MS3001D ENGINEERING ECONOMICS

GEE PROJECT

Data Analysis on Precipitation of All Indian Districts

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Introduction :

Now a days World is developing very rapidly. It's a very good thing. But every good thing comes at a cost. This modern world costs our beautiful environment. We people doesn't value the things comes to us at free of cost. Mother nature is no exception. While we are busy to build our civilization , nature is being destroyed slowly. And climate change is one of the major phenomenons caused by this.

Now as an element of climate change we are going to discuss the change in precipitation. And the frame of reference for our project is India, a developing country.

Project Details :

Title: Precipitation in all districts of India.

Source: Google Earth Engine Code Editor

Data-set: NEX-GDDP: NASA Earth Exchange Global Daily Downscaled Climate Projection (https://developers.google.com/earth-engine/datasets/catalog/NASA_NEX-GDDP)

Shapefile: 2001 districts shapefile

RAVI K. VERMA

Objective :

Our objective is to collect and analyse the data on precipitation of all indian districts and observe the changes caused by the climate change.

The main motive is to find the answer of the questions:

1. Is climate change a myth?
2. Should the government be concerned about the climate change?

Data Extraction :

We have collected data from GEE for 2001 , 2006 , 2011 , 2015 & 2019 . The time period of our data is the mean of the first week of each month of the respective above mentioned years.

	DISTRICT	DT_CEN_CD	ST_CEN_CD	ST_NM	date	mean
0	Chandigarh	1	4	Chandigarh	2001-01-01	0.000002
1	Dadra & Nagar Haveli	1	26	Dadara & Nagar Havelli	2001-01-01	0.000000
2	Lakshadweep	1	31	Lakshadweep	2001-01-01	0.000016
3	Data Not Available	99	99	Jammu and Kashmir	2001-01-01	0.000004
4	Anantnag	6	1	Jammu and Kashmir	2001-01-01	0.000008
...	...	...	...	...	...	...
35635	Yanam	1	34	Puducherry	2019-12-01	0.000043
35636	Karaikal	4	34	Puducherry	2019-12-01	0.000166
35637	Mahe	3	34	Puducherry	2019-12-01	0.000011
35638	Nicobars	2	35	Andaman & Nicobar Island	2019-12-01	0.000071
35639	Andamans	1	35	Andaman & Nicobar Island	2019-12-01	0.000037

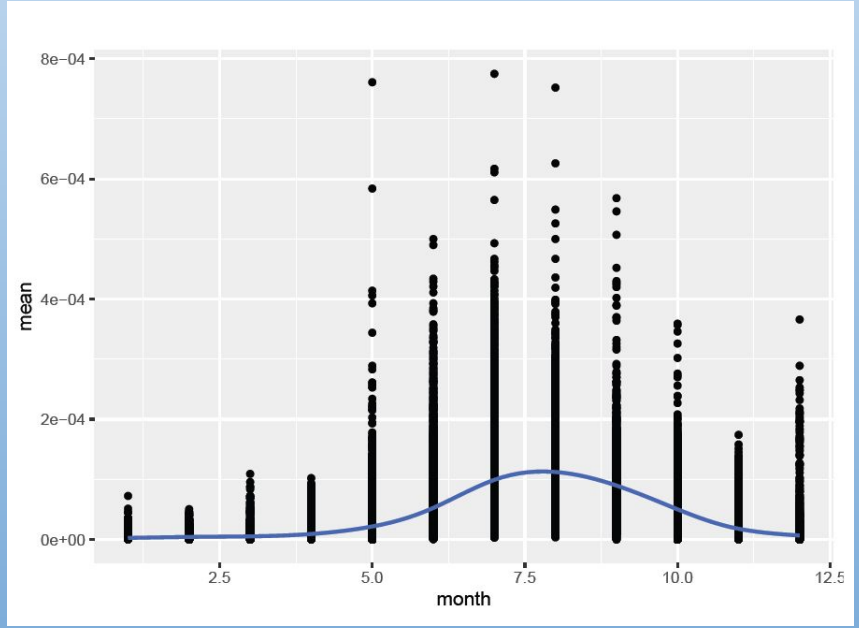
35640 rows × 6 columns

Data Analysis :

- Concept about India's Climate
- Concept about India's Precipitation
- Variation with time (year)
- Variation with location (state)
- Indian Map plot

ANANT K. ANAND

Concept about India's Climate



Here in the graph we can see the nature of the precipitation in india. In the X axis we have month and Y axis contains precipitation. Now as the line shows a central tendency and slightly positive skew as well , we can conclude that mostly precipitation occurs in the month of June , July and August.

For a country of northern hemisphere it's quite natural.

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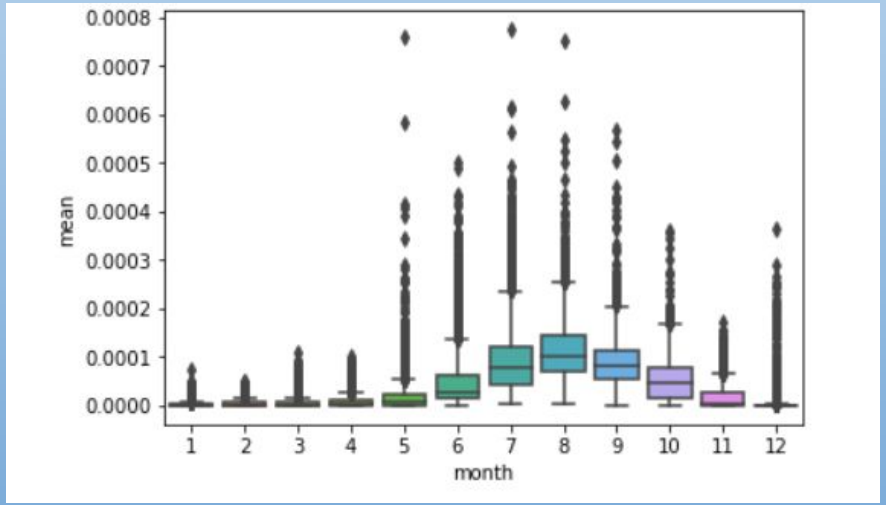
In this box plot diagram the picture is more clear as the outliers are been filtered like Rajasthan (low rain region) , Meghalaya (high rain region). And we got a more prominent and rigid reflection. Here we can clearly see the most rain containing month is July and August. Although it is not quite accurate as the current years also included . as a result the central tendency also been shifted slightly.

This result shows us that the precipitation is actually in the somewhat middle of the year unlike the country of the southern hemisphere.



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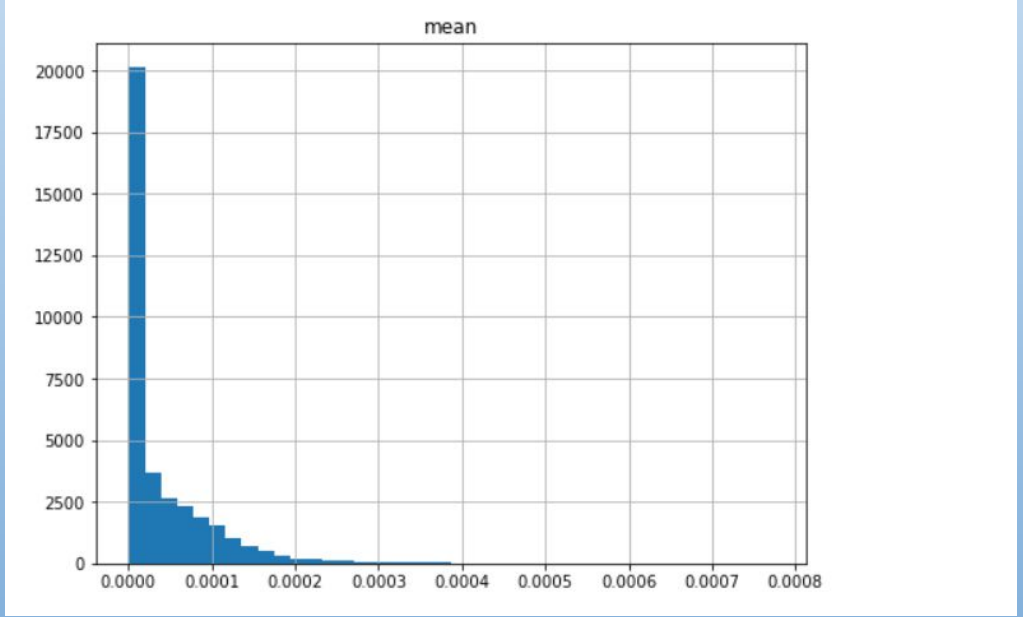
Concept about India's Precipitation

In this histogram we can see that the no of days with no precipitation is very high in India. As India is a country away from equator , this phenomenon is natural . But beside this we also can see the graph is extended to a quite good extend. This is because of the outliers like Meghalaya,Sikkim .



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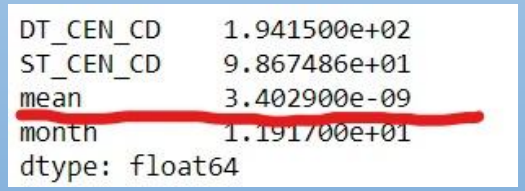
The variance of a population of a data shows that how much the data deviates from the mean value , means the scattering of the data. As for this data-set we can see that the variance is quite big .

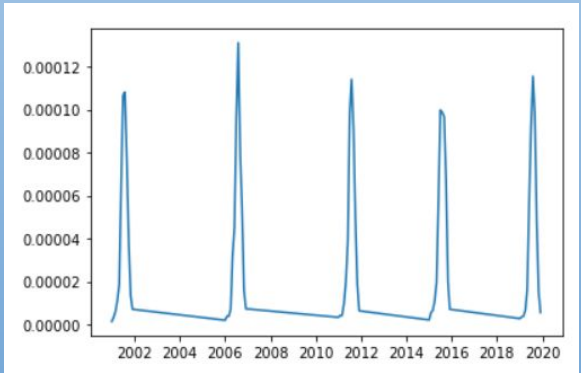
This gives us the idea of the versatility of India . From this we can see that India's precipitation is far from uniform . It's diverse depending upon the geographical situation, land quality etc.

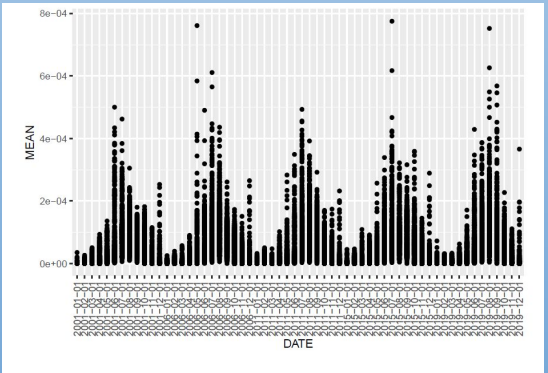


Variation with Time (year)

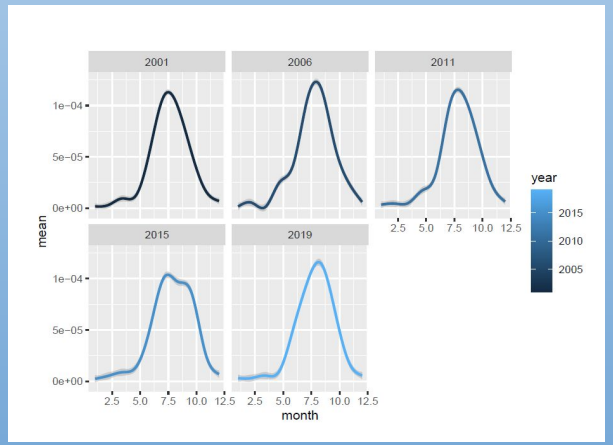
Here in these figures we can see the variation of precipitation with the passing time(year) . In the first figure we can see the peak value is kind of falling after 2006 upto 2015. Now in 2019 there is a slight increment. Does this mean nature is healing?

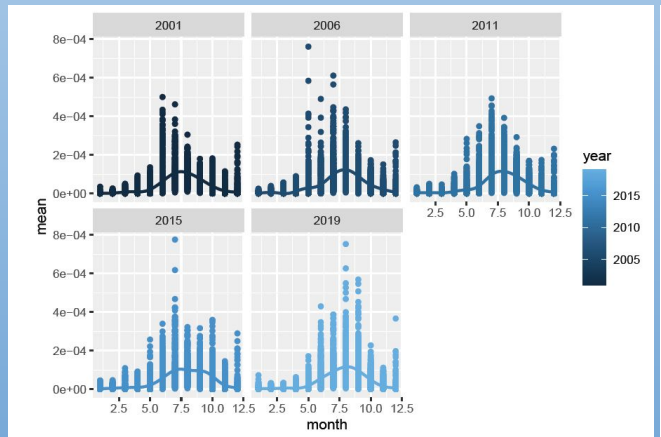
No , we can not conclude anything rigid just with a peak value that occured for 2019.

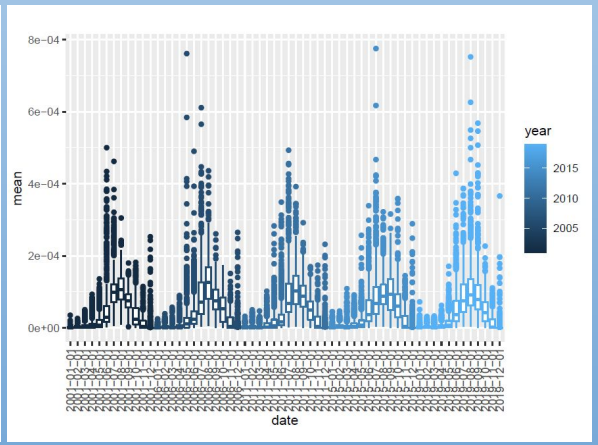




- In the first graph we can see the graph is flattening with the increase in year. It depicts the deviation of precipitation from Rainy season.
- Second graph shows us that the skewness is shifting towards right, which means the major precipitation is going to the end of the year.
- In the third one the deviation is clear that the distribution of precipitation is being affected heavily by climate change with the change of time.







TARUN KANSAL

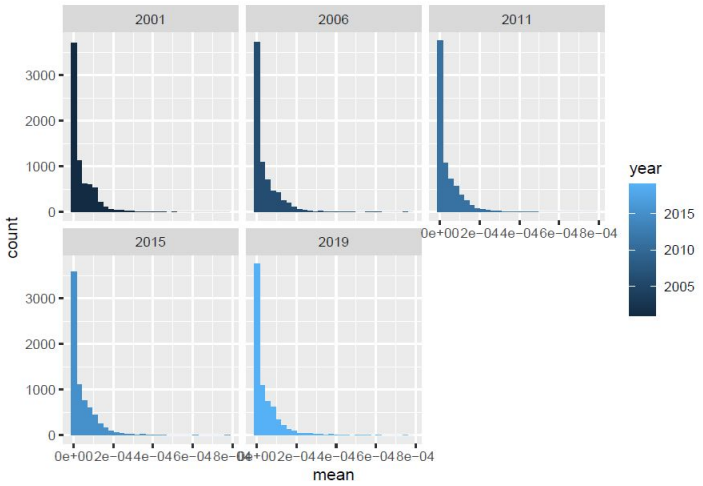
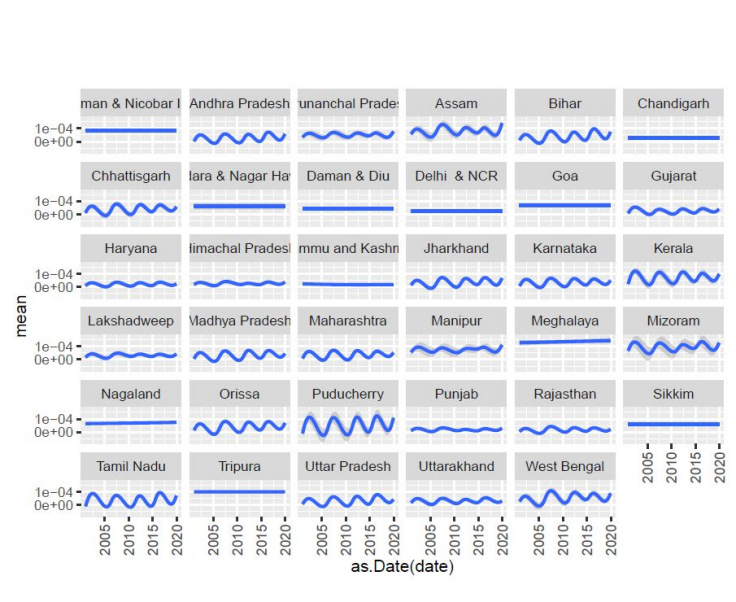


Fig: precipitation quantity vs number of occurance.

This is a graph of the number of occurance of the precipitation quantity. Here we can see that the number of zero precipitation is pretty high in each graph. But if we look closely then we can see that the number of zero precipitation is slightly increasing with the passing years. And the number is very high in 2019 compared to 2015 and slightly higher than 2001,2006 and 2011.

Variation with Location (state)



As we know India is a versatile country with diversity in geographical structure , geographical location , soil components and many more.

So we derived the variation of precipitation for each state. Here we can see in most states the peak value as well as overall value is decreasing.

We can see some flat line as well because of the generalization of data for line diagram.

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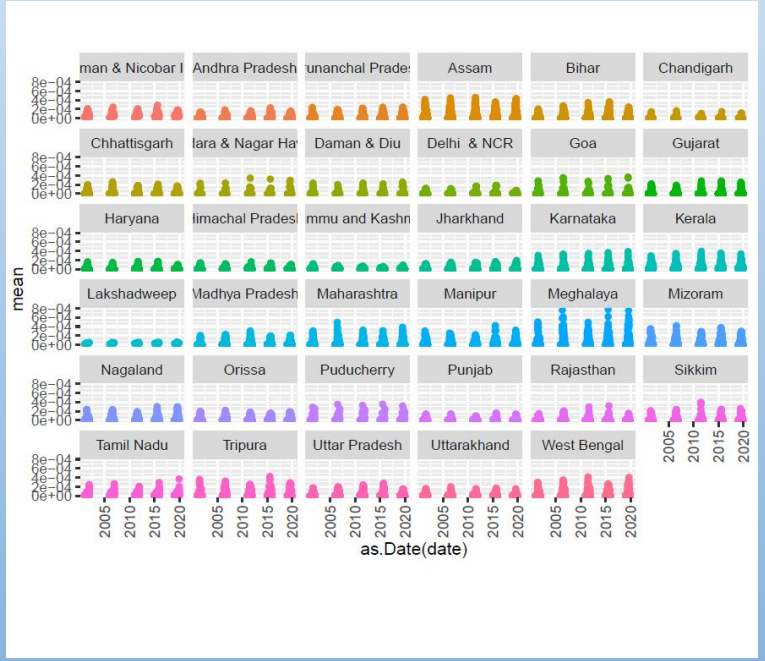

Because of the disability of line diagram we made a dot diagram to see the clear picture.

In this diagram we can see that the precipitation rate of meghalaya is quite high as expected as an outlier.

For the middle portion of India the precipitation rate is low but consistant compared to others.

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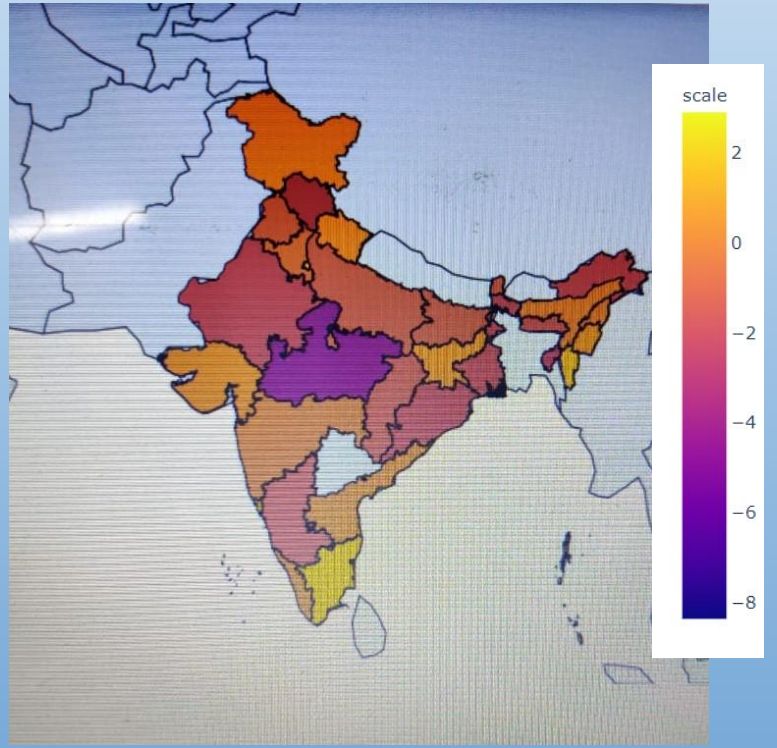
Indian Map Plot

So as per the data we plotted a colour map according to states in india. Here we can have a brief idea about the relationship between the precipitation rate and the geographical variables.

As we can see that the seaside states having more precipitation than the middle land states.



AMAN S. KADIYAN

Visualization :

With all the graphs we can see that effect of climate change upon precipitation is not that the precipitation rate is decreasing rapidly. It's the distribution of precipitation throughout the year which is being affected by it.

In all the graphs the peak value is not changing significantly as for the regions like Meghalaya and some east side states the precipitation rate is not changing that much. But it doesn't mean every state is in a good condition. We can observe that also in the state wise data analysis.

Data Story :

Climate is changing . There is no doubt about that. And like all the other elements of climate it is affecting precipitation as well.

Now as per our previous data analysis we didn't see any major difference in the peak value(maximum precipitation) and the overall quantity.

So where is the problem? Why should we be worry?

Now , if precipitation quantity and peak values will increase then there will be only flood and if it decreases there will be drought only. But in real both are are happening now due to climate change. So the main reason is not the amount of precipitation , it is the distribution of precipitation.

And our data also tells the same story that the distribution of precipitation throughout the year is changing. It's becoming more random , causing floods and drought and so unpredictable that farmers could not do their harvesting properly.

These are the reasons to fear the climate change and take required measures to prevent it.

Limitations :

- Our data is not a continuous type as we are taking data of 2001 , 2006 , 2011 , 2015 , 2019 as the Earth Engine not responding to large data extracting.
- Instead of covering the whole year , our data contains the mean of the first week of each month. We have to do this as the maximum duration of data we are getting is a week.
- As for the data flaws the predictions and regression line is not possible for our dataset.
- In the map plotting we didn't find any geojson file for districts. As a result we have to work with the states instead .

Tools & References :

- For data analysis we have used Jupyter notebook for python(pandas) and R studios for R.
- For map plotting we have used states_india.geojson file.
- Video for map plotting: https://www.youtube.com/watch?v=aJmaw3QKMvk&t=822s
- Simple google search for other unknown data analysis.

Thank You