Predictive Yield

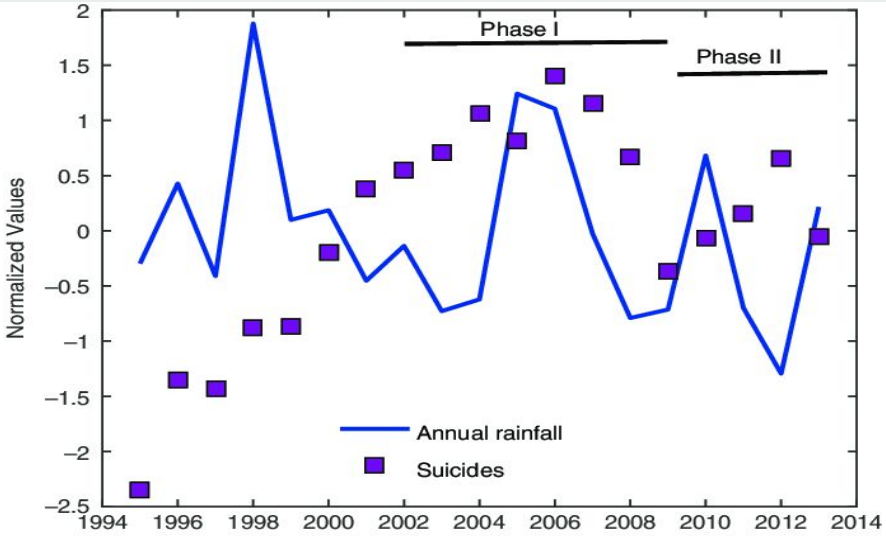
By:

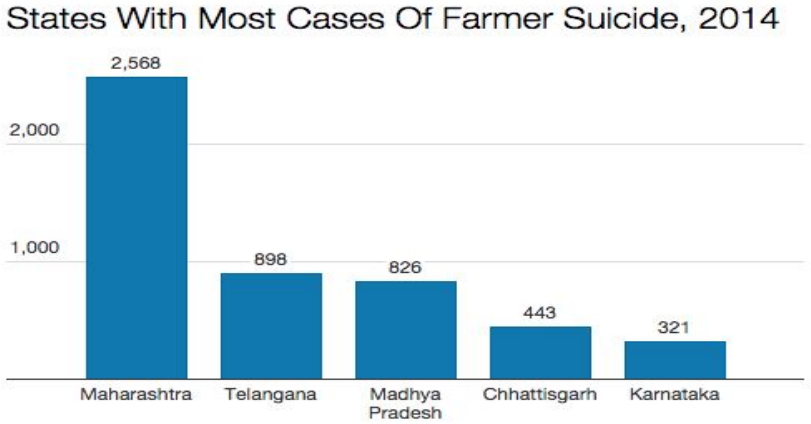
1) Amogh Desai - 1680012
2) Mihir Jadhav - 1680018
3) Pooja Patel - 1781107

Need of the System

- Farmers are 20% of the 1.36 billion people in India[4].
- Agriculture is the main source of income for more than 50% of the total population in India[5].
- National Crime Records Bureau of India in its 2017 report stated that about 12000 farmers committed suicide, this amounts to 11.2%[3].

- Overdependence on Rain
- Small Land Holdings
- Inability to pay loans
- Lack of Education





Problem Statement

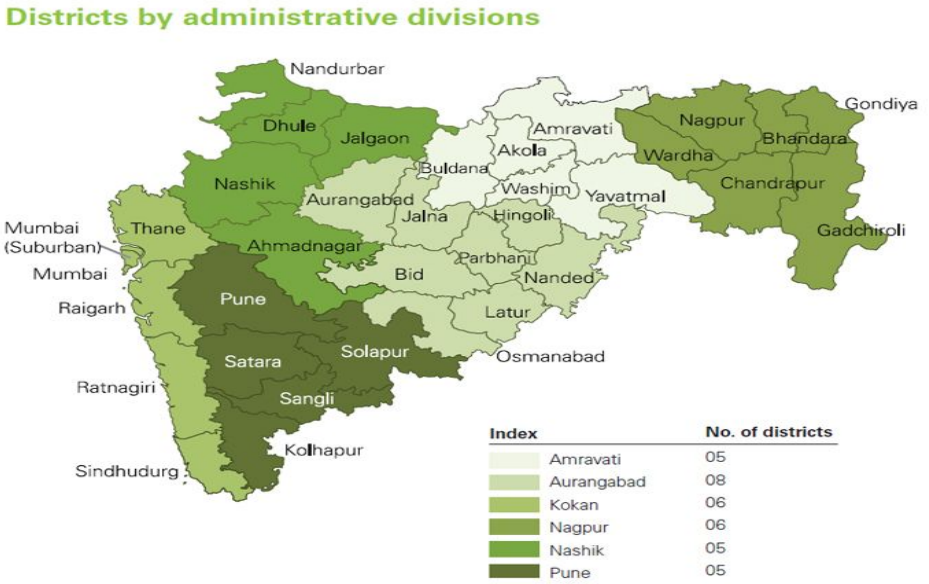
More than 70% of the total cultivated crops are destroyed because of unseasonal rains, drought, floods and pest attacks[2]. This affects farmers adversely[1].

Develop a system that will help alleviate this problem as well as aid and improve the present state of Indian farmers by recommending suitable and profitable crops. Various factors such as soil, climate conditions etc. should be considered while recommending crops. Moreover, the results should be presented in a manner that is convenient and understandable to the farmers.

Our Solution

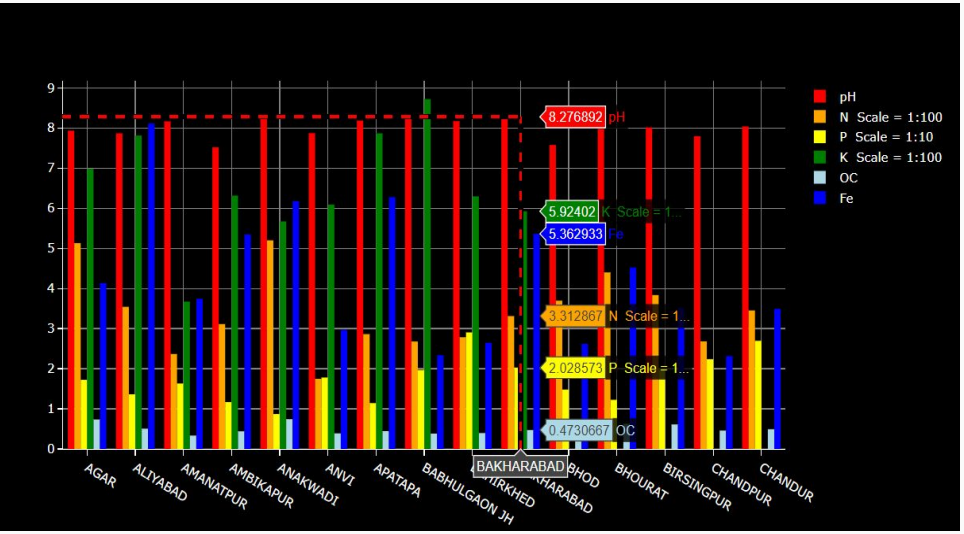
Solution = Predictive Yield

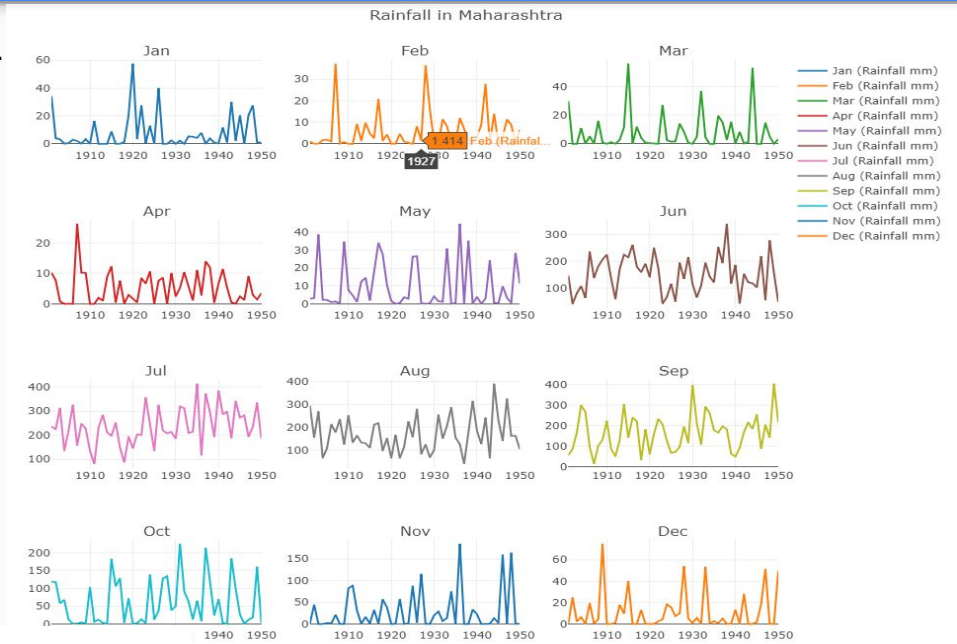
Customized Crop Recommendation to Maharashtra Farmers



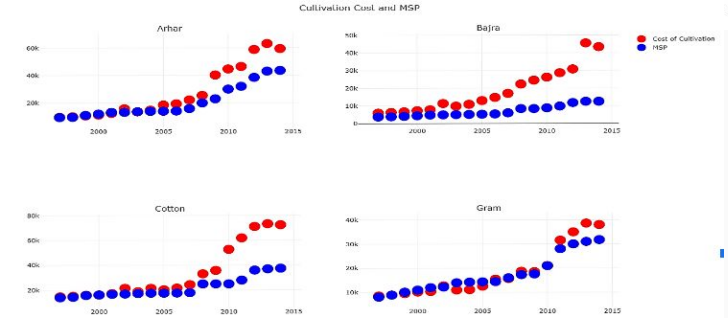
Parameters we use for Recommending

Soil Data of more than 44000 villages of Maharashtra





More than 15 years of Crop Yield Data



100+ Years of Weather Data

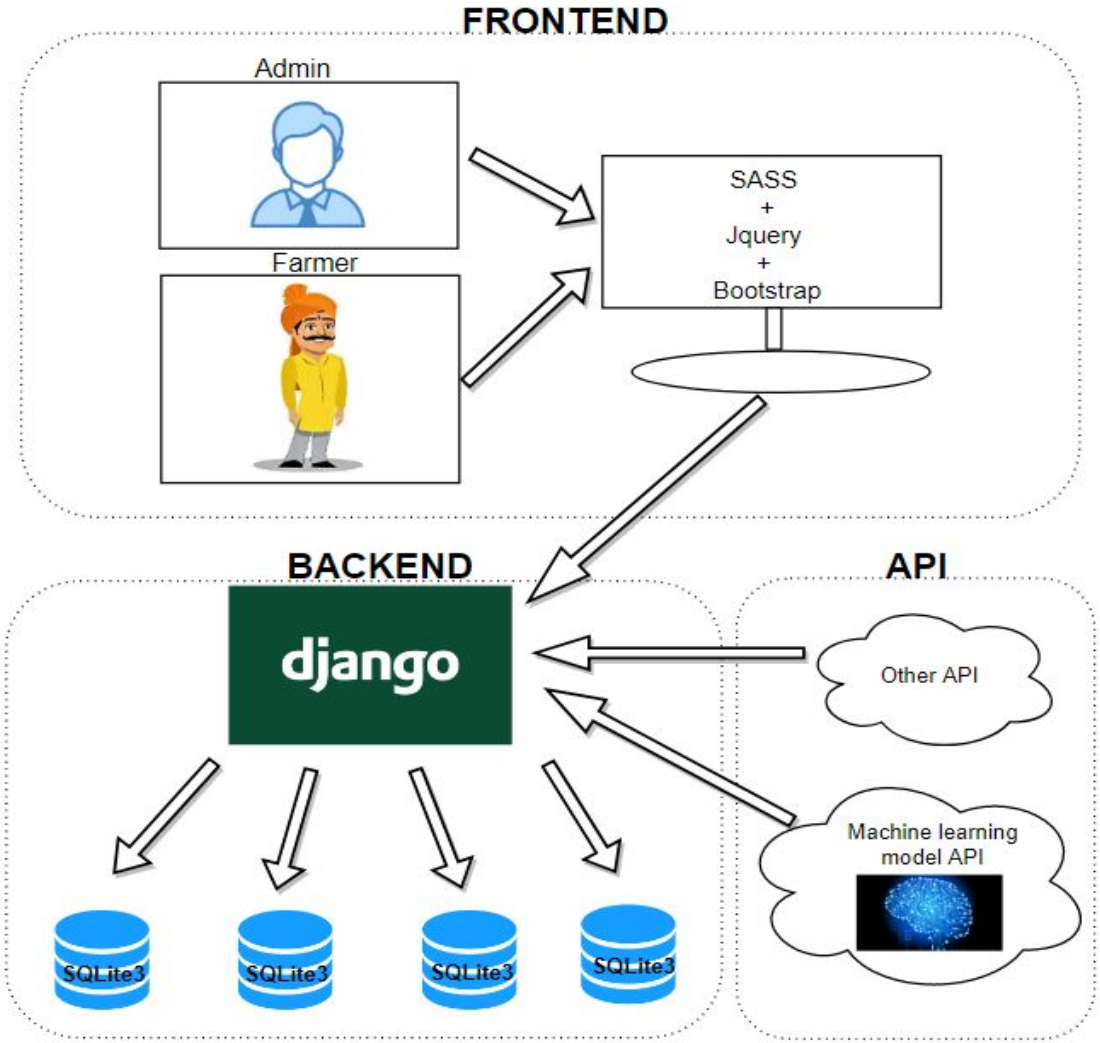
Predictive Yield

Our aim is to empower farmers to obtain better yields and digitize every farm all over India with the help of precision agriculture.

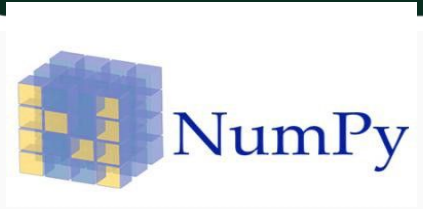
Now, instead of just talking about the frontend of our website let's see a live demonstration of the website!!

Technical Aspects

System Architecture



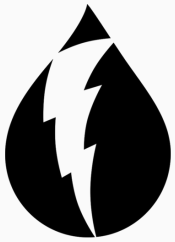
Technologies Used



Database Used

- Stores district, village, soil, rainfall and other information
- SQLite is used as it is not resource intensive
- SQLite easily integrates with Django

API's Used



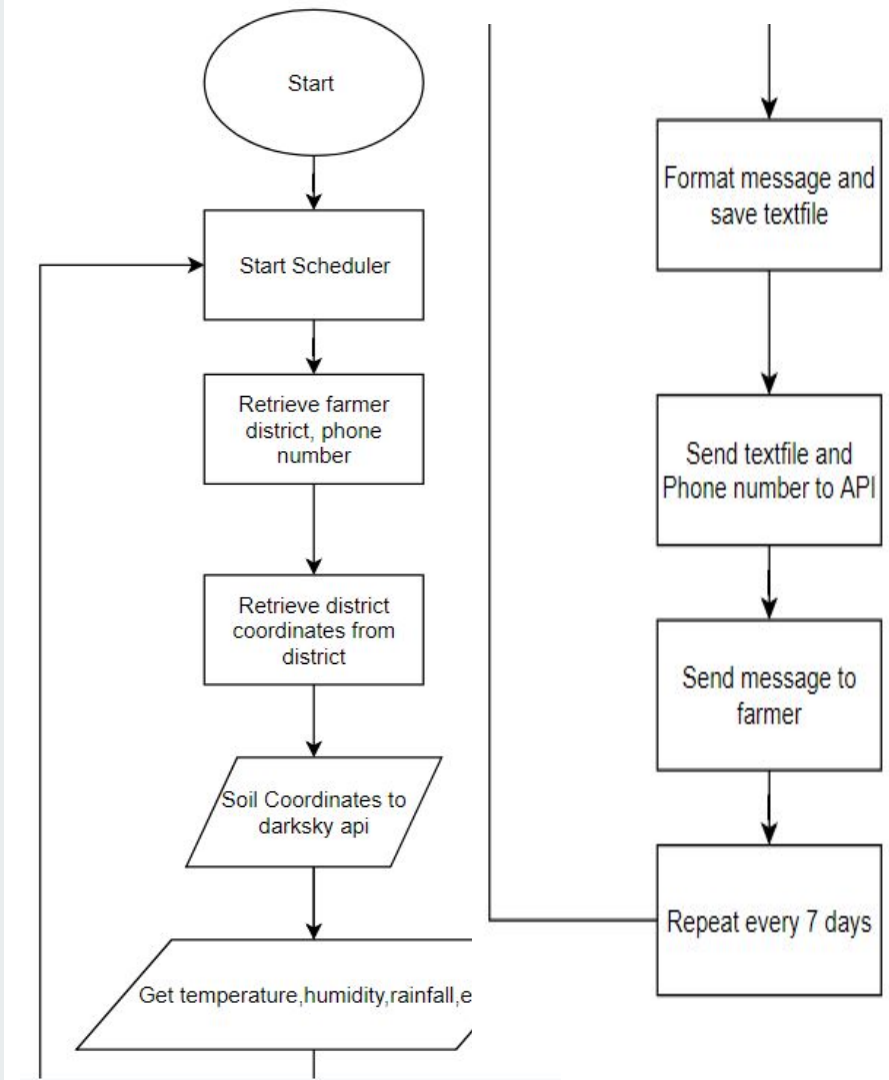
Powered by Dark Sky

Flask

web development, one drop at a time

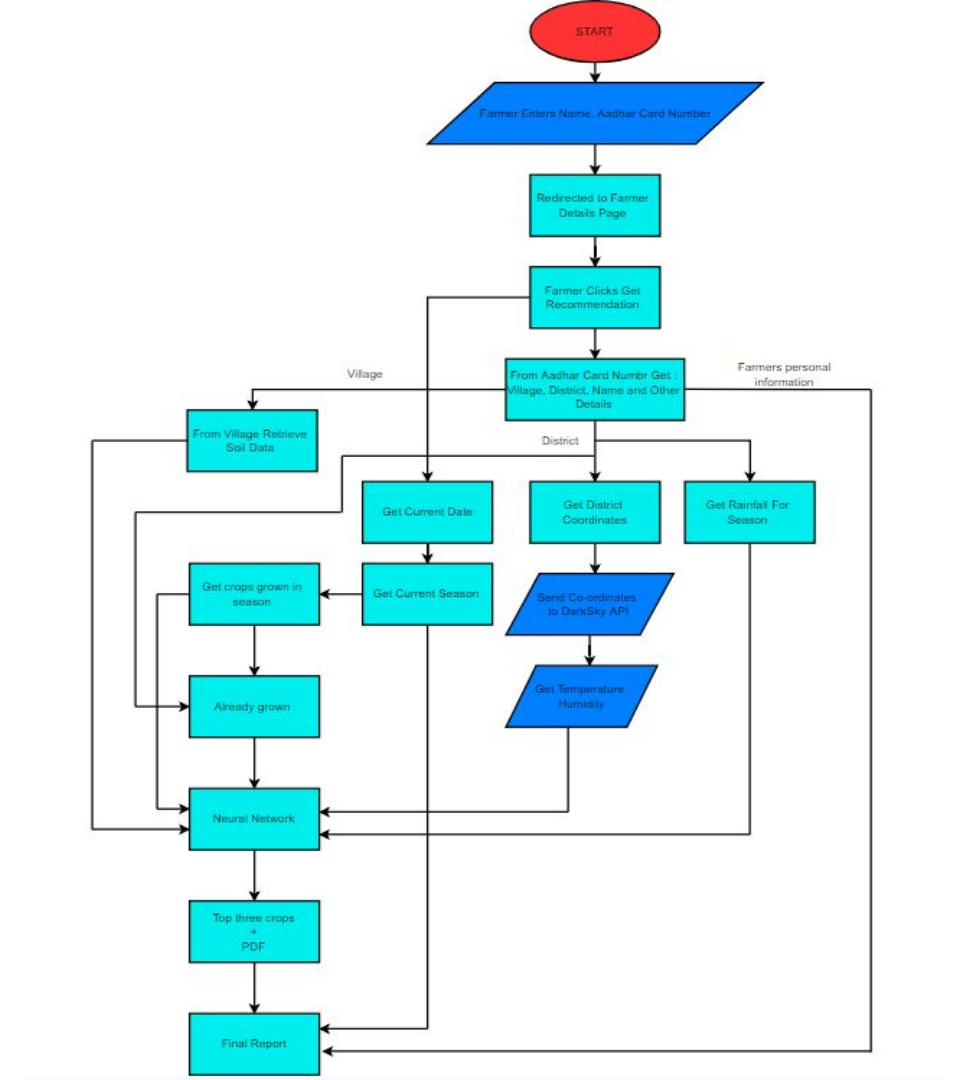
FAST2SMS

Weather Alerts & Messaging API



Recommender System

- Inputs: Soil, Temperature, Humidity and Rainfall, Crops grown in the current season
- Process: Predict the Profit per Hectare
- Outputs: A PDF report with crop recommendations



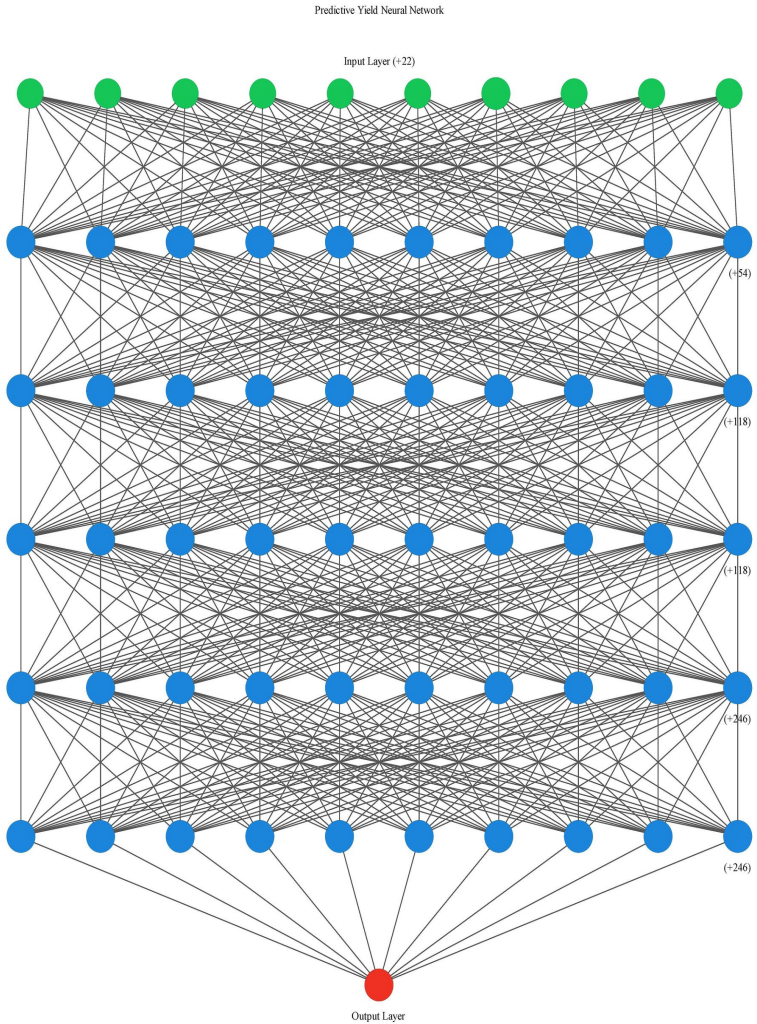
Machine Learning Model

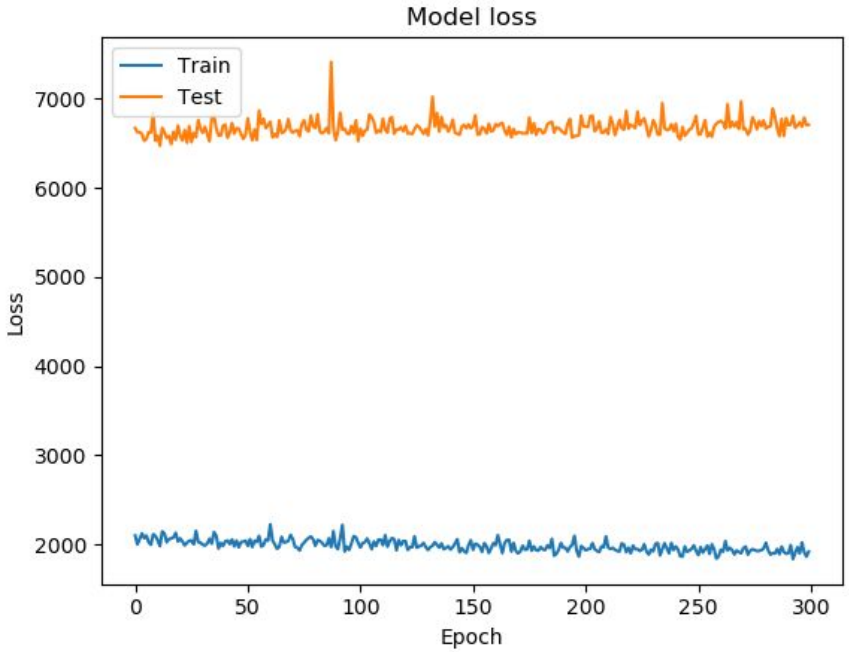
- 9915 rows of data in total which is divided into training and testing data in the ratio 80:20.
- Deep neural network with 6 layers.
  a. 32 input nodes and 64 output nodes.
  b. 128 Nodes
  c. 128 Nodes
  d. 256 Nodes
  e. 256 Nodes
  f. 1 Node
- Optimizer: Adam
- Activation function: Exponential Linear Unit(ELU)

Layer (type)	Output Shape	Param #
dense_1 (Dense)	(None, 64)	2112
dense_2 (Dense)	(None, 128)	8320
elu_1 (ELU)	(None, 128)	0
dense_3 (Dense)	(None, 128)	16512
elu_2 (ELU)	(None, 128)	0
dense_4 (Dense)	(None, 256)	33024
elu_3 (ELU)	(None, 256)	0
dense_5 (Dense)	(None, 256)	65792
elu_4 (ELU)	(None, 256)	0
dense_6 (Dense)	(None, 1)	257

Total params: 126,017
Trainable params: 126,017
Non-trainable params: 0

	pH	N	P	K	OC	Fe	Rainfall	Temperature	Humidity	Min PPH
count	9915.000000	9915.000000	9915.000000	9915.000000	9915.000000	9915.000000	9915.000000	9915.000000	9915.000000	9915.000000
mean	7.499429	287.472383	25.139488	455.577850	0.637394	6.392591	774.922632	25.930564	70.517755	11713.277535
std	0.471060	96.044070	12.492287	82.996113	0.312248	6.042089	728.593270	1.729113	11.949214	18421.081618
min	5.737000	155.208000	10.111000	287.430000	0.417000	1.914000	3.958000	20.954000	43.803000	-86575.620000
25%	7.427000	231.718000	14.075000	395.941000	0.476000	3.469000	161.907500	24.565000	62.917000	-924.761500
50%	7.679000	272.108000	22.634000	457.092000	0.522000	4.636000	721.100000	26.228000	68.837000	12307.314000
75%	7.809000	298.268000	31.756000	519.958000	0.602000	6.728000	956.636000	27.253000	77.549500	20327.777000
max	8.004000	752.843000	63.784000	602.551000	1.661000	39.760000	3825.700000	29.541000	107.426000	123099.610000





Loss: Mean Absolute Error
5000 epochs. Batch Size: 15

Minimum Value of Validation Loss obtained: ~3000

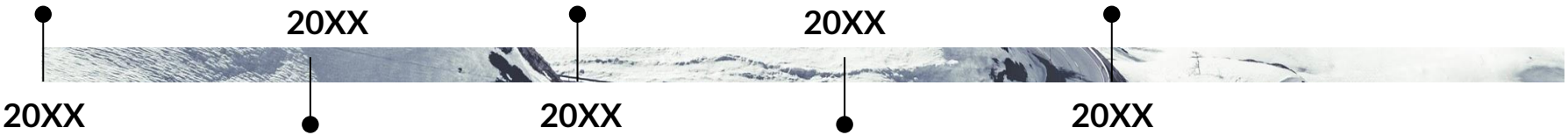
Conclusion

Limitations

- Caters to only a single state in India
- Does not give an on-field analysis of crop data
- Not as accurate as competitors that use IOT
- Stable Internet connection is necessary

Future Scope

1. Expand Scope to whole of India by collecting more data
2. Expand this application on other platforms such as Android, IOS etc.
3. Use IOT and various networking devices to get an on-field analysis of crops
4. Gather satellite imagery for better soil, crop growth diagnosis



Conclusion

We have developed Predictive Yield which uses real world data to provide crop recommendations to farmers.

32

Parameters for Recommending Crops

44000+

Villages covered in Maharashtra

6000+

Lines of Code

References

[1]- An Analysis of Agriculture Sector in Indian Economy. Himani, Assistant Professor in Economics, Guru Nanak Khalsa College Yamuna Nagar, Haryana. IOSR Journal Of Humanities And Social Science (IOSR-JHSS) Volume 19, Issue 1, Ver. X (Feb. 2014), PP 47-54 e-ISSN: 2279-0837, p-ISSN: 2279-0845.

[2]-https://www.nextgurukul.in/nganswers/ask-question/answer/Why-is-Indian-agriculture-largely-dependent-on-monsoon/OldAgriculture-in-India/105516.htm

[3]- Web-Based Recommendation System for Farmers. Kiran Shinde, Jerrin Andrei, Amey Oke. Computer Department, KJ Somaiya College of Engineering, Vidyavihar, Mumbai, India

[4] - Crop Recommendation System to Maximize Crop Yield using Machine Learning Technique. Rohit Kumar Rajak, Ankit Pawar, Mitalee Pendke, Pooja Shinde, Suresh Rathod, Avinash Devare. Dept. of Computer Engineering, Sinhagad Academy of Engineering, Maharashtra, India

[5] - Recommendation System: A Collaborative Model for Agriculture. K.Anji Reddy, R.Kiran Kumar. University College of Engineering and Technology, Department of Computer Science, Krishna University, Machilipatnam, India

Thank You.