Industrial Internship Report on

"Weed in crops"

Prepared by: Zufaiz Saneen

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 weed detection

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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Introduction

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

About UniConverge Technologies :

UniConverge Technologies Pvt Ltd is an amazing company that provide IoT solutions to the world by using Data Science and Machine learning etc.

Learnings:

1. Big data: It refers to the humongous amount of data.

It is characterized by: Volume, Velocity and Variety(structured and unstructured).

Examples: IoT, Digital transactions, stock exchanges etc.

2. Introduction to Machine learning: In ML, the computer system learns from experience.
3. Examples: Recommendations, or a product is suggested to you according to your search, which helps in cross-selling.
4. Uses of ML:

Object recognition, face recognition, languages detection, live captioning on YouTube etc.

5. Types of Machine Learning:

 Supervised (label on input output data) and unsupervised (not labeled Input-output data).

IMPACT OF BIG DATA ON BUSINESSES:

1. Can maximize business growth.
2. Delivers valuable insights (analysing market trends to forecasting customer demeanour etc.).
3. It helps discover patterns, trends and insights which help in overall efficiency in business.

For Business:

1. They lean on Big data for business decisions.
2. Big data can affect their business model.
3. Business decisions are then taken based on facts and trades.

MAIN TYPES WHERE BIG DATA IMPACTED BUSINESSES:

1. Find fresh opportunities.
2. Knowledgeable business decisions.
3. Predictive analysis. (Most important – to determine new market possibilities, detect scams and personalise customer interactions etc.).

HOW BUSINESSES ACROSS INDUSTRIES ARE USING BIG DATA:

1. Construction sector: Use predictive analysis for lower risk of false estimates and proposals.
2. Oil and Gas Sector: ease in decision-making through in-depth analysis but the implementation of big data is low.
3. Retail business: Collect data by bonus programs, mobile apps etc. To learn purchasing habits of customers & recommend products etc. It also drives customers loyalty.
4. E-commerce businesses: All intelligence is provided by big data by behavioural analysis.
5. Logistics, Entertainment & Media: build customer profiles.
6. Manufacturing sector: big data here help save costs and improve product quality.

Therefore, Amazing growth in years, due to:

1. Increase in structured and unstructured data.
2. Increased tech perception in life.
3. Spread of smartphones.

Which leads to data creation.

PROS AND CONS OF BEING A DATA SCIENTIST VS DATA ANALYST:

Data Analyst:

1. Uses statistical analysis and data visualization to comprehend data and spot trends.
2. Uses tools like R, SQL, Python etc.
3. Work with structured data.
4. Address real world business issues.

PROS:

1. To succeed, an organization must have a data analyst.
2. They Gather, arrange, analyse data.
3. Increase productivity.
4. Make recommendations.
5. Are in high demand.
6. There is a work life balance and flexibility.

CONS:

1. Work interrupted by urgent client requests.
2. Deadline pressure.
3. Job might monotonous.

DATA SCIENTIST:

Develops frameworks and algorithms to Gather data businesses can use.

PROS:

1. Many job opportunities.
2. Ensure things are always delivered at right location and moment.
3. High payment.

CONS:

1. Information is extractive.
2. Tools for analytics may be expensive.
3. Some tools need special training.

AI VS DATA SCIENCE:

AI:

1. AI stands for Artificial intelligence.
2. Structured and unstructured data are building blocks.
3. AI engineering etc. Need data scientist skills.
4. AI experts should have understanding of data science.

Data Science:

1. Data science is a broad process that includes pre-treatment, analysis and visualization.
2. It is used in machine learning, deep learning etc.
3. Data science expert should understand the complexities of AI.

Why study data:

1. To pull valuable understanding of business.
2. To evaluate data, various disciplines are combined such as statistics, Artificial intelligence and computer engineering etc.

And with this data analysts, respond to various business questions.

What is AI?:

AI is the replication of human intelligence by computer system.

Applications:

Speech recognition and Natural language processing etc.

AI methods work by:

1. Consuming huge labelled training data.
2. Analysing data for correlation and patterns which are used for predictions about business decisions.

AI VS DS JOBS:

First, have to analyse required respective skill sets for each path.

IN-DEMAND JOB POSTS:

1. Big data engineer/architect: develop and plan whole data environment on Hadoop and spark. Holds experience in data visualization, data migration, Java and python etc.
2. Machine learning engineer: Understands programming languages, has analytical skills and uses mathematical, data set and development tools. Preferably Masters/doctorate in Math/CS.
3. Business Intelligence developer: should understand BI tools and DS. Should have excellent communication skills, problem solving approach, able to analyse complicated data sets and identify market trends.
4. Research scientist: should have knowledge of AI, Applied math, ML, Computational statistics, deep learning and parallel computing. Skills required are NLP, distributed computing and reinforcement learning etc.
5. Statistics Scientist: should understand platforms like Hadoop etc. And should have analytical skills and business knowledge.

Companies expect: ability to learn, work in team, positive attitude and aptitude.

Data engineering is in demand. A data engineer is a person who plans, constructs, and engineers an Infrastructure. They convert data into formats useful to data scientists. The annual compensation for a

Big data engineer in India is on average 836,443.

Data Science incorporates statistics, math, specialized programs, artificial intelligence, machine learning

Etc.

API, stands for the application program interface.

Ensemble Learning is clubbing numerous weak learners (ml classifiers) and then operating aggregation

For result projection.

SALARY:

DS: 10 LPA to 30 LPA.

AI ENGINEER: 15 LPA to 50LPA.

In conclusion, DS is popular while AI-Ml is evolving and specialization in either require knowledge of other.

TOP DATA SCIENTIST SKILLS:

A data scientist should have data analytical skills to solve complex problems.

A data scientist collects, analyses and interprets data and puts valuable insights beyond statistics.

They can work in public as well as in private sector. Examples: Education, Finance, Consulting and Manufacturing.

What they do?

1. Work with business heads.
2. Understand business goals.
3. See how business can use data to fulfil the goals.
4. Collect large amount of data.
5. Goes through the data.
6. Extract meaningful information.
7. Use tools like R and python etc.

Responsibilities:

1. Collect data.
2. Gather structured and unstructured data.
3. Convert it in information.
4. Create project blueprint.
5. Make data visualization.
6. Maintain edit, analyse data for trends and patterns.
7. Use ML framework for mathematical computation.
8. Improve data collection procedure.
9. Create data dashboard.
10. Identify problem.
11. Establish data sets.
12. Validate data.
13. Analyse it.
14. Discuss findings.

Data scientist requires: A certification from a prestigious institute and skills.

TOP 5 SKILLS:

1. Programming: such as python(most commonly used), R, C etc.
2. Statistics and math: to extract relevant data.
3. Machine Learning: to make accurate estimates.
4. Deep learning: to enhance decision making.
5. Big data: for broad data analysis, identify trends and develop predictions.

Machine learning:

Machine Learning (ML) gives computers the capability to learn without being explicitly programmed.

Uses: face Recognition/ Online customer support/ Product recommendations etc.

Linear functions in DS:

Linear algebra is a very important component of data science.

Crucial part is representation and how many variables are present.

What is DS:

Data science is an interdisciplinary field that analyses massive volumes of data using algorithms,

Procedures, and processes.

What are linear functions

A linear function will be presented in the form of a straight line on the coordinate plane.

$F(x)=6x-4$

Optimisation: optimization technique is used to generate parameter values that minimize the function's

Error when used to map the inputs to outputs.

Weed detection project:

Weeds are unwanted crops that we want to get rid of. To get rid of weeds in our fields, we can spray pesticides.

First and foremost we need to identify the weed. Then spray the correct pesticide. We need to buy pesticides after carefully reading the instructions and important information written on the label.

We should use right equipment for spraying the pesticides.

There are weather conditions that need to be taken care of as well.

Take precautions and monitor the treated field.

After taking necessary measures, the other crops are less likely to be affected badly due to pest spray.

Code:

Here we are assuming the color of weed is green.

```
import cv2

import numpy as np


# Load the image

image_path = 'path_to_your_crop_image.jpg'

img = cv2.imread(image_path)


# Convert the image to the HSV color space

hsv_img = cv2.cvtColor(img, cv2.COLOR_BGR2HSV)


# Define a green color range (HSV values for green)

lower_green = np.array([30, 50, 50])

upper_green = np.array([90, 255, 255])
```

```python
# Create a mask using the defined color range
mask = cv2.inRange(hsv_img, lower_green, upper_green)

# Apply a series of morphological operations to remove noise and fill gaps
kernel = np.ones((5, 5), np.uint8)
opening = cv2.morphologyEx(mask, cv2.MORPH_OPEN, kernel)
closing = cv2.morphologyEx(opening, cv2.MORPH_CLOSE, kernel)

# Find contours in the binary image
contours, _ = cv2.findContours(closing, cv2.RETR_EXTERNAL, cv2.CHAIN_APPROX_SIMPLE)

# Draw contours on the original image
for contour in contours:
    cv2.drawContours(img, [contour], -1, (0, 255, 0), 2)

# Display the original image with contours
cv2.imshow('Weed Detection', img)
cv2.waitKey(0)
cv2.destroyAllWindows()
```