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"GRIDDED RAINFALL DATA SET"

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ABSTRACT:

Rainfall patterns usually have spatial and temporal variability. This variability affects the agricultural production, water supply, transportation, the entire economy of a region, and the existence of its people. Agriculture would be seriously affected by increased variability and trends in the seasonal characteristics of rainfall in an environment where one of the major limiting factors of agricultural production is the amount of water available through rainfall. This dissertation work is an analysis of variations and trends in rainfall for Belgaum district, Karnataka. Some parts of Belgaum district receive annual rainfall less than 750 mm and hence are drought prone**. [**1**]**

INTRODUCTION:

The length of the rainfall which can be more appropriately called as depth of the rainfall can be measured when rainwater is accumulated on the flat surface during a given amount of time.0.039 inches of the rainfall is the equivalent to one liter of water per square meter.

Rain is actually measured in units of length per unit time, typically in millimeters per hour or in the countries where the imperial units are common can be typically in inches per hour. With a rainfall of 0.039 inches,every square meter receives 1 liter of rainwater.A rainfall of 0.039 inches supplies 61.023 Cubic inches or 1 liter of water to each square meter of the field.Thus 1 hectare receives 10000 liters. Python DBMS(data base management system) i.e sqlite3 are very important and easy way to store very large data with ease. Python DBMS is used in a large variety of fields like agriculture,software industry,automobile industry,educational institutions and astronomical research areas like ISRO,so in this project we shall be using python DBMS to store the annual rainfall of the any area.

Fig 1: Rain Gauge Measurement

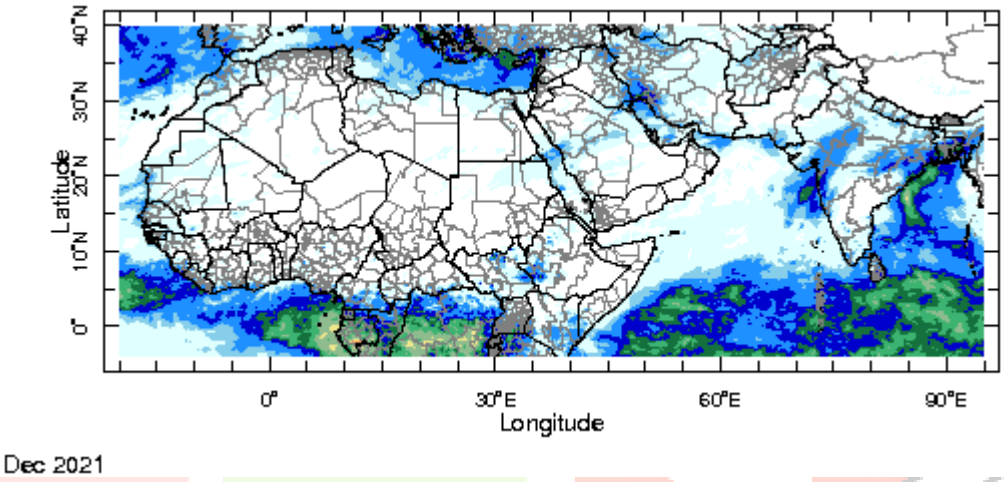


Fig 2: Accumulated rainfall during the most recent month based on estimates from the Climate Prediction Center Morphing technique.[source: IRI]

OBJECTIVE OF THE PROJECT:

This is a project used to store the annual average rainfall of a particular region into a database with the help of python programming.As the Meteorological department uses a very complex system of storing large amount of annual rainfall we have decided to do the same in a simpler manner where the python program is used to the average annual rain record as the input and store it sequentially in the form of a table.

LITERATURE SURVEY:

1. Rainfall in Karnataka:The state of Karnataka in India has a bittersweet relationship with rains. While its regions of Malnad and Coastal Karnataka receive copious amounts of rainfall; its north Bayaluseeme region in the Deccan Plateau is one of the most arid regions in the country. Most of the rains received in the state is during the monsoon season. Being an agrarian economy with a large percentage of its citizens engaged in agriculture, the failure of rains can have a crippling effect on the economy of the state.[2]

Year	Hulikal Rainfall (mm)	Agumbe Rainfall (mm)	Amagaon Rainfall (mm)	Talacauvery Rainfall (mm) [2]	Kokalli Rainfall (mm)	Nilkund Rainfall (mm)	Castle Rock Rainfall (mm)	Mundrote Rainfall (mm)	Kollur Rainfall (mm)
2017	5,700	6,311	4,733	5,859	3130	4981	5560	1002	5203
2016	5,721	6,449	4,705	5,430	2682	4655	4968	1458	3496
2015	6,035	5,518	4,013	5,319	2730	4367	3667	3143	4254
2014	7,907	7,917	5,580	7,844	8746	6710	5956	5566	3308
2013	9,383	8,770	8,440	8,628	4464	7082	3667	7199	6614
2012	8,409	6,933	5,987	5,722	5036	5398	6165	3727	6715
2011	8,523	7,921	9,368	6,855	4437	6593	7083	9974	7083
2010	7,717	6,929	10,068	6,794	4002	-	-	5042	7685
2009	8,357	7,982	-	-	-	-	-		
2008	7,115	7,199	-	-	-	-	-		
2007	9,038	8,255	-	-	-	-	-		
2006	8,656	8,457	-	-	[3][4]	-	-		

2. Malenadu: Malenadu is a region in the state of Karnataka in India. Malenadu covers the western and eastern slopes of the Western Ghats of Sahyadri mountain range, and is roughly 100 kilometers in width.Western ghats act as the rain barrier during south-west monsoon season. This region is one of the wettest regions in the world where the rainfall measurements had overflown over 7000mm whereas Cheerapunji and Mawsynram at average receives about 11,000mm of rainfall per year. **[**3**]-[**4**]**

Rank	Hobli/Village	District	Taluk	Year	Rainfall in mm	Elevation in metres
1	Amagaon	Belgaum district	Khanapur	2010	10,068	785
2	Mundrote	Kodagu district/Coorg District	Madikeri	2011	9,974	585
3	Hulikal	Shimoga district	Hosanagara	2013	9,383	614
4	Agumbe	Shimoga district	Thirthahalli	2013	8,770	643
5	Kokalli/Kakalli	Uttara Kannada	Sirsi	2014	8,746	780

3. Geography of Karnataka:The southwest monsoon accounts for almost 80% of the rainfall that the state receives. The annual rainfall across the state ranges from low 50 cm to copious 350 cm. The districts of Bijapur, Raichur, Bellary and Southern half of Gulbarga experience the lowest rainfall ranging from 50 to 60 cm while the west coastal region and Malenadu enjoy the highest rainfall.

PROBLEM STATEMENT:

Earlier organizations and people used to store annual average rainfall in the form of a sequence in a book which is a tedious process and requires a lot of maintenance and hard work.The problem with books was that it was not a permanent record keeping item.The other problem was book had a limit to store data in it.

EXISTING SYSTEM:

The existing system which we already stated are of two types:

A. Basic

- This method uses books to store large amounts of data.
- This method is traditionally used by small organizations or people situated in rural or suburban areas.

B. Advanced

- This method uses a computer system to store large amounts of data in the form of documents or files.
- This method is widely used by meteorological departments worldwide to record rainfall and depict it in the form of a graph.

PROPOSED SYSTEM:

In order to resolve the problems in the existing system we have come up with a simpler and efficient way of storing the average annual rainfall with the help of a python code linked to sqlite3 i.e python DBMS.Our system is simpler because the requirements are minimal and can run on any modern device.

HARDWARE AND SOFTWARE REQUIREMENTS:

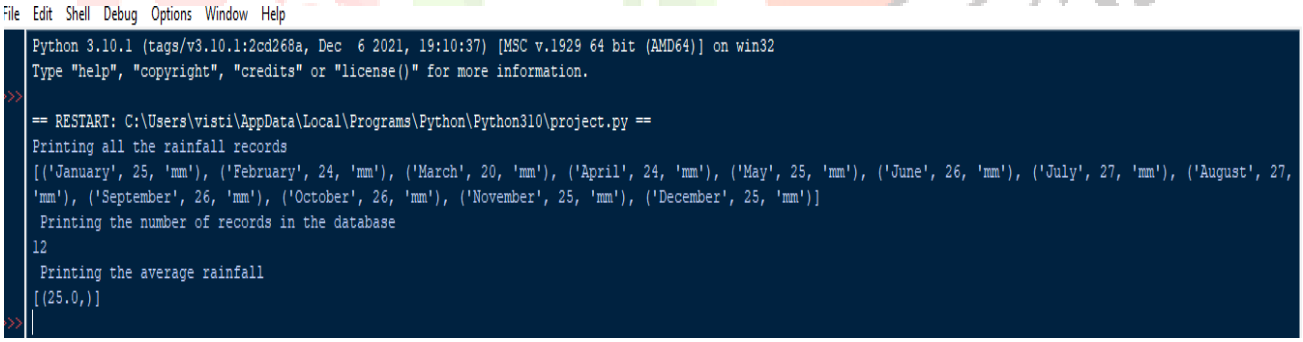
1. Operating system: Linux- Ubuntu 16.04 to 17.10, or Windows 7 to 11, with Mac OS X 10.11 or higher, 64-bit
2. You have to install Python 3.6, 3.7,3.8 or 3.9 and related packages, please follow the installation instructions given below as per your operating system.
3. 2GB RAM (4GB preferable)
4. 5 GB free disk space
5. x86 64-bit CPU (Intel / AMD architecture)
6. Minimum Intel i3 processor.
7. Internal storage 500GB and above.

CODE FOR THE PROJECT:

```
import sqlite3
conn = sqlite3.connect('rainfall_database')
c = conn.cursor()

# I'm deleting a table if it exists - to start with.
# Or else I will get an error.

c.execute("DROP TABLE IF EXISTS WEATHER")

#print("Creating the table here");

table = """ CREATE TABLE WEATHER (
          Month CHAR(25) NOT NULL,
          Rainfall INT,
          Units CHAR(25) NOT NULL
       ); """;
c.execute(table)
#print("Table Created");

print("Printing all the rainfall records" )
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("January",25,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("February",24,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("March",20,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("April",24,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("May",25,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("June",26,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("July",27,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("August",27,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("September",26,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("October",26,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("November",25,"mm")""")
c.execute("""INSERT INTO WEATHER (Month,Rainfall,Units) VALUES ("December",25,"mm")""")
```

```
# Now, get the records and print them.
c.execute("""SELECT Month,Rainfall,Units from WEATHER """)
print(c.fetchall())

# print the 'number of records ( i.e 12 )

print (" Printing the number of records in the database");
c.execute("""SELECT Month,Rainfall,Units from WEATHER """)
print(len(c.fetchall()))

print (" Printing the average rainfall");
# get them and let the sql figure out the average using their built in function.

c.execute("""SELECT avg(Rainfall) FROM WEATHER""")
print(c.fetchall())

conn.commit()
conn.close()
```

RESULT:



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