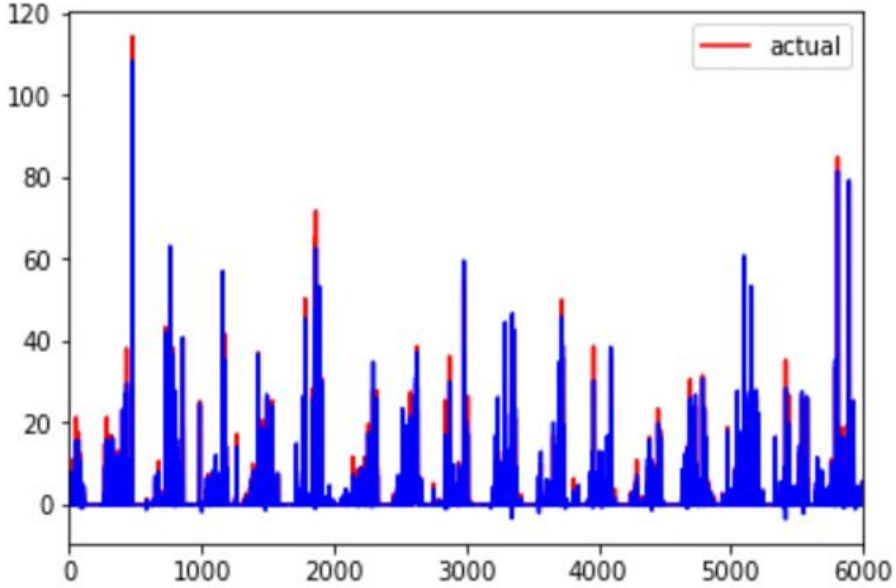
- For each site located neighbours within some fixed distance.
- Linear Regression Model was fit using rainfall data of the neighbours

$$Y = a_1 x_1 + a_2 x_2 + ... + a_k x_k$$

$x_1, x_2, \ldots, x_k$ are spatially neighbouring sites

Results





R2 Score ~ [0.90 - 0.95]

Spectral Clustering

- Created a weighted undirected graph of the weather sites.
- Edge weights are decided on basis of correlation value between two weather sites. If correlation value is lower than some threshold then no edge is added between them, else edge weight equals correlation value.
- Then Laplacian for that graph was calculated as :

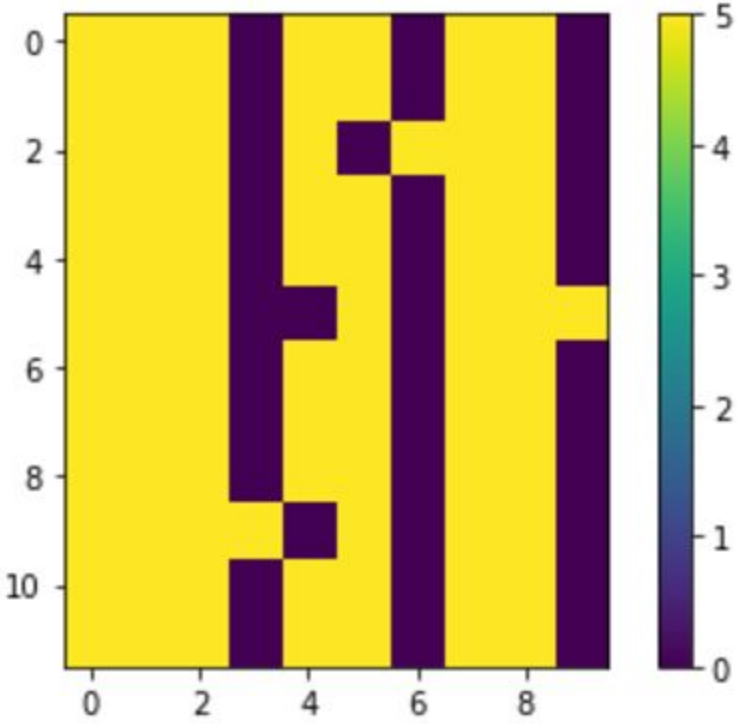
$$L = D - A$$

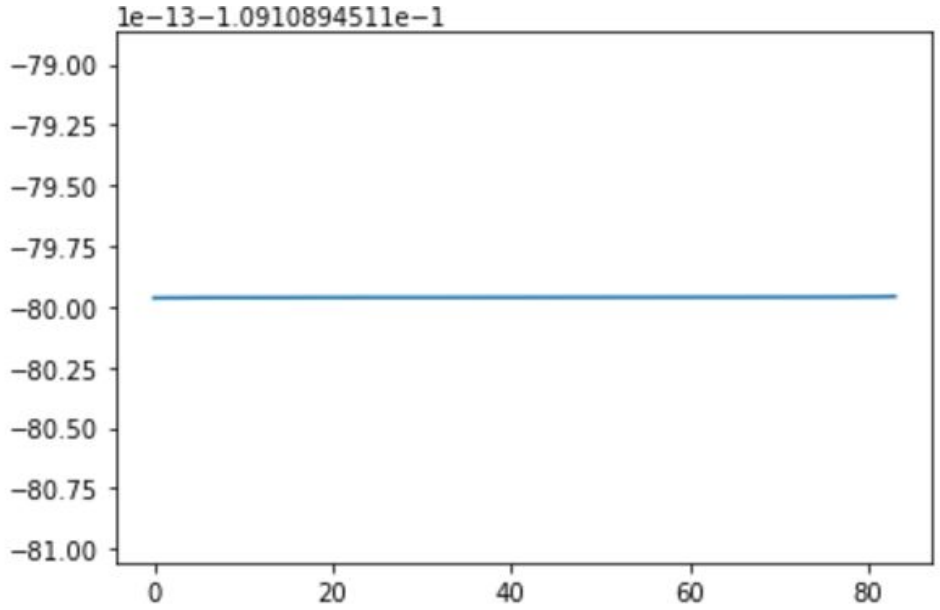
Where **D** is a diagonal matrix, such that **D[i][i]** = sum of edge weights incident on node i. And **A** denotes adjacency matrix of the graph

Spectral Clustering

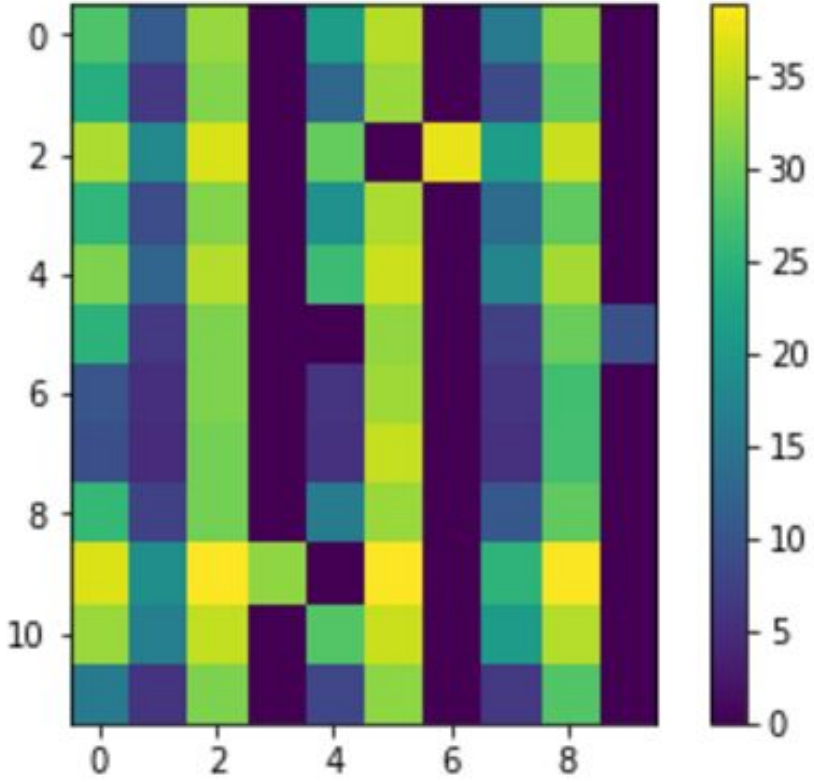
- Using Eigen decomposition of L, its eigen values (w) and eigen vectors (v) are obtained

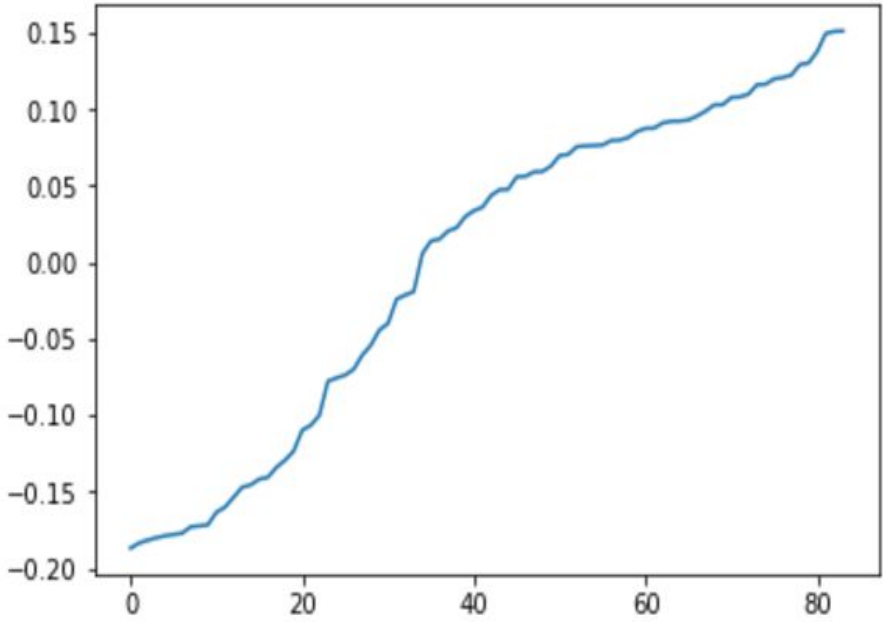
- Based on values of a particular eigen vector , all nodes in our graph were assigned a value and then was plotted as an image to visualize any spectral clustering





1st eigen value is zero and its corresponding eigen vector a constant .



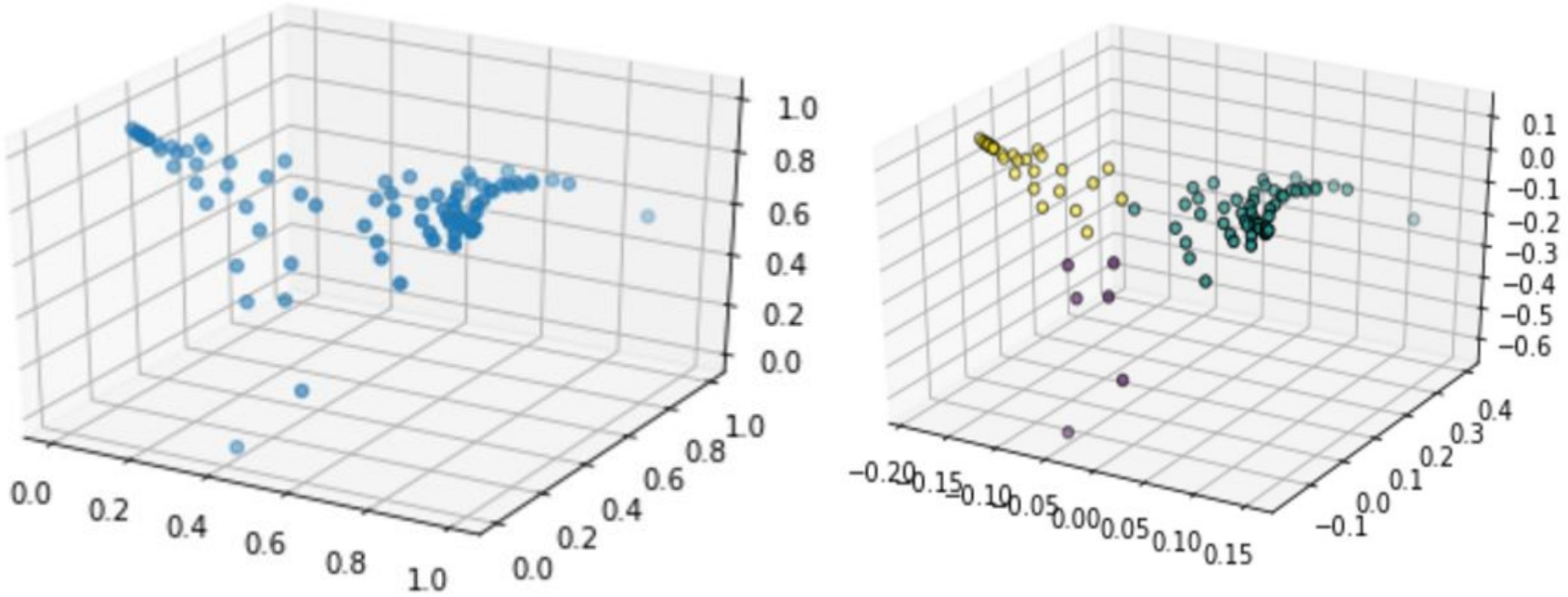


Eigen Vector corresponding to first non-zero eigen value shows two components and zero crossing .

Spectral Clustering

- Next step was to instead of using only one eigen vector, use more (say 3) eigen vectors (corresponding to first three non-zero eigen values) and then plot our weather sites in the 3D space formed by those eigen vectors.

- As we hoped, we do get some clusters here.



Clusters obtained by K-means (K = 3)

Next Steps

Future Plans

Next Steps

- Instead of using spatial neighbours in linear regression, use the neighbours given by spectral clustering and compare both results.

- Try other ML models

Thank You