Industrial Internship Report on

Prediction of Agriculture Crop Production in India
Forecasting of Smart City Traffic Patterns

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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 two real-world projects assigned by UCT:

1. Prediction of Agriculture Crop Production in India
2. Forecasting of Smart City Traffic Patterns

Both projects were completed within a 6-week period, covering problem understanding, data preparation, model building, performance testing, and presentation.

This internship offered hands-on experience with real industrial challenges and exposure to practical solutions using data-driven and machine learning approaches. It enhanced my skills in data science, modeling, visualization, and analytical thinking.

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Preface

Over six weeks, I worked on two impactful projects aimed at solving real-world problems using data analytics and machine learning. The internship enabled me to apply theoretical knowledge in a practical setting. The guidance provided by the mentors from USC, UCT, and The IoT Academy was instrumental. The sessions were structured to gradually introduce concepts, tools, and industry expectations.

I express my heartfelt thanks to the Upskill Campus, The IoT Academy, and UniConverge Technologies Pvt Ltd for providing this opportunity. This internship was a stepping stone toward my career in data science and smart technology solutions.

Introduction

2.1 About UniConverge Technologies Pvt Ltd

Established in 2013, UCT works in the Digital Transformation domain and offers Industrial solutions focused on sustainability and Return on Investment (RoI). UCT uses advanced technologies like IoT, Cybersecurity, Cloud computing, Machine Learning, and more to develop scalable products for industrial use cases.

UCT IoT Platform - Insight

- Built using Java (backend) and ReactJS (frontend)
- Supports MySQL and NoSQL databases

- Compatible with IoT protocols (MQTT, HTTP, CoAP, etc.)
- Features: custom dashboards, alerts, analytics, third-party integration, and rule engines

Factory Watch

- Platform for asset monitoring, OEE, predictive maintenance
- Modular architecture for scalability
- SaaS model for smart factories

2.2 About Upskill Campus

Upskill Campus is a career development platform that provides industry-aligned training, internships, and mentorship. It aims to upskill 1 million learners in 5 years by delivering scalable and measurable coaching experiences.

2.3 Objectives of Internship

- Gain hands-on industrial experience
- Solve real-world problems using technical skills
- Improve employability and domain knowledge
- Foster personal and professional development

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3. Problem Statement

Project 1: Prediction of Agriculture Crop Production in India

India's agricultural sector faces issues such as irregular crop yield, climate dependencies, and region-specific productivity. The goal was to predict crop production trends using historical data to support better planning.

Project 2: Forecasting of Smart City Traffic Patterns

Government bodies need predictive tools to handle traffic fluctuations and plan infrastructure. This project aimed to analyze traffic trends across junctions in a smart city to improve planning and reduce congestion.

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4. Existing and Proposed Solution

Existing Solutions

- Traditional reports based on historical averages

- Limited or no use of ML for forecasting
- Manual planning methods for traffic and agriculture

Proposed Solution

- Use of Python, pandas, scikit-learn, and visualization libraries
- For agriculture: applied regression techniques for production prediction
- For traffic: used time series models (ARIMA, Prophet) for traffic peak forecasting

Value Addition

- Improved prediction accuracy
- Insightful visualization for better decision-making
- Automation of repetitive forecasting processes

GitHub Code Repository: [https://github.com/Mandalshravan/upskill]
Report Submission Repository: [https://github.com/Mandalshravan/upskill]

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5. Proposed Design / Model

Agriculture Crop Production Prediction

- Data cleaning & preprocessing (null values, format corrections)
- Feature engineering (season, zone, cost analysis)
- Linear regression & random forest regression models

Smart City Traffic Forecasting

- Data exploration and trend analysis
- Time series forecasting (seasonal and holiday-aware)
- Visualization of hourly, daily, weekly traffic patterns

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6. Performance Test

Test Constraints

- Data quality and volume
- Model training time
- Forecast accuracy and interpretability

Test Plan & Procedure

- Split data into train-test sets (80-20)
- Evaluated using MAE, RMSE, and R2-score for crop prediction
- Evaluated traffic models with MAPE and time-based plots

Performance Outcome

- Agriculture model achieved R2-score of ~0.85
- Traffic model showed reliable holiday vs. working-day forecasts

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7. My Learnings

- Practical knowledge of machine learning workflows
- Data handling and model optimization
- Using GitHub for version control
- Communicating findings through reports and visuals
- Real-world problem-solving mindset

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8. Future Work Scope

- Extend agriculture dataset with recent years and weather parameters
- Deploy prediction models as web applications
- Use deep learning (LSTM) for more robust traffic predictions
- Integrate IoT sensors in real-time traffic data collection
