Water Pollution And Data Analysis Using Google Earth Engine

Dr. Swati Arora
Cluster Innovation Centre

Dr. Harendra Pal Singh
Cluster Innovation Centre

HARSH KUMAR (12021) | HARSHVIR SANDHU(12022) | SACHIN(12049)

ABSTRACT

In this project we collect the data from satellite images. A python library named EE (Google Earth Engine) is used to find data of any location using coordinates of that location and filling starting – ending dates. It gives a dataset of parameters such as pH, temperature, turbidity etc. then we analyse the parameters of the collected data. For validation, our data is compared to other real datasets. Since there are no publicly available datasets for analysis of water quality, earth engine API is used to collect data.

INTRODUCTION AND RELATED WORK

Water pollution is a big issue not only in India but also across the world. Day by Day we are seeing that the water is being polluted. Water pollution occurs when harmful substances, often chemicals or microorganisms, contaminate a stream, river, lake, ocean, aquifer, or other body of water, degrading water quality and rendering it toxic to humans or the environment.

Source:https://www.circleofblue.org/

- Water consumed is stored in several water bodies in and around us, among which dams occupy a major portion of water.
- The literature depicts that the methods involving remote sensing and image processing of water quality analysis consume time, and require cost-effective methods to monitor water quality devoid of considerable human intervention

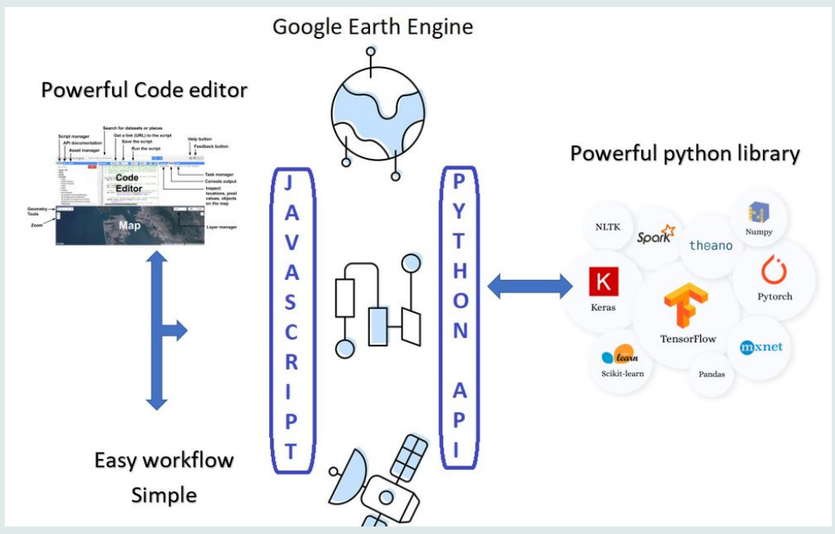
METHODOLOGY

Earth Engine Python API

Google Earth Engine Application Programming Interface (API) is a cloud-based geospatial processing platform that brings large-scale cloud computing functionality to the public.

GeeMap

Geemap is a Python package for interactive mapping with Google Earth Engine (GEE), which is a cloud computing platform with a multi-petabyte catalog of satellite imagery and geospatial datasets.

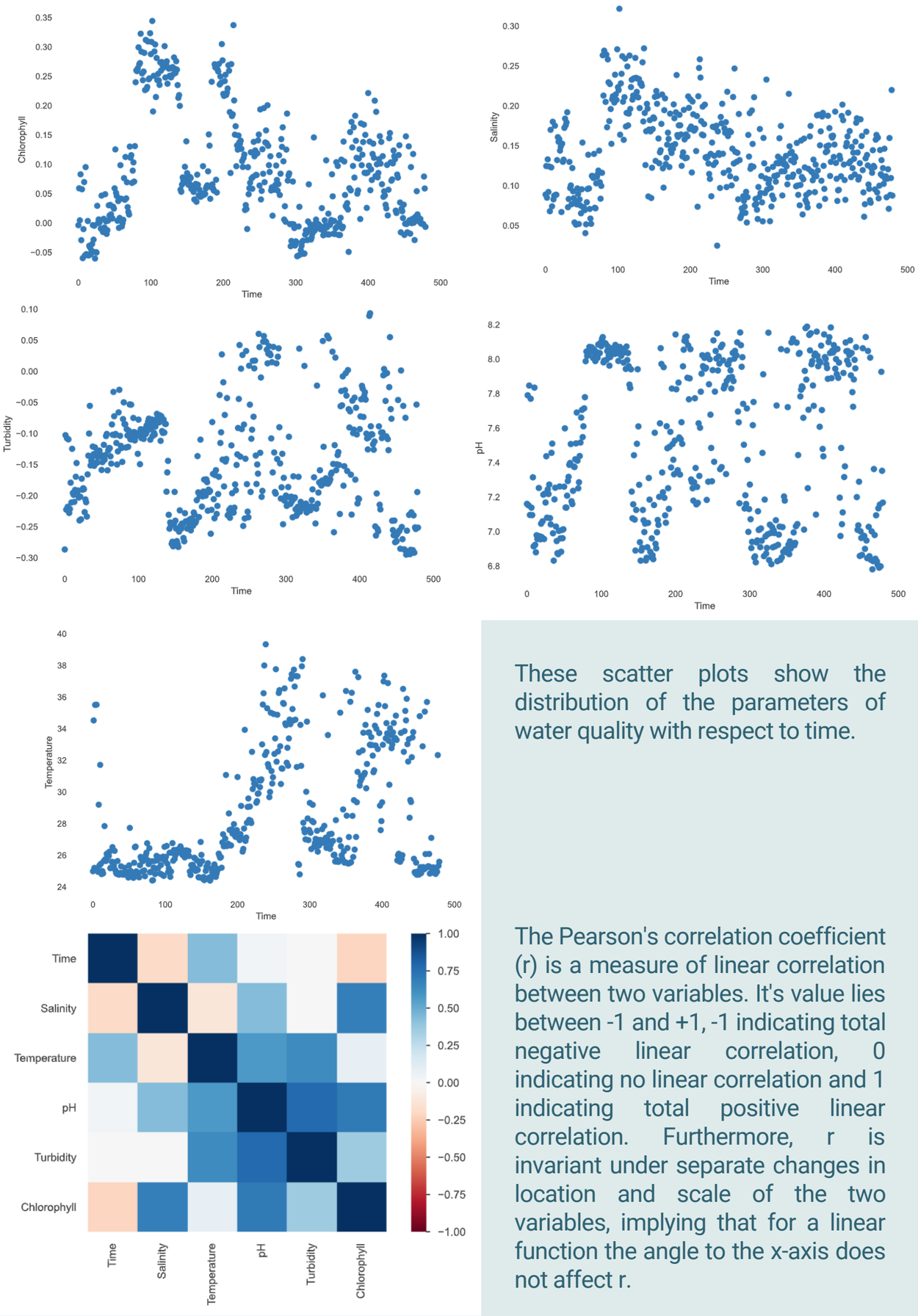


Source:https://bikeshbade.com.np/media/tutorial/comparison.JPG

RESULT AND DISCUSSION

The results of our measurements have been summarized in the form of Tables. The minimum, maximum and mean values of the six studied water quality parameters of all measurements obtained from June 1, 2019 to January 1, 2020 of Chandola Lake, Ahmedabad are presented.

SAMPLING LOCATIONS	PARAMETERS	ACTUAL RANGE	OBTAINED RANGE
Kankaria Lake Ahmedabad	pH	7.9-8.9	6.7-8.1
	Temperature (°C)	25-33	12-37
	Salinity (mg L−1)		516-3161
Chandola Lake Ahmedabad	pH	7.3-8.3	6.7-8.2
	Temperature (°C)	25-33	25-39
	Salinity (mg L−1)		159-2817
Fatehwadi Canal Ahmedabad	pH	7.3-7.9	6.8-8.2
	Temperature (°C)	25-35	25-39
	Salinity (mg L−1)		248-3216



These scatter plots show the distribution of the parameters of water quality with respect to time.

The Pearson's correlation coefficient (r) is a measure of linear correlation between two variables. It's value lies between -1 and +1, -1 indicating total negative linear correlation, 0 indicating no linear correlation and 1 indicating total positive linear correlation. Furthermore, r is invariant under separate changes in location and scale of the two variables, implying that for a linear function the angle to the x-axis does not affect r.

CONCLUSION AND FUTURE WORK

Finding a dataset using other techniques may be a time consuming method as the laboratory one. If one wants a dataset of a particular location our method provides n numbers of parameters and approximate 1000 entries in it. If one prefers to choose a laboratory method to find a dataset then it will take a lot of time in only calculating two or three parameters and only a few values of those parameters will be found.

1. This project is very useful to collect data of large water bodies such as ponds, lakes and canals. However, when it comes to water bodies like streams and rivers we are not able to collect data. We plan to solve this issue by gaining more experience with the earth engine API and also use other GIS related tools.
2. Once we have collected the data, we can also try to fit a model on the data. This will allow us to predict the future surface water quality of a given location.

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