CAPSTONE PROJECT

CROP RECOMMENDATION SYSTEM USING AUTOAI & WATSONX.AI

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OUTLINE

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- Conclusion
- Future Scope
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PROBLEM STATEMENT

Precision agriculture is growing rapidly to help farmers make informed decisions regarding crop selection. Choosing the right crop to maximize yield based on soil nutrient content and climatic factors is challenging. The issue is to develop a system that recommends the most suitable crop to grow on a farm, considering soil nutrients, weather, and environmental parameters.

PROPOSED SOLUTION

- The proposed system aims to address the challenge of predicting the required bike count at each hour to ensure a stable supply of rental bikes. This involves leveraging data analytics and machine learning techniques to forecast demand patterns accurately. The solution will consist of the following components:
- Data Collection:
  - Gather historical data on bike rentals, including time, date, location, and other relevant factors.
  - Utilize real-time data sources, such as weather conditions, events, and holidays, 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 bike demand.
- Machine Learning Algorithm:
  - Implement a machine learning algorithm, such as a time-series forecasting model (e.g., ARIMA, SARIMA, or LSTM), to predict bike counts based on historical patterns.
  - Consider incorporating other factors like weather conditions, day of the week, and special events to improve prediction accuracy.
- Deployment:
  - Develop a user-friendly interface or application that provides real-time predictions for bike counts at different hours.
  - Deploy the solution on a scalable and reliable platform, considering factors like server infrastructure, response time, and user accessibility.
- Evaluation:
  - Assess the model's performance using appropriate metrics such as Mean Absolute Error (MAE), Root Mean Squared Error (RMSE), or other relevant metrics.
  - Fine-tune the model based on feedback and continuous monitoring of prediction accuracy.
  - Result:

SYSTEM APPROACH

- Platform: IBM Cloud Watsonx.ai Studio
- Tools: AutoAI for automatic model building
- Dataset: Crop Recommendation Dataset (Kaggle/ICFA India)
- Steps Followed:
  - Dataset upload and preprocessing in Watsonx.ai
  - Running AutoAI experiments
  - Selection of best model pipeline
  - Model saving, promoting and deployment
  - Testing predictions with new inputs
- Libraries: AutoAI built-in, no manual coding.

ALGORITHM & DEPLOYMENT

- Algorithm Selection:
  AutoAI selects best performing pipelines using various algorithms evaluated automatically (e.g., Random Forest, Gradient Boosting).
- Data Input:
  Input features: N, P, K soil ratios, temperature (°C), humidity (%), pH, rainfall (mm).
  Target variable: Crop label.
- Training Process:
  AutoAI experiment runs training with cross-validation and hyperparameter tuning.
- Prediction Process:
  Deployed model accepts new feature inputs and predicts the recommended crop with confidence score.

IBM watsonx.ai Studio | Search in your workspaces | Upgrade | HARISH NAIDU YARRA's ... | Sydney | HY

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crop_Recomendation

Deployed | Online

API reference | Test

https://au-syd.ml.cloud.ibm.com/ml/v4/deployments/37bd34f0-e034-43c0-9a93-6886d929770d/predictions?ve

Learn more about the 2021-05-01 version query parameter

Code snippets

cURL | **Java** | JavaScript | Python | Scala

```
import java.io.*;
import java.net.MalformedURLException;
import java.util.Base64;
import java.util.HashMap;
import java.util.Map;
import java.net.HttpURLConnection;
import java.net.URL;
import java.nio.charset.StandardCharsets;
public class HttpClientTest {
        public static void main(String[] args) throws IOException {

                // NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud account. (https://au-syd.dai.clo

                String API_KEY = "<your API key>";
```

Show more

au-syd.dai.cloud.ibm.com/ml-runtime/deployments/37bd34f0-e034-43c0-9a93-6886d929770...

About this deployment

Name
crop_Recomendation

Description
No description provided.

Deployment Details
Deployment ID: 37bd34f0-e034-43...
Serving name:
No serving name.
Software specification:
hybrid_0.1
Hybrid pipeline software specifications:
autoai-kb_rt24.1-py3.11
Copies:
1

Tags
Add tags to make assets easier to find.

Associated asset
P3 - Snap Random Forest Regresso...
db432baf-f436-4bbb-93e9-c01f195d15d7

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CONCLUSION

- The system successfully recommends the most suitable crop based on a range of agro-environmental features with high confidence. Using IBM Watsonx.ai AutoAI pipeline reduces manual effort for model creation and deployment. This solution can assist farmers in making informed crop decisions, improving agricultural yield.

FUTURE SCOPE

- Incorporate real-time weather and soil sensor data for dynamic recommendations.
- Extend model to recommend fertilizers and crop maintenance plans.
- Deploy as a mobile app for easy farmer access in rural areas.
- Expand dataset with multi-year and regional data for improved accuracy.

REFERENCES

- Crop Recommendation Dataset - Kaggle (SiddharthSS).
- Indian Chamber of Food and Agriculture – ICFA.org.in
- IBM Watsonx.ai & AutoAI Documentation.

IBM CERTIFICATIONS

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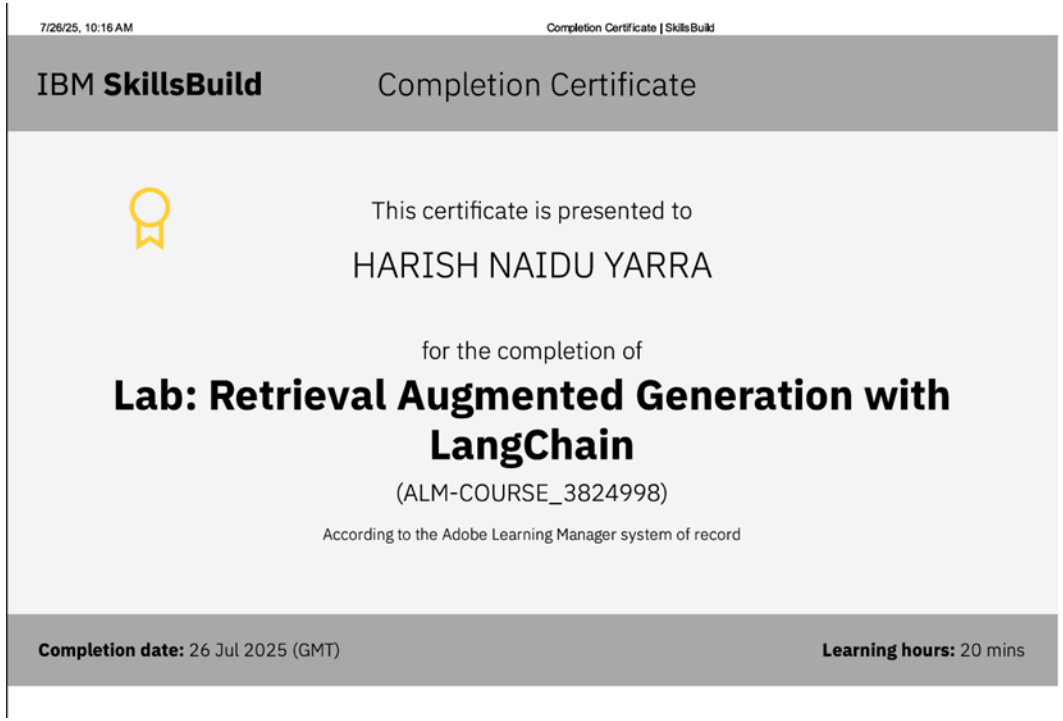
IBM CERTIFICATIONS

- Screenshot/ credly certificate(Journey to Cloud)

IBM CERTIFICATIONS

- Screenshot/ credly certificate(RAG Lab)



THANK YOU

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