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MT Project

Temperature Prediction

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Abstract : This paper focuses on the statistical nature of temperature predictions with the help of Internet of Things (I.O.T). The DHT 11 sensor will take the data . That data will be stored in google firebase. By extracting that data from cloud predictions are done. The layers of this process is mentioned in this paper.

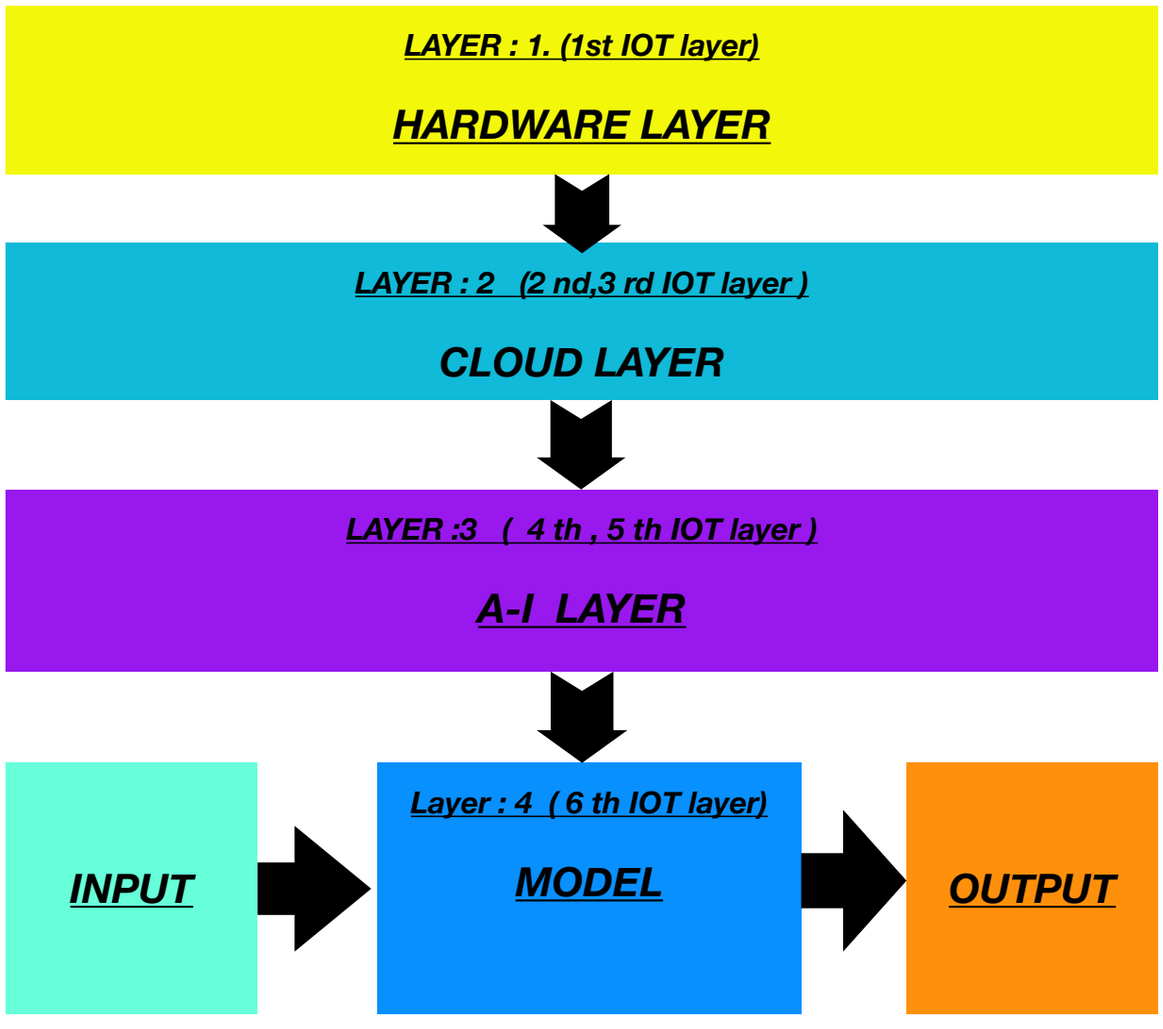
INTRODUCTION

This paper is all about temperature prediction with the help of Internet of things. The first layer of our model will be hardware layer. For hardware we need ESP8266 microcontroller. DHT 11 or DHT22 as temperature sensor , Jumper wires and USB cable. For software we need Arduino software in a descent laptop.

The Second Layer consists of Data taken from sensor will be stored in cloud. For this Google Firebase will be used. From firebase the data can be extracted in any system.

The Third Layer consists of Artificial intelligence. The data extracted from cloud will go under the process of Predictions . For this Python is required with the libraries of Numpy , Pandas , Matplotlib and Sklearn . The Whole output we can get in these 3 layers. This Layers has also some layers. Which we will be there in Architecture of this model. The IOT Layer is present in the summary

ARCHITECTURE



LAYER 1 : HARDWARE LAYER

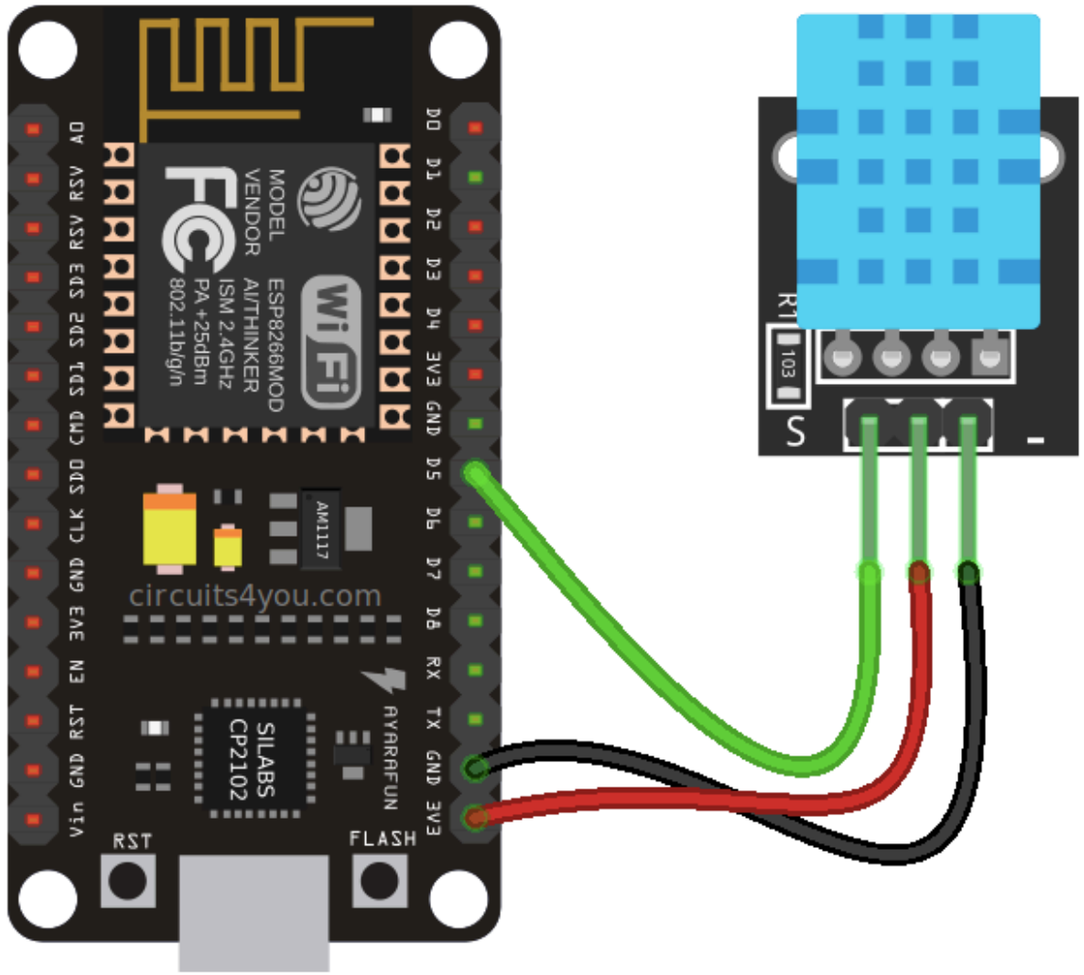
The Architecture of first layer is given below.

Circuit Connection

Arduino Coding

1) Circuit Connection

The components you need for this circuit is jumper wires , bread board (if possible) , DHT11 , and DHT 11 stand(if possible) , and USB cable. Connect one ground with GND of DHT 11 and +5V to VCC of DHT11. One AD pin for digital input and output. Finally connect USB cable with you laptop which contains Arduino code and usb of microcontroller . Refer figure.



Circuit Connection of DHT 11

2) Arduino code

The whole arduino code is there in below link.

https://github.com/S-SANTOSH/Temperature-Prediction/blob/master/temperature_prediction.ino

Layer 2 : The Cloud Layer

The data will get arranges in the think speak . Now it will be difficult for me to wait for the dataset. Hence I took the readymade dataset of 8 different country of at least 270 years . In that data set every 1st day of every month the reading is taken at various location.

You can get the dataset from the following link.

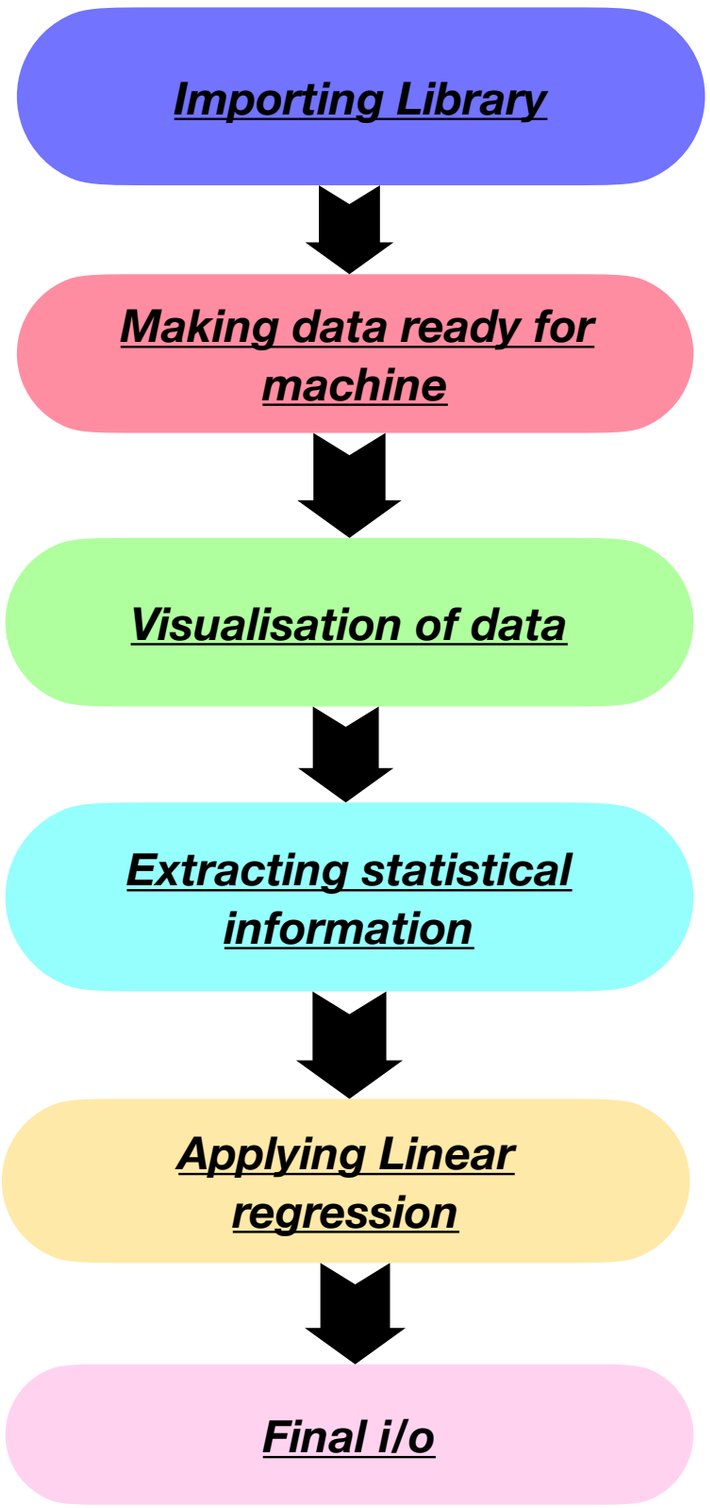
https://github.com/S-SANTOSH/Temperature-Prediction/blob/master/temperature.csv

the dataset you will get is raw data. The basic summary of the data is given below.

record_id	month	day	year	AverageTemperatureFahr	AverageTemperatureUncertaintyFahr	City	country_id	Country	Latitude	Longitude
474376	1	1	1853	NA	NA	Auckland	NEW	New Zealand	36.17S	175.03E
474377	2	1	1853	NA	NA	Auckland	NEW	New Zealand	36.17S	175.03E
474378	3	1	1853	NA	NA	Auckland	NEW	New Zealand	36.17S	175.03E
474379	4	1	1853	NA	NA	Auckland	NEW	New Zealand	36.17S	175.03E
474380	5	1	1853	NA	NA	Auckland	NEW	New Zealand	36.17S	175.03E
474381	6	1	1853	51.9062	36.9572	Auckland	NEW	New Zealand	36.17S	175.03E
474382	7	1	1853	52.3886	34.5488	Auckland	NEW	New Zealand	36.17S	175.03E
474383	8	1	1853	52.853	33.5498	Auckland	NEW	New Zealand	36.17S	175.03E
474384	9	1	1853	52.5776	33.638	Auckland	NEW	New Zealand	36.17S	175.03E
474385	10	1	1853	54.8726	33.9836	Auckland	NEW	New Zealand	36.17S	175.03E
474386	11	1	1853	56.6888	34.2518	Auckland	NEW	New Zealand	36.17S	175.03E
474387	12	1	1853	59.846	37.5062	Auckland	NEW	New Zealand	36.17S	175.03E
474388	1	1	1854	64.5908	36.23	Auckland	NEW	New Zealand	36.17S	175.03E
474389	2	1	1854	65.372	35.6576	Auckland	NEW	New Zealand	36.17S	175.03E
474390	3	1	1854	64.9688	35.3966	Auckland	NEW	New Zealand	36.17S	175.03E
474391	4	1	1854	59.927	35.2022	Auckland	NEW	New Zealand	36.17S	175.03E
474392	5	1	1854	57.5042	34.511	Auckland	NEW	New Zealand	36.17S	175.03E
474393	6	1	1854	54.518	34.7972	Auckland	NEW	New Zealand	36.17S	175.03E
474394	7	1	1854	53.1914	35.024	Auckland	NEW	New Zealand	36.17S	175.03E
474395	8	1	1854	52.8044	34.3544	Auckland	NEW	New Zealand	36.17S	175.03E
474396	9	1	1854	53.3912	33.683	Auckland	NEW	New Zealand	36.17S	175.03E
474397	10	1	1854	54.7538	37.4108	Auckland	NEW	New Zealand	36.17S	175.03E
474398	11	1	1854	57.317	35.0024	Auckland	NEW	New Zealand	36.17S	175.03E
474399	12	1	1854	60.0296	35.924	Auckland	NEW	New Zealand	36.17S	175.03E
474400	1	1	1855	63.3578	36.0716	Auckland	NEW	New Zealand	36.17S	175.03E

Dataset of temperature.

Architecture

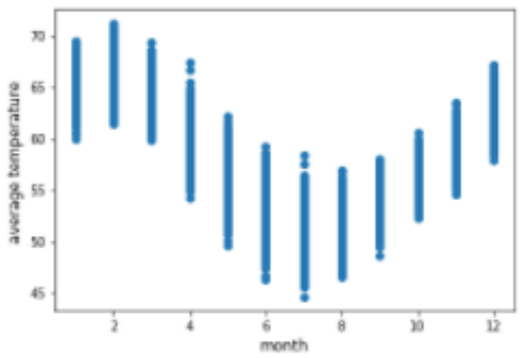


Description of Layers in Artificial Intelligence

1) Importing Libraries: firstly we will importing the libraries in python such as numpy , pandas , matplotlib , and sklearn.

2) Making data ready for machine: In this we separated on the basis of country

3) Visualisation of data: In this we plot the data into graph for statistical outcome. The type of graph is in sinusoidal and cosinusoidal pattern. With a range of +/- 10 width. The graph off of one country is given rest you can refer in code.



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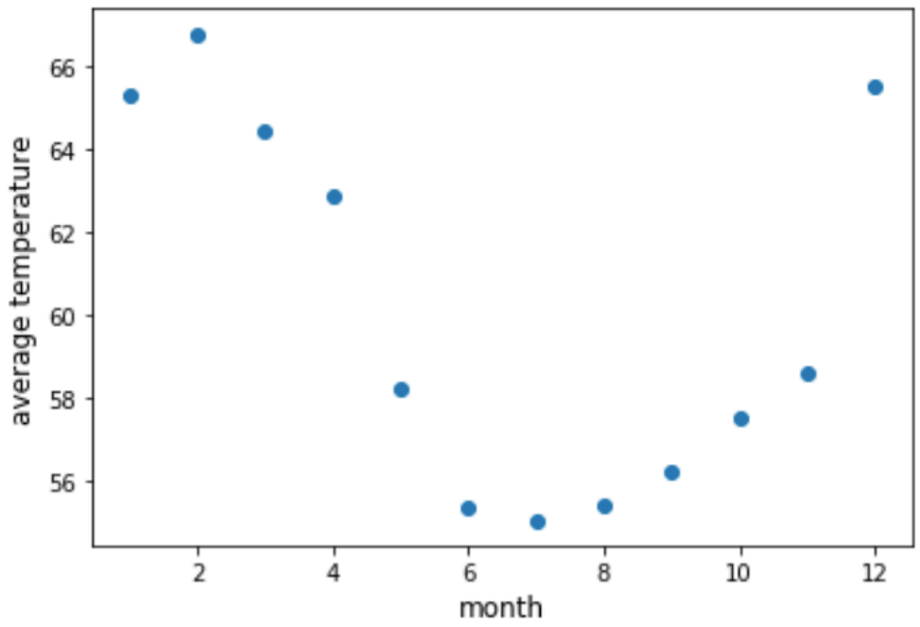
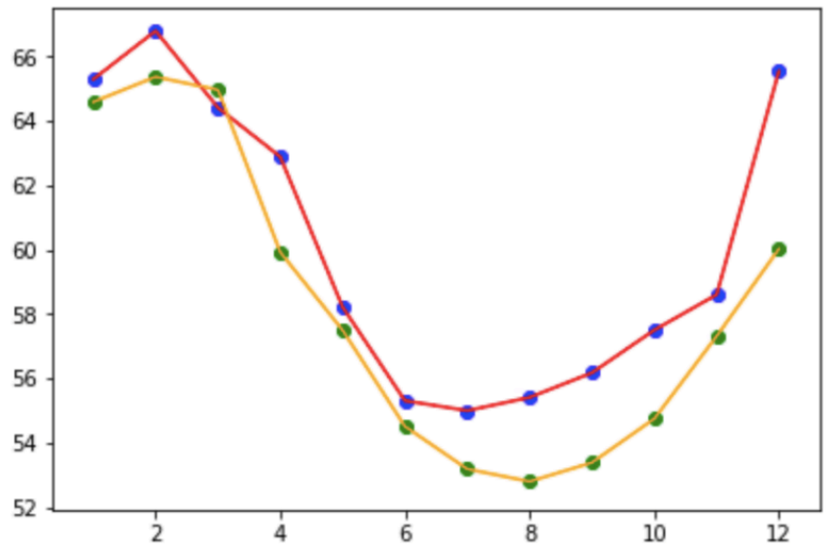
4) Statistical information: As the similar. pattern which is followed in these graph. Hence. linear regression can go overfitting. Hence I took only minimum and maximum years of. all countries every month.

hence the modified dataset gives to plot like this



Latest year temperature of Newzealand

5) Applying Linear Regression : After that applied the algorithm to our modified data the result are as follows . Refer code for the rests

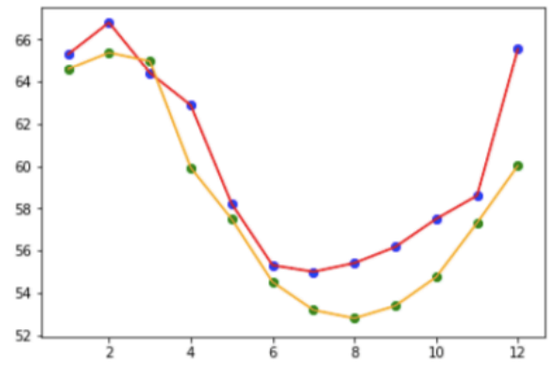


Final fit

6) Final i/o : It is a small code which takes input and with the help of model predicts output. One country i/o is mentioned below.

```
34]: main() # actual is 62 f

Welcome to our temperature prediction model
You can predict the temperature of the following country
0 : Newzealand , 1 : Brazil , 2 : South Africa , 3 : Ukraine , 4 : France , 5 : Sweden , 6 : Jap
, 7 : Poland
Enter the index of the country = 0
Enter the month in numeric form = 3
Enter the futher year of which you want to predict2020
The Predicted average temperature of  March  will be 61.4075 fahr
the consecutive error will be added
```



i/o operations on model

You can refer the whole code with the following link:

https://github.com/S-SANTOSH/Temperature-Prediction/blob/master/Temperature%20Predictions.ipynb

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Summary: