CAPSTONE PROJECT

CROP GROWTH PREDICTION

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OUTLINE

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PROBLEM STATEMENT

Develop a machine learning model to predict crop growth based on environmental factors like temperature, humidity, and soil moisture. This model will identify how these factors influence crop development over time, addressing the major problem of optimizing crop yields. By providing insights into these relationships, the model will help farmers and agricultural scientists make data-driven decisions, improving crop planning and resource allocation.

PROPOSED SOLUTION

- The proposed system aims to address the challenge of predicting crop growth based on environmental factors like temperature, humidity, and soil moisture. This involves leveraging data analytics and machine learning techniques to make data-driven decisions, improving crop planning and resource allocation. The solution will consist of the following components:
- Data Collection:
  - Gather historical data on temperature, humidity, soil moisture and other relevant environmental factors.
  - Utilize real-time data sources, such as temperature, humidity, soil moisture to enhance prediction accuracy.
- Data Preprocessing:
  - Clean and preprocess the collected data to handle missing values, outliers, and inconsistencies.
  - Feature engineering to extract relevant features from the data that might impact crop growth.
- Machine Learning Algorithm:
  - Implement a machine learning algorithm, such as Linear Regression, LGBM regressor, to predict crop growth based on historical patterns.
  - Consider incorporating other factors like temperature, humidity, and soil moisture to improve prediction accuracy.
- Deployment:
  - Deployed the model on IBM in my Deployment Space
- Evaluation:
  - Assess the model's performance using Root Mean Squared Error (RMSE).
  - Fine-tune the model based on feedback and continuous monitoring of prediction accuracy.

SYSTEM APPROACH

Hardware Requirements:

IBM Cloud

Environment definition:

Large: 8 CPU and 32 GB RAM

Software Requirements:

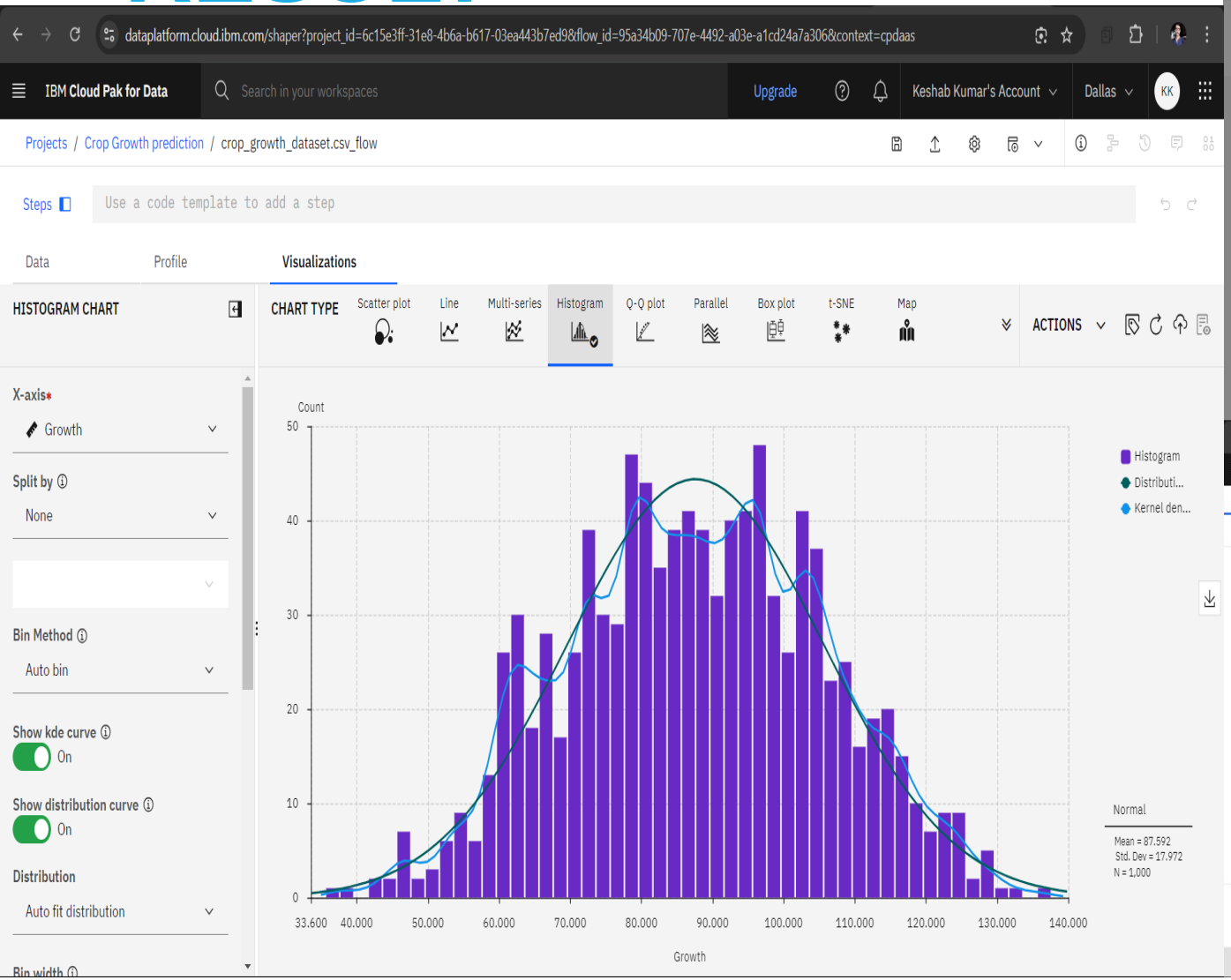
Operating System: Linux or Windows Server

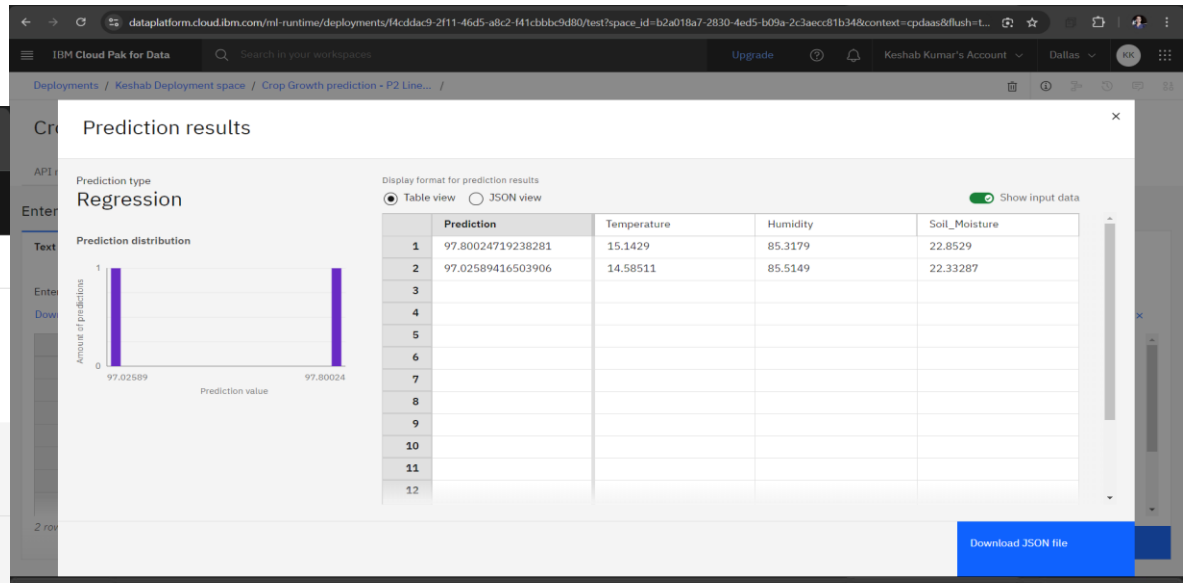
I used Watson Studio for EDA, Auto AI experiment and deployment space for Crop Growth model deployment.

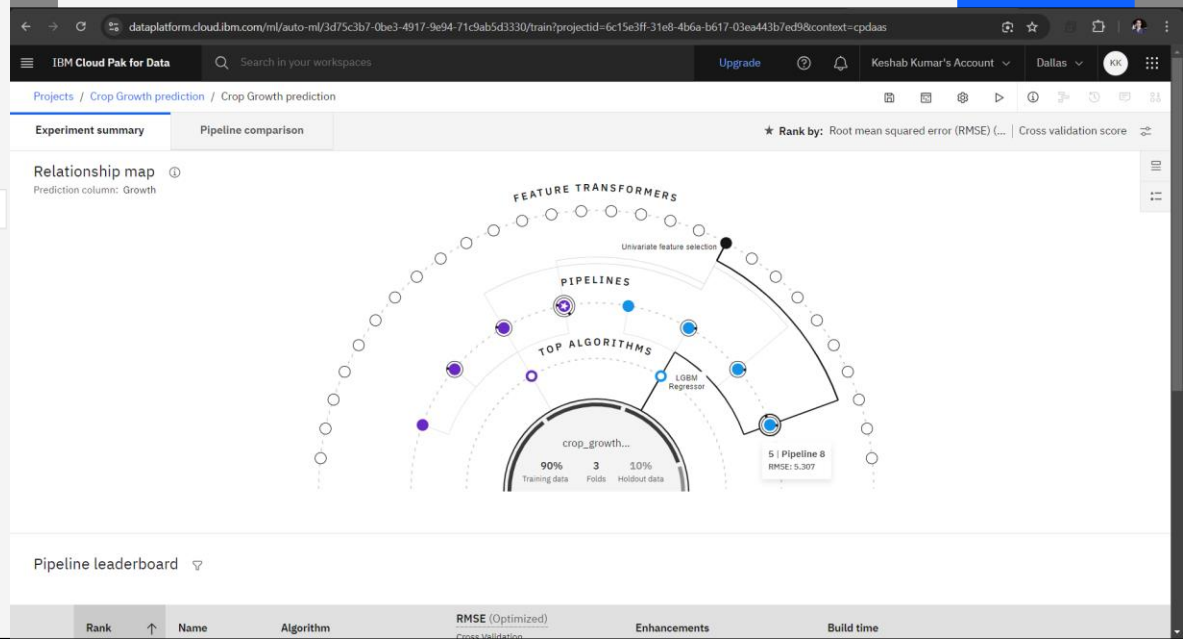
ALGORITHM & DEPLOYMENT

- Algorithm Selection:
  - I used Linear Regression and LGBM regressor for prediction as I found these algorithms gives more accuracy and it is easy to implement.
- Data Input:
  - These algorithm uses Historical temperature, humidity, and soil moisture.
- Training Process:
  - These algorithm is trained by Auto AI using the data provided by me which was given by Edunet foundation.
  - Auto AI using Watson Studio uses 8 pipelines, HPO-1,HPO-2,FE and RMSE.
- Prediction Process:.
  - I did EDA on Watson Studio and eliminated duplicates and filled the empty data using RMSE.
  - Then I did Auto AI on the Watson studio and did 8 pipelining used one of the for model building then deployed the crop growth predictive model on my deployment space.
  - I checked my model efficiency by giving 15.1429, temperature, 85.3179 humidity and 22.8529 soil moisture and got the crop growth of 97.80024719238281

RESULT







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CONCLUSION

- I got 98 % correct prediction from the ML model that I made. This can help farmers and agricultural scientists make data-driven decisions, improving crop planning and resource allocation.

FUTURE SCOPE

- The machine learning model I developed using Watson Studio and IBM predicts crop growth based on environmental factors like temperature, humidity, and soil moisture. It helps optimize crop yields by providing insights into how these factors influence crop development over time. Future enhancements will include integration with IoT devices for real-time data collection, scalability to various regions and crop types, advanced predictive capabilities for yield forecasting and pest management, and user-friendly applications for farmers and scientists. These advancements will drive data-driven decisions, improve crop planning, and promote sustainable farming practices.

REFERENCES

Project ID:6c15e3ff-31e8-4b6a-b617-03ea443b7ed9

Private endpoint: https://private.us-south.ml.cloud.ibm.com/ml/v4/deployments/267979ef-0abb-4300-aa28-2ba709a4bc71/predictions?version=2021-05-01

Public endpoint: https://us-south.ml.cloud.ibm.com/ml/v4/deployments/267979ef-0abb-4300-aa28-2ba709a4bc71/predictions?version=2021-05-01

https://academic.ibm.com/a2mt/downloads/ibm_cloud#/

https://github.com/Keshabkjha/Edunet-Foundation-Internship

https://cloud.ibm.com/

https://drive.google.com/drive/folders/1F7wikFEYv7hs2Sf0vOV4VcyhBbPCR1B2?usp=sharing

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