

Industrial Internship Report on " Prediction of Agriculture Crop Production in India"

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Executive Summary

This report provides details of the Industrial Internship provided by upskill Campus and The IoT Academy in collaboration with Industrial Partner UniConverge Technologies Pvt Ltd (UCT).

This internship was focused on a project/problem statement provided by UCT. We had to finish the project including the report in 6 weeks' time.

My project was (Tell about ur Project)

This internship gave me a very good opportunity to get exposure to Industrial problems and design/implement solution for that. It was an overall great experience to have this internship.

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1 Preface

Summary of the whole 6 weeks' work.

About need of relevant Internship in career development.

Brief about Your project/problem statement.

Opportunity given by USC/UCT.

How Program was planned



Your Learnings and overall experience.

Thank to all (with names), who have helped you directly or indirectly.

Your message to your juniors and peers.

2 Introduction

2.1 About UniConverge Technologies Pvt Ltd

A company established in 2013 and working in Digital Transformation domain and providing Industrial solutions with prime focus on sustainability and RoI.

For developing its products and solutions it is leveraging various **Cutting Edge Technologies** e.g. **Internet of Things (IoT), Cyber Security, Cloud computing (AWS, Azure), Machine Learning, Communication Technologies (4G/5G/LoRaWAN), Java Full Stack, Python, Front end** etc.



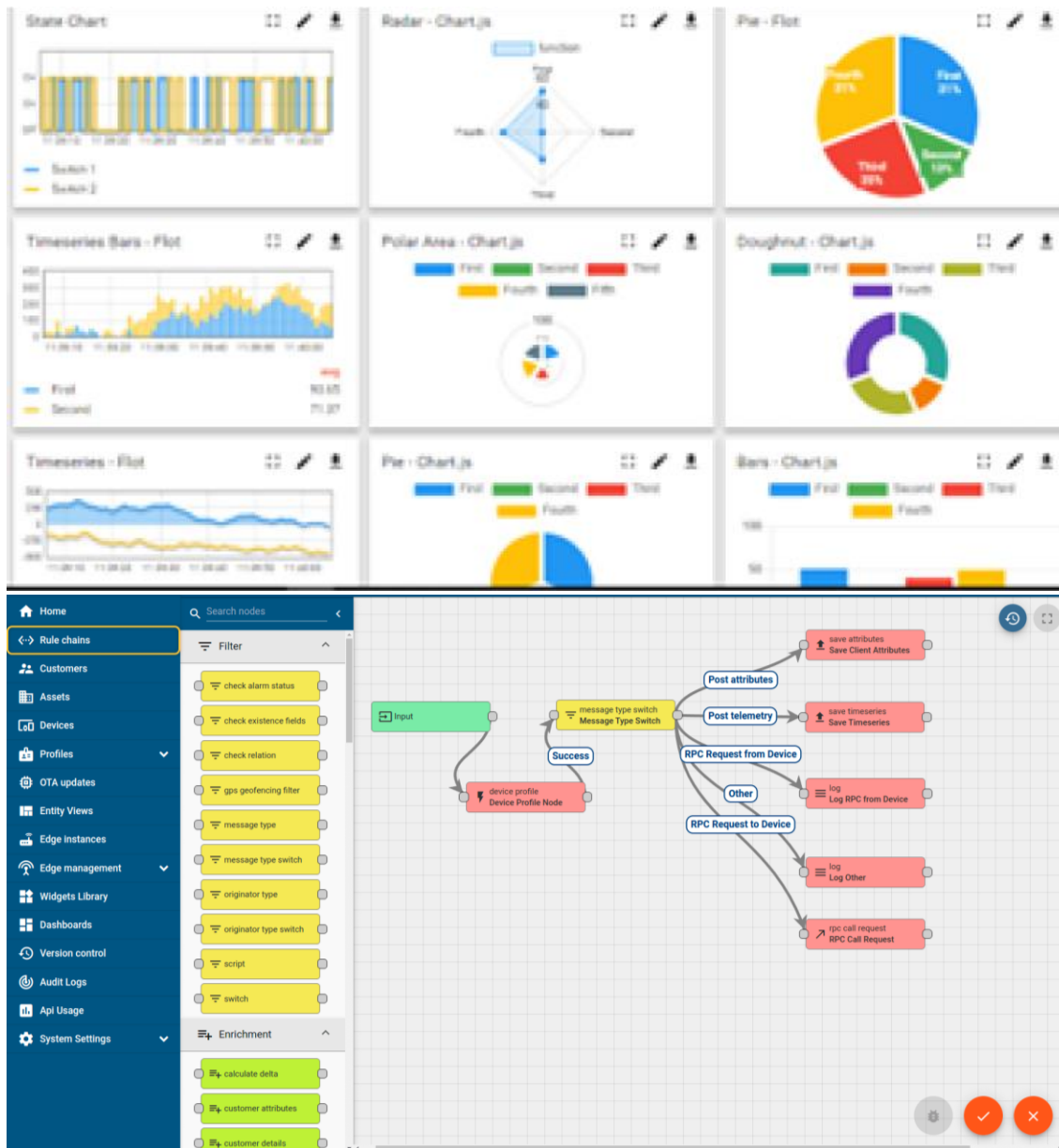
i. UCT IoT Platform ()

UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable “insight” for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP, HTTP, Modbus TCP, OPC UA
- It supports both cloud and on-premises deployments.

It has features to

- Build Your own dashboard
- Analytics and Reporting
- Alert and Notification
- Integration with third party application(Power BI, SAP, ERP)
- Rule Engine



FACTORY WATCH

ii. Smart Factory Platform ()

Factory watch is a platform for smart factory needs.

It provides Users/ Factory

- with a scalable solution for their Production and asset monitoring
- OEE and predictive maintenance solution scaling up to digital twin for your assets.
- to unleash the true potential of the data that their machines are generating and helps to identify the KPIs and also improve them.
- A modular architecture that allows users to choose the service that they want to start and then can scale to more complex solutions as per their demands.

Its unique SaaS model helps users to save time, cost and money.



Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i



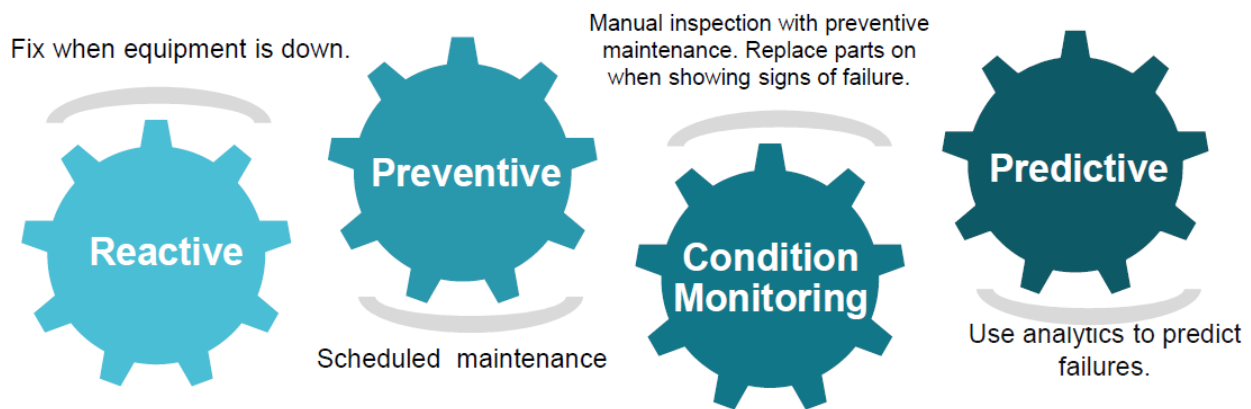


iii. LoRaWAN based Solution

UCT is one of the early adopters of LoRAWAN teschnology and providing solution in Agritech, Smart cities, Industrial Monitoring, Smart Street Light, Smart Water/ Gas/ Electricity metering solutions etc.

iv. Predictive Maintenance

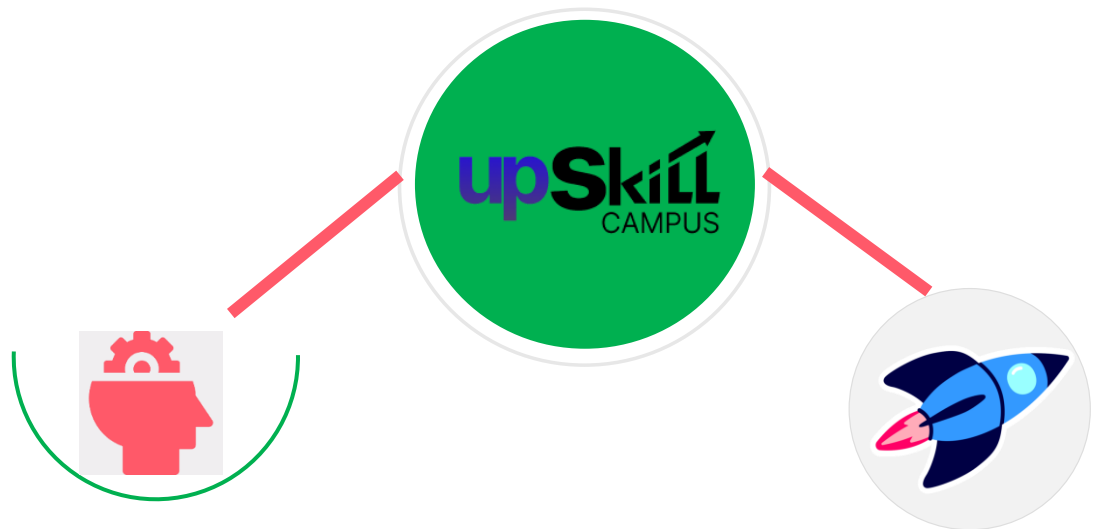
UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.



2.2 About upskill Campus (USC)

upskill Campus along with The IoT Academy and in association with Uniconverge technologies has facilitated the smooth execution of the complete internship process.

USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.



Seeing need of upskilling in self paced manner along-with additional support services e.g. Internship, projects, interaction with Industry experts, Career growth Services

upSkill Campus aiming to upskill 1 million learners in next 5 year

<https://www.upskillcampus.com/>



2.3 The IoT Academy

The IoT academy is EdTech Division of UCT that is running long executive certification programs in collaboration with EICT Academy, IITK, IITR and IITG in multiple domains.

2.4 Objectives of this Internship program

The objective for this internship program was to

- get practical experience of working in the industry.
- to solve real world problems.
- to have improved job prospects.
- to have Improved understanding of our field and its applications.
- to have Personal growth like better communication and problem solving.

2.5 Reference

- [1] <https://learn.upskillcampus.com/s/mycourses>
- [2] [//drive.google.com/file/d/1zfqvs8-mAO6E0JpgvhBdueNx8Th03pUp/view?usp=sharing](https://drive.google.com/file/d/1zfqvs8-mAO6E0JpgvhBdueNx8Th03pUp/view?usp=sharing)
- [3]

2.6 Glossary

Terms	Acronym
Yeild	Crop production interms of weight
Area	Locations of crop grown
Season	Nature's climatic season
Hectare	Dimentions of field
Production	Agricultural outcome

3 Problem Statement

The project focuses on developing an effective prediction system for agriculture crop production in India by harnessing data-driven methodologies. The primary objective is to create a reliable model that forecasts crop yields based on historical crop data, weather patterns, soil characteristics, and socioeconomic variables. The project workflow includes data collection from diverse sources, meticulous preprocessing to ensure data quality, and strategic feature engineering to capture essential predictors. Advanced machine learning techniques, such as ensemble methods or deep learning, will be employed for model development. Rigorous evaluation using appropriate metrics will validate the model's accuracy and robustness.

4 Existing and Proposed solution

Existing solution

- 1.Data Collection: Gather comprehensive data on traffic patterns, including volume, congestion, and factors like weather and accidents.
- 2.Data Preprocessing: Clean and process data, aggregating it into relevant time intervals.
- 3.Exploratory Data Analysis: Use visualizations to identify trends and anomalies, with a focus on understanding how holidays and special occasions affect traffic.

Proposed Solution:

- 1.Crop Forecasting: Utilize time series forecasting models to predict crop patterns for different locations, taking into account weather and soil conditions.
- 2.Scenario Analysis: Analyse how yield varies during seasons.
- 3.Agriculture Management and Optimization: Develop real-time crop management systems that optimize season, weather, provide dynamic updates.
- 4.Infrastructure Planning: Collaborate with urban planners to design infrastructure improvements based on crop forecasts.

4.1 Code submission : https://instagram.com/kumar_gowda_17?igshid=MzRIODBiNWFIZA==

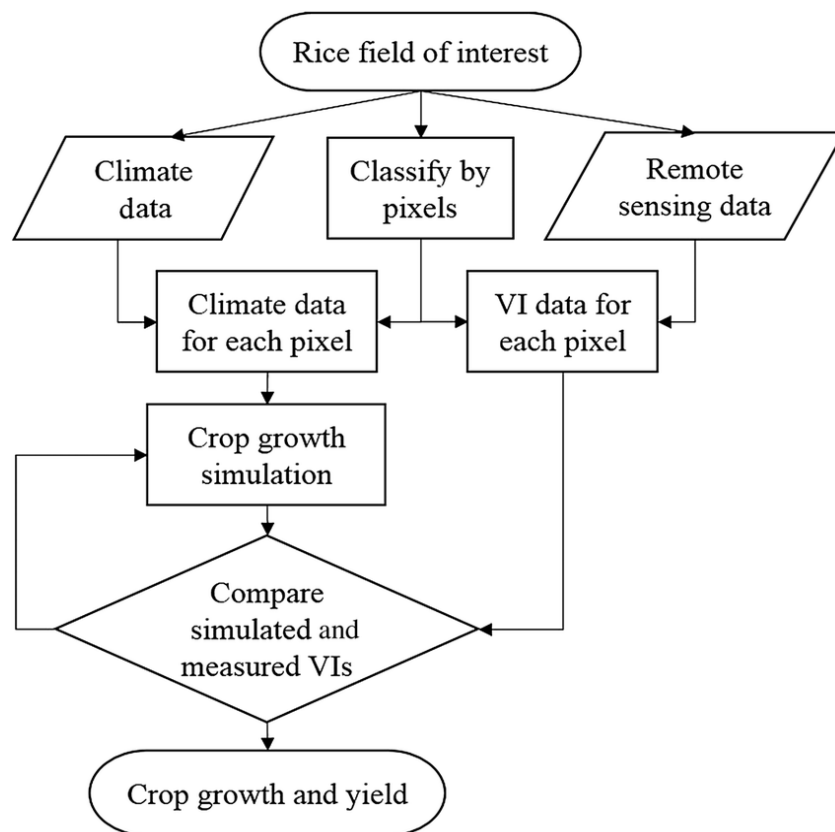
4.2 Report submission : https://instagram.com/kumar_gowda_17?igshid=MzRIODBiNWFIZA==

5 Proposed Design/ Model

The project focuses on developing an effective prediction system for agriculture crop production in India by harnessing data-driven methodologies. The primary objective is to create a reliable model that forecasts crop yields based on historical crop data, weather patterns, soil characteristics, and socioeconomic variables.

5.1 Interfaces (if applicable)

Update with Block Diagrams, Data flow, protocols, FLOW Charts, State Machines, Memory Buffer Management.



6 Performance Test

Evaluation Metrics:

Select appropriate evaluation metrics for crop production prediction, such as Mean Absolute Error (MAE), Root Mean Square Error (RMSE), or R-squared (R^2).

Consider domain-specific metrics if available, like Crop Yield Index or Crop Specific Accuracy.

Testing:

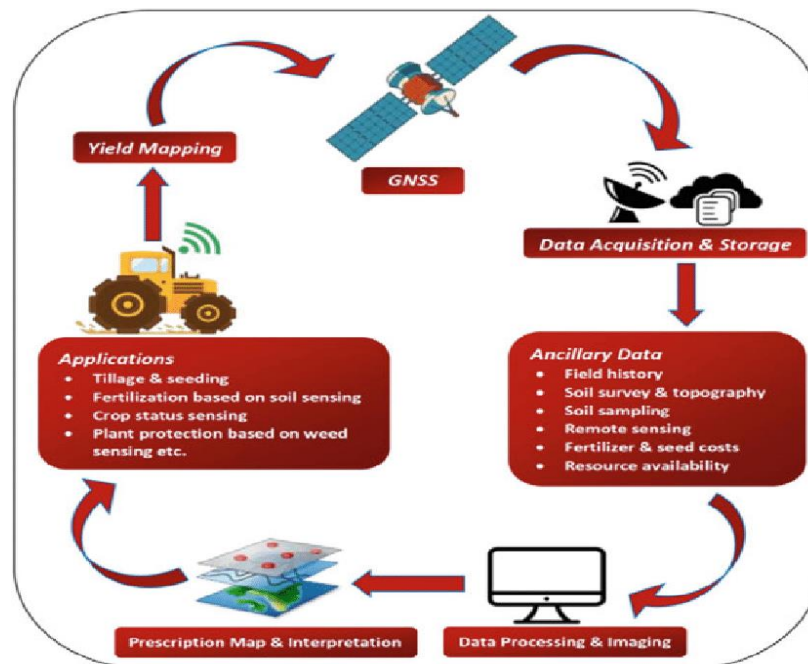
Assess the model's performance on the test dataset, which it has never seen before. This provides an estimate of its real-world performance.

Error Analysis:

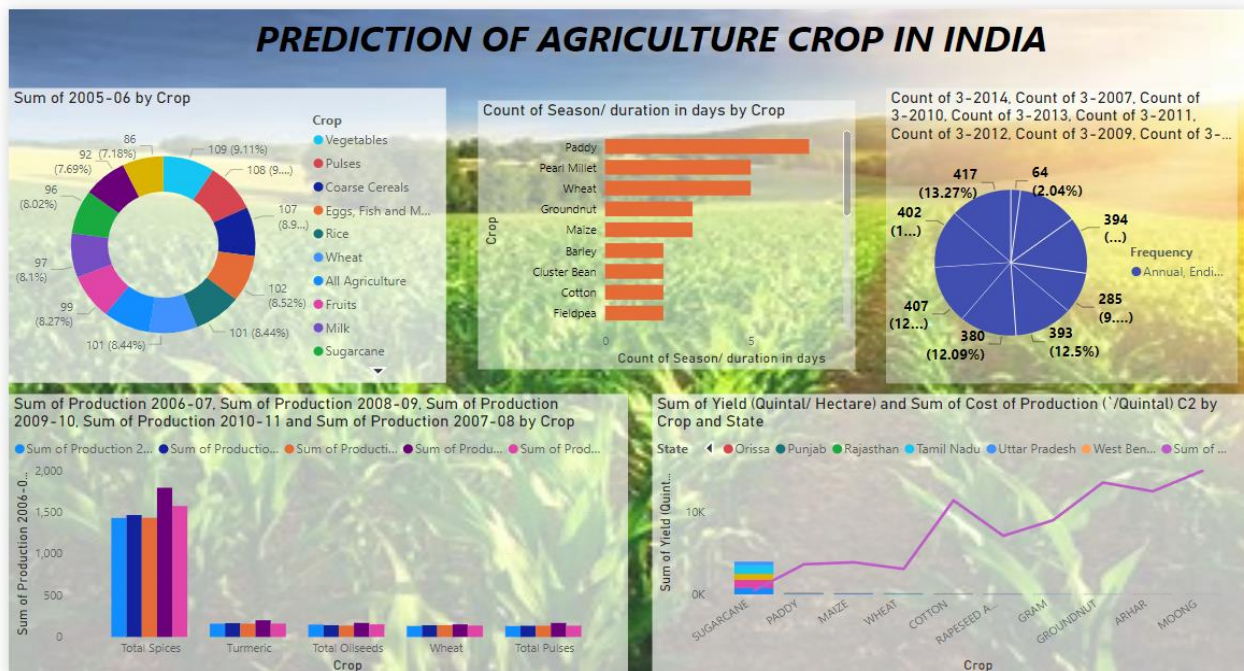
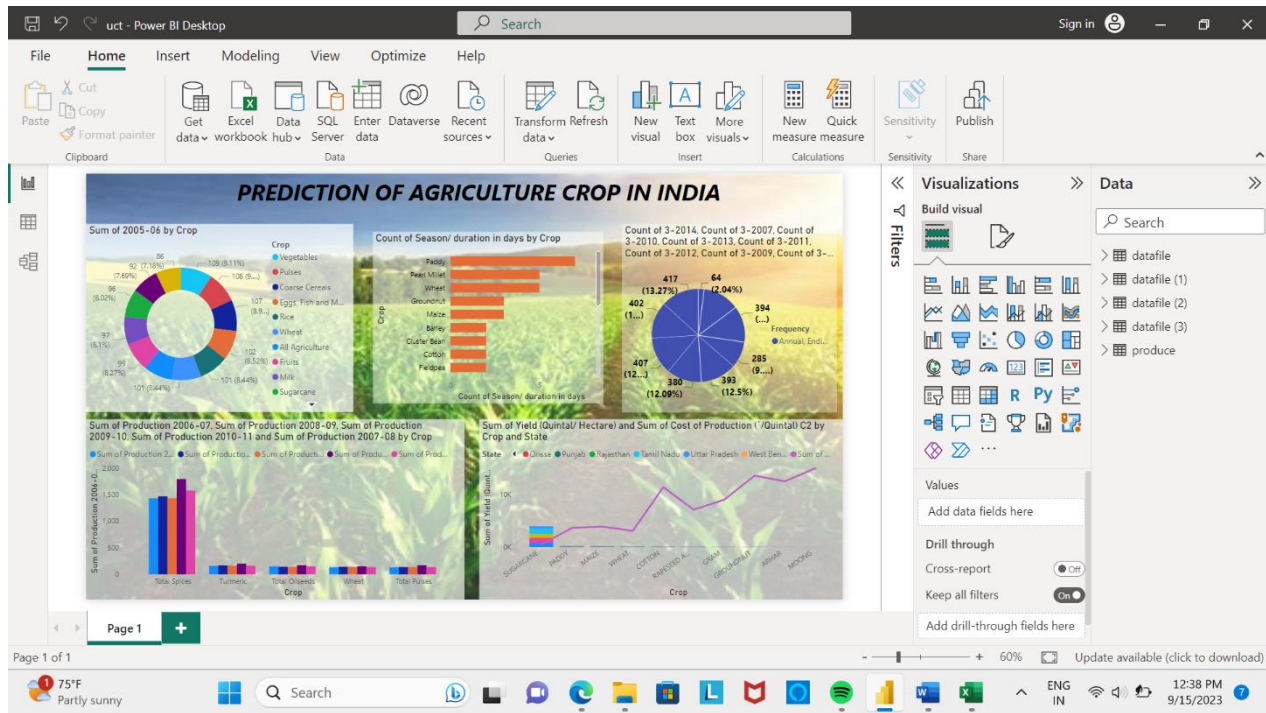
Analyze prediction errors to understand where the model performs well and where it struggles.

Investigate whether certain crops or regions pose more significant challenges for prediction.

6.1 Test Procedure



6.2 Performance Outcome



7 My learnings

Working on a data science project to predict agricultural crop production in India can be a valuable learning experience. Here are some key highlights and takeaways you might encounter during such a project:

Domain Knowledge: You'll gain a deep understanding of agriculture in India, including factors such as climate, soil types, cropping patterns, and the impact of various variables on crop production.

Machine Learning Models: You'll work with various machine learning algorithms such as regression, decision trees, random forests, and possibly more advanced techniques like gradient boosting or neural networks.

Model Evaluation: Evaluating model performance using metrics like Mean Absolute Error (MAE), Root Mean Square Error (RMSE), and R-squared will help you understand how well your predictions align with actual data.

Interpreting Model Results: Communicating model results to non-technical stakeholders will teach you how to present complex technical concepts in a clear and understandable manner.

Visualizations: Creating visualizations to showcase data trends, model predictions, and insights is a crucial skill for effective communication.

Iterative Process: You'll understand that data science projects are iterative. You'll need to experiment with different approaches, models, and features to refine your predictions continually.

Problem-Solving: Tackling challenges such as data scarcity, model complexity, and noisy data will hone your problem-solving skills.

Project Management: Managing the project timeline, setting milestones, and adapting to changing requirements will give you insights into project management in a technical context.

Real-World Impact: Seeing how your predictions can have real-world implications for farmers, policymakers, and the agricultural industry can be one of the most rewarding aspects of the project.

Overall, a data science project focused on predicting agricultural crop production in India will not only provide technical learning but also deepen your understanding of the agricultural sector and its complexities. It's an opportunity to apply data science techniques to address real-world challenges and contribute to improving agricultural practices and outcomes.

8 Future work scope

The future scope for agriculture crop production in India is vast and promising. Advancements in technology, sustainable practices, and policy reforms are expected to play a pivotal role in transforming the agricultural sector. Here are some potential areas for future work in agriculture crop production in India:

Government Policies and Subsidies:

Advocate for supportive government policies, subsidies, and financial incentives to encourage sustainable agriculture and provide a safety net for farmers.

Agricultural Education and Training:

Invest in farmer education and training programs to enhance their knowledge of modern farming techniques and technologies.

Integration of Agribusiness and Technology Startups:

Promote collaborations between agribusinesses and technology startups to drive innovation in the agriculture sector.

Crop Insurance and Risk Management:

Develop robust crop insurance schemes to mitigate risks associated with crop failures and adverse weather conditions.

Research and Development:

Invest in agricultural research and development to create new crop varieties, pest-resistant strains, and innovative farming practices.

Digital Agriculture Extension Services:

Expand digital agriculture extension services to provide farmers with timely information, weather forecasts, and advisory services through mobile apps and other platforms.

Eco-friendly Practices:

Encourage organic waste management, recycling, and the use of renewable energy sources on farms to reduce the carbon footprint of agriculture.

