Internship Report

Submitted in partial fulfillment for

The award of the degree of

Master of Science

in

Data Science

By

THANUJA B

(22PDS10)

Department of Computer Science

Data Science

Women's Christian College, Chennai-06.

AUGUST 2023

WOMEN'S CHRISTIAN COLLEGE

DEPARTMENT OF COMPUTER SCIENCE

DATA SCIENCE

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Bonafide Certificate

Register Number: _____22PDS10_____

This is to certify that the Internship Report is a bonafied work done by **Thanuja B (22PDS10)**, submitted to the Department of Data Science, Women's Christian College, Chennai, in partial fulfillment of the requirement of the award of the degree of Master of Science in Data Science.

Submitted for the viva-voce examination held on ___31/08/2023___ at Women's Christian College, Chennai.

Internal Examiner

External Examiner

_____

_____

COMPANY BONAFIDE CERTIFICATE

Ventura

Internship Certificate

25.08.2023

I am confirming that Thanuja B was interning at Ventura Automation Services Inc for past 2.5 months creating real-time fabric optimization engine which will be used in textile fabric manufacturing companies.

She completed her internship successfully and she has been a valuable contributor to our team since 07.06.2023. She is highly skilled & intellect.

Please feel free to contact us for further clarifications if any.

Thanking you

Yours Truly

REGISXAVIER

Digitally signed by REGISXAVIER
Date: 2023.08.25 17:21:37 +05'30'

Regis Xavier
CEO

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DECLARATION

I hereby declare that the Internship Report submitted to the Department of Data Science, Women's Christian College, Chennai – 600006 is a bonafied work done by **Thanuja B (22PDS10) ,** submitted to the Department of Data Science, Women's Christian College and this report work has not formed the basis or submitted for the award of any Degree/ Diploma or any similar title. I further certify that this work did not form a part of any other published work.

Place: Chennai.

Date: 28/08/2023 Signature of the Candidate

ACKNOWLEDGEMENT

I extend my heartfelt gratitude to all those who have been instrumental in the successful completion of my internship and the subsequent preparation of this report.

I am deeply grateful to Mr.Srinivasan, my internship supervisor, for providing me with invaluable guidance, unwavering support, and constructive feedback throughout my internship journey. Their expertise and mentorship have greatly enriched my learning experience.

I also extend my sincere appreciation to the entire Ventura team for welcoming me into their workspace and offering a collaborative and conducive environment for learning. The knowledge and insights I have gained from my colleagues have been indispensable.

My sincere thanks also go to my academic advisors and professors who provided me with the necessary theoretical foundation and encouraged me to apply my knowledge in a real-world setting.

I would like to express my gratitude to my family and friends for their constant encouragement, understanding, and belief in my abilities.

Finally, I acknowledge the support of all those who may have contributed in ways known or unknown. Each contribution, no matter how small, has played a significant role in shaping this internship experience.

Thank you.

Sincerely,

Thanuja B

TABLE OF CONTENTS

1. SYNOPSIS

PROJECT TITLE : FABRIC OPTIMIZATION

1.1. INTRODUCTION

Optimization of Fabrics in Textile Industry finds extensive application in the textile industry to optimize the utilization of fabrics during the cutting process, aiming to achieve maximum realized meters while adhering to various constraints. This process holds significant importance as it directly impacts material efficiency, production costs, and sustainability goals within the industry. At the core of this application is the goal to obtain the highest possible realized meters of fabric from a given roll, while ensuring that the patterns produced meet quality standards, fit the intended garments, and adhere to practical limitations like maximum meters and minimum defect points.

Key benefits arise from employing optimization for fabric cutting. The reduction of fabric waste is paramount. By optimizing the arrangement of patterns, remnants and offcuts are minimized, leading to significant cost savings. This waste reduction also aligns with sustainability initiatives, as less discarded fabric translates to a smaller environmental footprint. Furthermore, the process enhances production efficiency.

1.2. OPTIMIZATION OF FABRICS HELPS IN SEVERAL WAYS :

A substantial aspect is the integration of linear optimization with automated cutting machines. Once an optimized cutting plan is generated, these machines follow the prescribed cutting paths, reducing the risk of human error and further enhancing efficiency. This integration extends to batch production scenarios, where multiple garment sizes or styles are cut from the same roll of fabric, optimizing the use of the material.

The application of optimization technique in fabric cutting within the textile industry is pivotal for achieving maximum realized meters. By minimizing waste, reducing production costs, and improving sustainability, linear optimization contributes to efficient operations and responsible manufacturing practices. The technique's versatility, adaptability to constraints, and integration with cutting technologies collectively underscore its critical role in shaping a more efficient and sustainable textile production landscape.

Linear optimization of fabrics in the textile industry to obtain maximum realized meters has several important uses and benefits:

1.2.1. REDUCED WASTE:

By optimizing the cutting process, you can minimize waste and utilize fabric more efficiently. This directly contributes to cost savings and environmental sustainability.

1.2.2. COST SAVINGS:

Maximizing the realized meters from each fabric roll reduces the amount of unused material, leading to lower material costs. Additionally, efficient cutting minimizes labor and production costs.

1.2.3. IMPROVED RESOURCE UTILIZATION:

Linear optimization helps in making the most of available resources, such as fabric rolls and production time, resulting in higher throughput and productivity.

1.2.4. ENHANCED SUSTAINABILITY:

Reduced fabric waste means less material ends up in landfills, contributing to a more environmentally friendly production process.

1.2.5. MEETING DEMAND:

By optimizing fabric cutting, you can better align production with customer demand, ensuring that you can fulfill orders with available resources.

1.2.6. HIGHER PROFITS:

Maximizing the realized meters from fabric rolls leads to higher output without needing to increase production capacity, which can lead to increased profits.

1.2.7. EFFICIENT PLANNING:

Optimization enables better planning of fabric cutting, allowing you to respond more effectively to changes in production schedules, customer orders, or unexpected disruptions.

2. ORGANIZATION PROFILE

Name of the Organization : VENTURA AUTOMATION SERVICES

2.1. VENTURA AUTOMATION SERVICE INC. :

Ventura Automation Services Inc, is an undisputed leader in providing Fabric Inspection Software Solutions in India.

Their flagship product, FIDAS is de facto software for fabric Inspection in India and having more than 100 successful implementations across country for 17 years since its inception.

They are always in the path of developing innovative solutions for textile industry. As a result, they have succeeded in maximizing technology in fabric inspection domain.

2.2. HISTORY:

- This organization has started in the year 2005, incorporated as Pragmatic Solutions (P) Ltd. to deliver automation solutions for Textile Industry.
- Ventura Automation Services Inc was created on 2008 to focus on Fabric Inspection Software domain within textile industry.

- Powerful Fabric Optimization Engine utilizing linear algorithm on 2015, launched and implemented successfully in finished fabric inspection.
- More than 100 Successful FIDAS software has been implemented in 2022 across India in various verticals of fabric Inspection.

2.3. ABOUT VENTURA AUTOMATION SERVICES :

Professional grade fabric inspection software with successful track record with rich 17 years of domain experience. They have successfully developed almost every IOT devices which automatically fetches fabric quality related data to our software.

2.4. ABOUT " FIDAS " :

FABRIC INSPECTION & DEFECT ANALYSIS SYSTEM (FIDAS)

Fabric Inspection & Defect Analysis System (FIDAS) is a combination of multiple inspection specific IoT devices & software exclusively developed for real-time on table fabric inspection purposes.

FIDAS monitors fabric quality and suggest cutting decision to inspectors on real-time basis to maximize fresh realization and avoid wastages. FIDAS automatically grades the fabric as per ASTM 4 Point System and print barcode in accordance to each every customer specification.

Various customized reporting for production teams and management teams based on defect analysis, fabric realization, reconciliation, operator performance, order profitability and utilization resources .Various fabric inspection-related IoT devices such as digital length counter, real-time width measurement, weighment are connected to the touchscreen monitor provided on the inspection machine.

Defects are punched by fabric checker, wherein FIDAS automatically calculates Point Per 100 Square/Linear Meters/Yards based on Length, Width, and defect points on a real-time basis. Fabric Length, Width & Weight automatically acquired using our inspection IoT-based automation devices.

Utilizing in-built artificial intelligence, FIDAS provides real-time downgrade alert during the inspection process and provides possible fabric cutting suggestions for better fresh yield, minimizing wastages & suggests piece joining options to make 2 part roll.

At the end of every roll, it automatically decides the fabric Grade, generates roll reports & prints customized barcodes / QR Codes according to your business needs.

2.5. CONTACT DETAILS :

Regis Xavier

Strategist – Digital Transformation

mailid : regi@fidas.in

Srini Vasan

Technical Support Specialist

mailid : srini@fidas.in

2.6. LOCATION :

Ventura Automation Services Head Office.

Chennai, Tamil Nadu, India

3. COMPANY DOMAIN

3.1. FABRIC INSPECTION SOLUTIONS :

Fabric optimization is a crucial process in the textile industry that aims to enhance the efficiency, quality, and sustainability of fabric production. It involves various techniques and methodologies to achieve these goals.

1) Fabric inspection (Greige) enables digitized fabric quality assurance, automatically calculates fabric grade according to ASTM 4 point system.

2) Sort wise, loom wise, weaver wise quality analysis and reporting.

3)Integrates with your ERP, Roll wise barcode is printed for fabric traceability.

- ✓ GET 360 DEGREE VIEW OF QUALITY:

Right from yarn quality, Loom/Knit machine maintenance, weaver training, daily inspection production, vendor analysis, crimps reporting etc.

- ✓ CAPA:

FIDAS instant reports with analytics would help you in every day Corrective & Preventive actions (CAPA) meetings without wasting time.

- ✓ ANALYTICS:

Order based profitability, defect analysis, fabric realization and wastage analysis helps you by data driven business and assist you in decision making.

- ✓ LABOUR SAVING:

All operations right from fabric receipt from loom shed into inspection shed till your packed fabric zone would be automated by FIDAS. No manual entry of data and 100% error free data assured.

3.2. DOMAIN OF INTERNSHIP :

MySQL, Python

3.2.1. MYSQL :

MySQL Workbench is a visual database design and administration tool for the MySQL database management system. It provides a user-friendly interface that allows database developers, administrators, and data analysts to perform various tasks related to database design, modeling, querying, and administration.

The key features of MySQL Workbench:

- Database Design and Modeling
- SQL Development
- Data Migration
- Database Administration
- Querying and Reporting
- Performance Analysis
- Schema Synchronization
- Backup and Restore
- Remote Database Access
- Version Control Integration
- Customization

3.2.2. PYTHON :

Python is a versatile programming language that is widely used in various domains, including business development. It offers a range of libraries, frameworks, and tools that can help streamline business processes, analyze data, build applications, and more.

The key features of Python:

- Simple and Readable Syntax
- Interpreted Language
- Dynamic Typing
- Rich Standard Library
- Ecosystem
- Extensibility
- Excellent Documentation
- Data Science and Machine Learning
- GUI Development
- Security
- Education
- Open Source and Community-Driven

3.2.3. DEPLOYMENT

Python deployment involves making Python applications operational in production environments. For web apps, this entails server setup, web server configuration, and database management.

Automation tools like Docker and CI/CD pipelines streamline deployment. Desktop apps require platform-specific packaging and distribution. APIs and machine learning models are deployed as services, often with Flask or FastAPI. Python packages can be shared on PyPI.

Security updates and monitoring are vital for production readiness. Deploying Python applications involves choosing the right tools and platforms, ensuring scalability, and

optimizing performance.

The process varies based on the application type, be it web, desktop, API, or package, and adheres to best practices to guarantee reliable operation in production settings.

4. USAGE OF COMPUTER

4.1. PYTHON IN ANACONDA (JUPYTER NOTEBOOK) :

Jupyter Notebook is an interactive computing environment that has gained immense popularity in the Python community due to its versatile and dynamic nature.

4.1.1. RICH ECOSYSTEM OF LIBRARIES :

Python's rich ecosystem of libraries, including NumPy, Pandas, Matplotlib, and Scikit-learn, synergizes well with Jupyter Notebook, enabling seamless integration of data manipulation, visualization, and modeling.

4.1.2. JUPYTER'S NOTEBOOK FORMAT :

The notebook format encourages a narrative-driven approach to programming, allowing users to intersperse code with explanations, insights, and visualizations. This makes it a powerful tool for data exploration and sharing findings with colleagues or a wider audience.

4.1.3. HIGHLY INTERACTIVE :

Jupyter Notebook's interactivity fosters a highly iterative development process, enabling users to test hypotheses, fine-tune code, and visualize results in real-time. Its collaborative features further enhance its utility, facilitating team collaborations on projects and enabling peer review of code and analyses. In essence, Jupyter Notebook serves as a creative playground for Python developers and data enthusiasts, combining the strengths of Python programming with dynamic documentation and interactive visualization capabilities.

4.1.4. COMPONENTS IN JUPYTER NOTEBOOK :

Markdown Cells:

For adding text, explanations, and formatting, you can use Markdown cells. In a Markdown cell, you can write formatted text using Markdown syntax.

Code Cells:

These cells are for writing and executing code. You can write Python (or other supported language) code in these cells and run it to see the output.

Kernel:

The kernel is the computing engine that executes the code in your notebook. You can restart the kernel if needed, clear output, or interrupt it if a code cell is taking too long to execute.

Sharing and Collaboration:

Jupyter Notebook files can be shared with others. You can upload your notebook to services like GitHub or use Jupyter's built-in collaboration features for real-time editing and sharing.

Extensions:

Jupyter Notebook can be extended with various plugins and extensions to enhance its functionality. Some popular extensions include Jupyter Widgets for interactive widgets, nbextensions for additional functionality, and more.

4.1.5. DEPLOYMENT

Deploying a Jupyter Notebook server, especially for production or collaborative use, requires additional considerations beyond simply running it locally. deploying Jupyter Notebooks involves considerations like security, scalability, resource management, and user experience.

4.2. MYSQL WORKBENCH

MySQL Workbench is a popular graphical user interface (GUI) tool used for managing MySQL databases. It provides a wide range of features and capabilities to help developers, database administrators, and data analysts work efficiently with MySQL databases.

4.2.1. DATABASE DESIGN AND MODELING:

MySQL Workbench allows to visually design and model our databases. We can create tables, define relationships between them, and set attributes and data types.

SQL Code Editor:

It includes a powerful SQL editor with features like syntax highlighting, code autocompletion, and query execution.

SQL Code Generation:

You can generate SQL code from your database model, making it easier to create and update tables, indexes, and other database objects.

Stored Procedures and Functions:

MySQL Workbench supports the creation and editing of stored procedures and functions.

4.2.2. BACKUP AND RESTORE:

Able to create and schedule database backups, as well as restore databases from backup files.

4.2.3. VISUAL DATABASE ADMINISTRATION:

Table Maintenance:

MySQL Workbench allows to create, modify, and delete tables, indexes, and foreign keys using a visual interface.

Data Editing:

To view and edit data within tables, making it easier to manage and manipulate data.

4.2.4.EXTENSIBILITY:

MySQL Workbench is extensible, allowing developers to create custom plugins and scripts to enhance its functionality.

4.2.5. CROSS-PLATFORM COMPATIBILITY:

MySQL Workbench is available on various platforms, including Windows, macOS, and Linux, making it accessible to a wide range of users.

4.2.6. CLOUD INTEGRATION:

MySQL Workbench supports connections to MySQL databases hosted on cloud platforms such as Amazon RDS, Google Cloud SQL, and Microsoft Azure.

MySQL Workbench is a versatile tool that simplifies many aspects of working with MySQL databases, from design and development to administration and performance optimization. It's widely used in the MySQL community and is an essential tool for anyone working with MySQL databases.

5. ROLE IN THE COMPANY

5.1. DATA OPTIMIZATION (INTERN)

The role of a Data Optimization Intern revolves around refining and fine-tuning data processes to ensure data accuracy, accessibility, and usefulness. This role involves focusing on enhancing the efficiency, quality, and value of some data-related processes.

5.2. RESPONSIBILITIES AND ACTIVITIES OF A SOFTWARE DEVELOPER :

5.2.1. DATA QUALITY ENHANCEMENT :

Collaborate with data teams to identify and address data quality issues, such as missing values, duplicates, and inconsistencies.Implement data validation and cleansing processes to ensure accurate and reliable data.

5.2.2. PROCESS AUTOMATION :

Identify data-related tasks and work on automating them using scripting or programming languages like Python or R. Create scripts or workflows to streamline data collection, cleaning, and transformation processes.

5.2.3. DATABASE MANAGEMENT :

Assist in managing and organizing databases to improve data accessibility and retrieval efficiency. Optimize database performance by indexing, partitioning, and implementing best practices.

5.2.4. DATA DOCUMENTATION :

Maintain thorough documentation of data sources, transformations, and processes

to ensure transparency and reproducibility.

5.2.5. CODING AND DEVELOPMENT:

Writing the code that brings the software application to life. We can use any programming language like Python, R etc. to implement the desired functionality and features.

5.2.6. TESTING AND DEBUGGING :

Any software created has to be tested under various circumstances to identify and fix bugs or issues in the software.

Performance Analysis:

Analyze data workflows and processes to identify areas for performance improvement in future.

Professional Development:

Take advantage of the internship to learn from experienced professionals and gain insights into best practices in data optimization. Seek opportunities to expand knowledge in data management, process automation, and data quality assurance.

5.2.7. PROGRAMMING LANGUAGE AND TECHNIQUES FOR OPTIMIZATION :

An intermediate knowledge in any one programming language is crucial for a . Commonly used languages include the following.

5.2.7.1. PROGRAMMING LANGUAGES FOR OPTIMIZATION:

Python :

Widely used for its rich libraries (e.g., NumPy, Pandas) that support data manipulation, analysis, and optimization tasks.

R :

Known for its statistical capabilities, R is useful for data analysis, visualization, and implementing optimization algorithms.

SQL:

Essential for managing and querying databases efficiently, optimizing data retrieval and manipulation.

Java :

Offers strong performance and is often used for developing high-performance applications with optimization requirements.

5.2.7.2. OPTIMIZATION TECHNIQUES:

Data Cleaning :

Remove duplicates, handle missing values, and correct inconsistencies to enhance data quality.

Indexing:

Create database indexes to accelerate data retrieval by reducing the need for full table scans.

Algorithm Optimization:

Choose efficient algorithms and data structures to reduce time complexity and

resource usage.

Memory Management:

Optimize memory usage to prevent excessive memory consumption and enhance application performance.

Compression:

Compress data to reduce storage requirements and improve data transfer speeds.

Code Profiling:

Identify bottlenecks in code execution using profiling tools to target optimization efforts effectively.

Vectorization :

Utilize vectorized operations to perform computations on arrays, enhancing speed and efficiency.

Batch Processing :

Process data in batches instead of individually to optimize resource usage and reduce overhead.

Query Optimization :

Optimize database queries using techniques like indexing, query rewriting, and join optimizations.

6. ACHIEVEMENTS AND LEARNING

6.1. ACHIEVEMENTS :

The key achievements I have gained during my internship are knowledge and experience gained in the workplace. My work experience has given me a range of effective skills. These include:

- Project Contributions and Impact
- Skill Development and Enhancement
- Networking and Professional Relationships
- Challenges Faced and Problem-Solving
- Adaptability and Flexibility in Work Environment
- Feedback and Growth During Internship
- Understanding Company Culture and Values
- Applying Classroom Knowledge to Real Projects
- Commercial awareness and an understanding of the retail sector
- Time Management and Balancing Responsibilities

6.2 LEARNING :

6.2.1. TECHNOLOGY 1 : MYSQL

MySQL is an open-source relational database management system (RDBMS) known for its efficiency, scalability, and ease of use. It allows users to store, manage, and retrieve structured data using the Structured Query Language (SQL). MySQL is widely used in web applications, data-driven websites, and various software applications due to its robust performance and reliability. It supports features like transactions, indexing, and user management, making it suitable for both small-scale projects and large-scale enterprise applications. MySQL offers multiple storage engines that cater to different requirements, whether it's speed, data integrity, or compatibility.

MySQL provides tools like MySQL Workbench for visual database design, administration, and development.

6.2.2. TECHNOLOGY 2 : PYTHON

Python is an interpreted, high-level programming language known for its simplicity and readability. It follows a general-purpose paradigm, meaning it can be used for various types of programming tasks, including web development, data analysis, artificial intelligence, and more.

Its extensive community and third-party libraries contribute to its popularity, enabling developers to accomplish tasks efficiently. The language's syntax is intuitive, resembling pseudo-code, which aids both beginners and experienced programmers. With cross-platform compatibility and an interactive interpreter, Python encourages quick experimentation and learning. Overall, Python's versatility, readability, and rich ecosystem make it a favored choice for a wide range of applications.

6.3. OVERVIEW OF HOW IT WORKS :

6.3.1. MYSQL WORKBENCH :

6.3.1.1. INSTALLATION:

To install MySQL Workbench, visit the official download page, select your operating system, and choose the appropriate version. Download the installer and run it. Follow the installation wizard's prompts to select components, set up shortcuts, and configure optional MySQL server connections. Once installed, launch MySQL Workbench from the Start menu (Windows) or Applications folder (macOS) and start managing MySQL databases using its visual interface.

6.3.1.2. DATABASE DESIGN AND MODELING:

MySQL Workbench allows you to visually design and model your database using Entity-Relationship (ER) diagrams. You can create tables, define relationships between them, and set attributes using a drag-and-drop interface. This design process helps you create a blueprint of

your database structure before implementation.

6.3.1.3. SQL DEVELOPMENT :

The tool includes SQL development features, including code editors with syntax highlighting, auto-completion, and real-time error checking. You can write, edit, and execute SQL queries and scripts directly within MySQL Workbench.

6.3.1.4. QUERY BUILDING :

The query builder feature enables you to visually construct complex SQL queries using a drag-and-drop interface. This is particularly helpful for those who are new to SQL or for building intricate queries.

6.3.1.5. ADMINISTRATION AND MANAGEMENT :

MySQL Workbench provides tools for managing and administering MySQL servers. You can create, modify, and delete database schemas, manage users and permissions, and optimize queries for better performance.

6.3.1.6. BACKUP AND RECOVERY:

The tool enables you to generate and schedule backups of your databases, ensuring data security and enabling recovery in case of data loss.

6.3.1.7. VISUAL TOOLS AND REPORTS:

MySQL Workbench provides tools for visualizing database schema diagrams, generating reports on database objects, and documenting your database structure.

6.3.2. PYTHON:

6.3.2.1. INSTALLATION:

Visit the official Python website at https://www.python.org/downloads/ and select the version that matches your operating system (Windows, macOS, or Linux).Choose the latest stable version of Python (e.g., Python 3.9). After downloading the installer executable, run it by

double-clicking on the downloaded file.The installer will copy necessary files and set up Python on your system.

6.3.2.2 WRITING PYTHON CODE:

Python code is written in plain text files with a .py extension. You can use any text editor or integrated development environment (IDE) to create and edit Python files. Popular choices include Visual Studio Code, PyCharm, and IDLE (Python's default IDE).

6.3.2.3. SYNTAX:

Python code is based on a clean and readable syntax. It uses indentation (whitespace at the beginning of a line) to define code blocks, instead of using braces ({}) or keywords like "end" in other languages. This indentation-based structure encourages code readability and enforces consistency.

6.3.2.4. EXECUTION:

Python is an interpreted language, which means it doesn't need to be compiled before running. The Python interpreter reads the source code line by line and executes it on-the-fly. This makes the development process faster and more flexible, as you can execute Python code directly without a separate compilation step.

6.3.2.5. LIBRARIES AND MODULES:

Python has a vast ecosystem of libraries and modules that provide pre-written code to perform specific tasks. These libraries extend Python's capabilities and allow you to accomplish complex tasks with minimal effort. Some popular libraries include NumPy for scientific computing, pandas for data analysis, TensorFlow for machine learning, and Django for web development.

6.3.2.6. PYTHON STANDARD LIBRARY:

Python comes with a comprehensive standard library that provides a wide range of modules for common programming tasks, such as file I/O, networking, regular expressions, and

more. The standard library is part of the Python installation and can be imported into your code using the import statement.

6.3.2.7. INTERACTIVITY:

Python is often used interactively, allowing you to write and execute code line by line in a Python shell or REPL (Read-Eval-Print Loop). This interactive mode is useful for experimenting, testing code snippets, and exploring libraries.

6.3.2.8. OBJECT-ORIENTED PROGRAMMING (OOP):

Python supports object-oriented programming principles. You can define classes and create objects with properties (attributes) and behaviors (methods). Python also supports other programming paradigms, such as procedural programming and functional programming.

6.3.2.9. CROSS-PLATFORM COMPATIBILITY:

Python is a cross-platform language, meaning Python code can run on different operating systems such as Windows, macOS, and various Linux distributions. This portability is facilitated by the Python interpreter, which is available for multiple platforms.

These are just the basics of how Python works. Python offers a wealth of features and functionalities that make it a popular choice for programmers across different domains, it provides for building a wide range of applications.

6.4. SOFTWARE/TOOLS INSTALLATION :

To use SQL Workbench (MySQL Workbench):

- Visit the official MySQL Workbench download page, select your OS, and download the installer.
- Double-click the downloaded installer file to run the installation process.
- Follow the installation wizard, selecting options like installation location and components to install.

- Configure MySQL server connection if prompted or set it up later within SQL Workbench.
- Once installed, find SQL Workbench in your applications and start using it for database management, design, and querying.

To use Python in Jupyter Notebook :

Launch Notebook: Open a command prompt or terminal and run jupyter notebook to start the Jupyter Notebook server. Your web browser will open with the Jupyter interface.

Create New Notebook: Click "New" > "Python" to create a new notebook. Add code in cells and text explanations in Markdown cells.

Run Code: Click inside a code cell and press Shift + Enter to execute the code. The output will appear below the cell.

Markdown Cells: Use Markdown cells for formatted text, headings, lists, links, and even images. Write Markdown text and press Shift + Enter to render it.

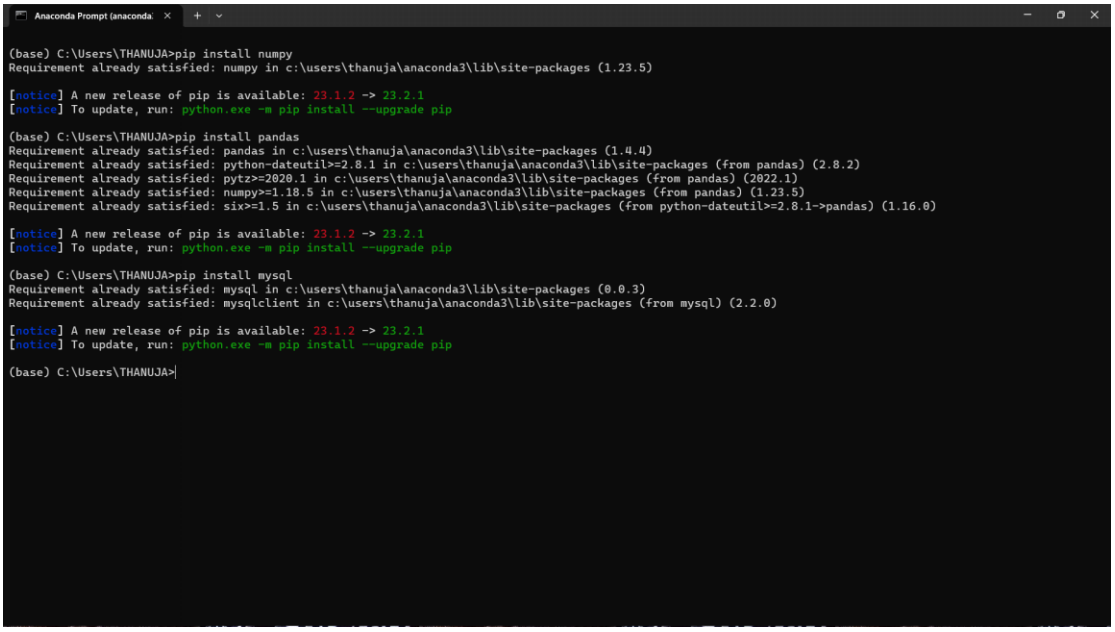
Save and Export: Regularly save your work by clicking "File" > "Save and Checkpoint." You can export notebooks as HTML, PDF, or Python scripts via "File" > "Download as."

6.5. PREREQUISITES

6.5.1. INSTALLING NECESSARY LIBRARIES:

- Type pip install NumPy and click enter. NumPy provides support for large, multi-dimensional arrays and matrices, along with a variety of mathematical functions to operate on these arrays efficiently.
- For pandas type pip install pandas. Python Pandas library is designed for data manipulation and analysis. It provides powerful data structures and functions to efficiently handle structured data.

- For connecting SQL, use mysql library. Type pip install mysql.connector .The mysql.connector module is for interacting effortlessly with MySQL databases. It allows easy connection setup using parameters, enabling query execution through cursors. Data retrieval and modification are straightforward, with options for secure prepared statements.



(Figure 6.1. Screenshot of Anaconda Prompt)

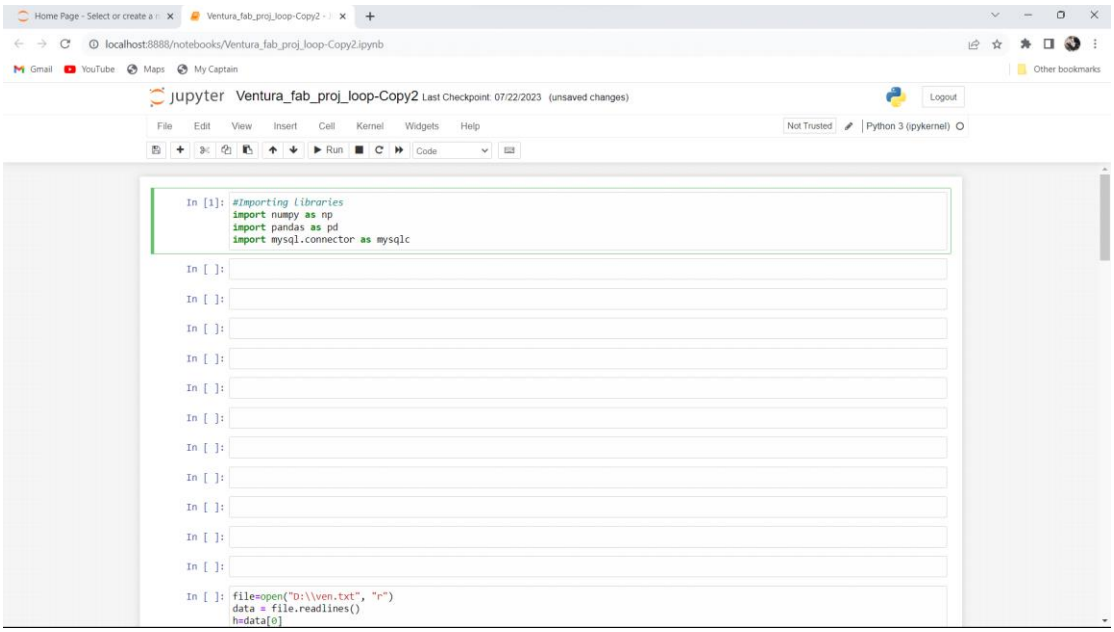
The above mentioned figure shows how to install the necessary libraries in Anaconda prompt using the command “pip install pandas” , “pip install numpy”, “pip install mysql”.

With Pandas, we can view data from files or databases into a DataFrame, manipulate and filter the data. It provides powerful data structures and functions to efficiently handle structured data.

The mysql.connector module is for interacting effortlessly with MySQL databases.

6.5.2. IMPORTING NECESSARY LIBRARIES:

Import the installed libraries each time when use it.



(Figure 6.2. Screenshot of importing libraries)

6.5.3. SCHEMA CREATION IN MYSQL WORKBENCH :

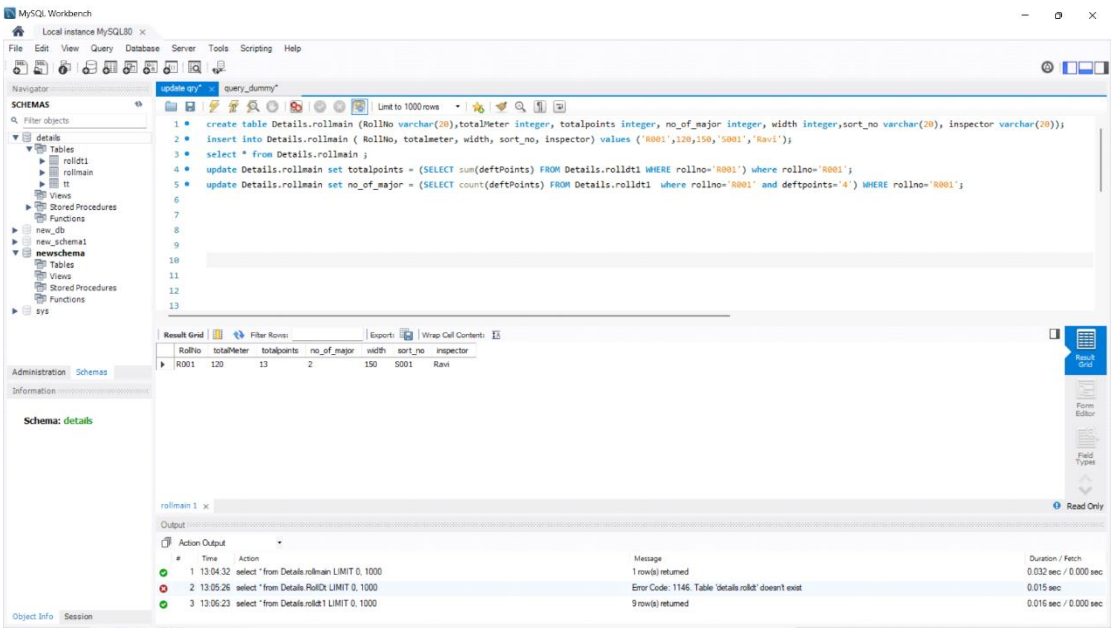
2 Datatables are needed to be created to enter the fabric roll details and the fabric roll main details.

A fabric roll is analyzed and then optimised to get the maximum realized meters based on the defect points in the roll.

The rollmain datatable has the following details:

- RollNo - Roll number of the fabric roll that is used for analysis. Each roll has unique roll number.
- TotalMeter - The total number of meters in that roll.
- TotalPoints - Total number of defect points in the roll.
- No_of_major - number of major defects that are there in each roll. A defect is considered to be a major if the number of defects is greater than or equal to 4.

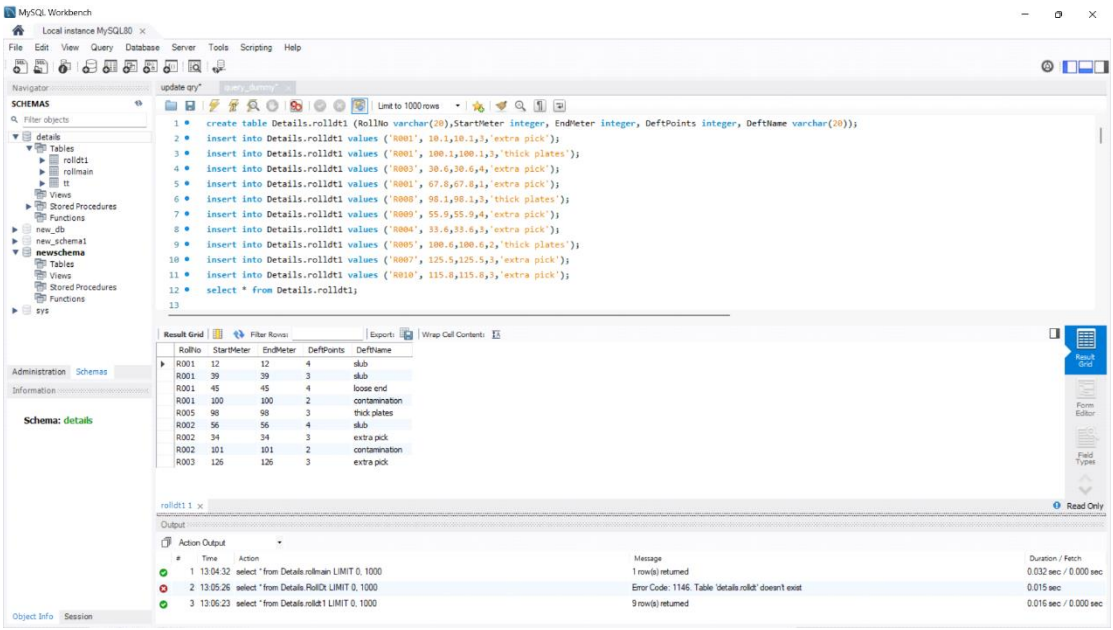
- Width – Width of the roll.
- Sort_no – Sort number the roll.
- Inspector – Name of the Inspector of that roll.



(Figure 6.3. Screenshot of rollmain datatable)

The rolldetails datatable has the following details:

- RollNo - Roll number of the fabric roll that is used for analysis. Each roll has unique roll number.
- StartMeter – The position of the defect where it starts.
- EndMeter – The position of the defect where it ends.
- DeftPoints – The number of defects at each place.
- DeftName – Name of the Defect



(Figure 6.3. Screenshot of rolldetails datatable)

6.6. WORKING OF THE PROGRAM

This program is to optimize the fabric roll with defects, to use it wisely with maximum realized meters. Each roll has certain length (say 120 meters), and has some defects in it. There are many defects that occur during the manufacturing of the fabric. Our aim is to analyze the roll defects and give the maximum useful meters. There is a condition with which the roll optimization is done and maximum useful meters are obtained, which plays a vital role in cutting and usage of cloth in the fabric industry. The condition is the maximum defect points per 100 metre should not be greater than 8. If the points per linear meter is greater than 8, then the piece of cloth will be considered as waste. Another important condition that we have here is the realized meter of cloth/fabric should be greater than 20 meters, as fabrics with a very small meters in length cannot be used for further usage.

Based on these two conditions, the program is constructed to get the useful meters. The dataset is being stored and retrived from the mySQL database through the SQL connection from Jupyter Notebook. The retrieved dataset is converted into a pandas dataframe as rows and

columns structure. Then, the optimization starts by checking the condition of no. of points per 100 meters in a roll.

For easier implementations, we use a number of logics based on the condition. Logic 1 calculated and checks for the basic condition which is, calculating the total points per 100 meters. If the total points per 100 meters is less than or equal to maxpoints (say 8), then the total cloth has passed the condition, which means we can use the total 120 meters of cloth.

Points per Linear Meter

= (Total Defect Points / Total length of the fabric roll) / 100

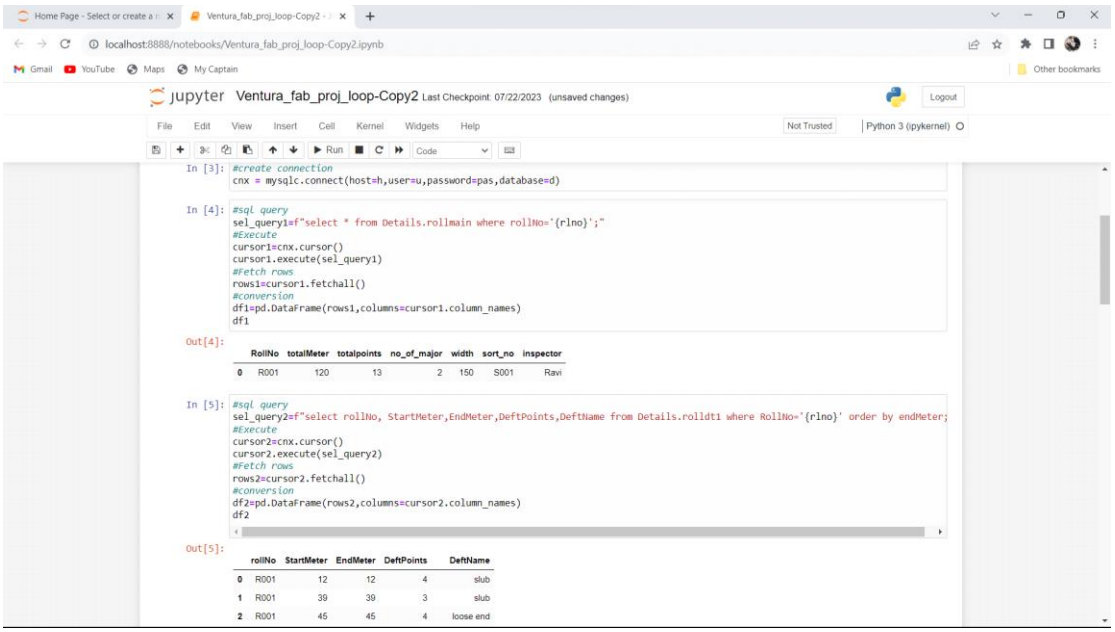
Now, if the roll has not passed or if it doesn't satisfy the condition, the Fabric needs to be optimized to get the maximum useful meters. Here comes the further logics where the points per 100 meters is calculated for the cloth, leaving the cloth till first defect. This process is carried on for all the number of defects in the total roll. (say till the second defect, till the third defect, etc.)

At each step, we will get certain length of meters as realized meters. Among the realized meters, select the maximum realized meter senario. After this step, we ought to get the maximum useful meters from the roll. Not only that, we also have the rest of the fabric before and after the useful meters. We can consider those as useful meters if it satisfies the necessary condition. Thus, the useful meters can be realized from this program.

The following sections describe and show the code snippet of the program.

6.6.1. CONNECTION WITH MYSQL WORKBENCH :

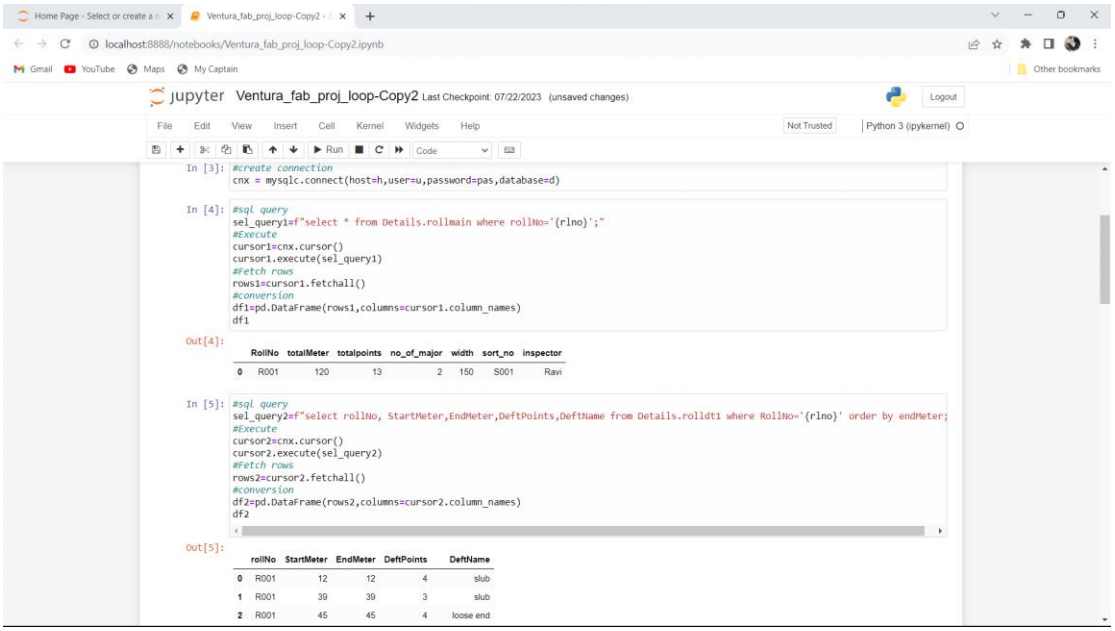
Now, we need a connection to connect and the database from MySQL. The mysql.connector module is used for interacting effortlessly with MySQL databases.



(Figure. 6.4. Connection with mySQL Workbench)

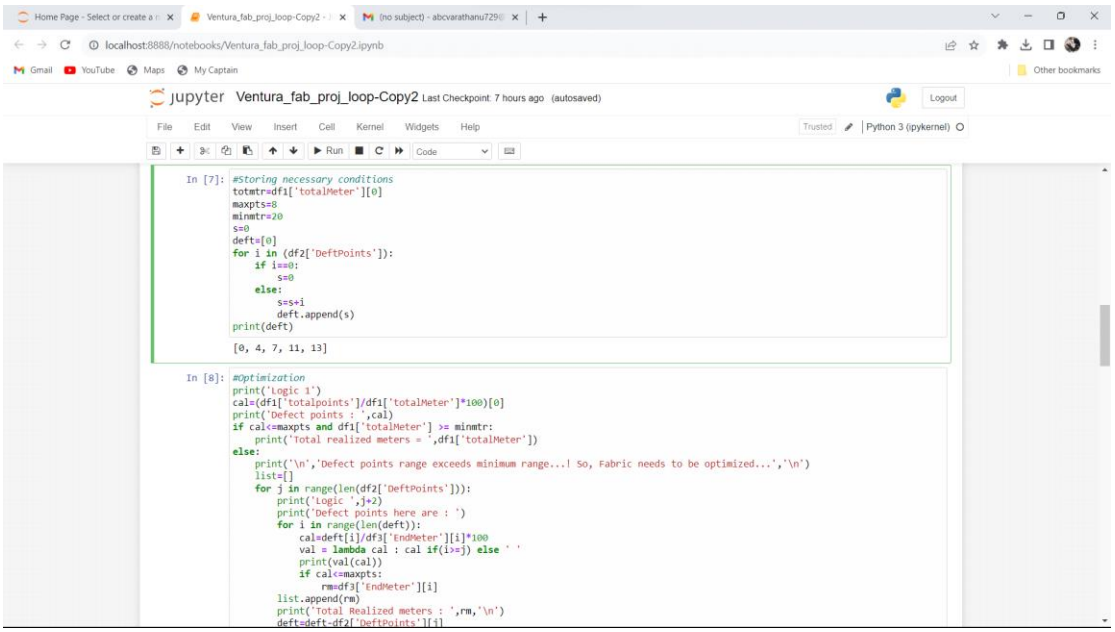
6.6.1. CONVERTING INTO PANDAS DATAFRAME :

Converting into pandas dataframe for easier manipulation and working.

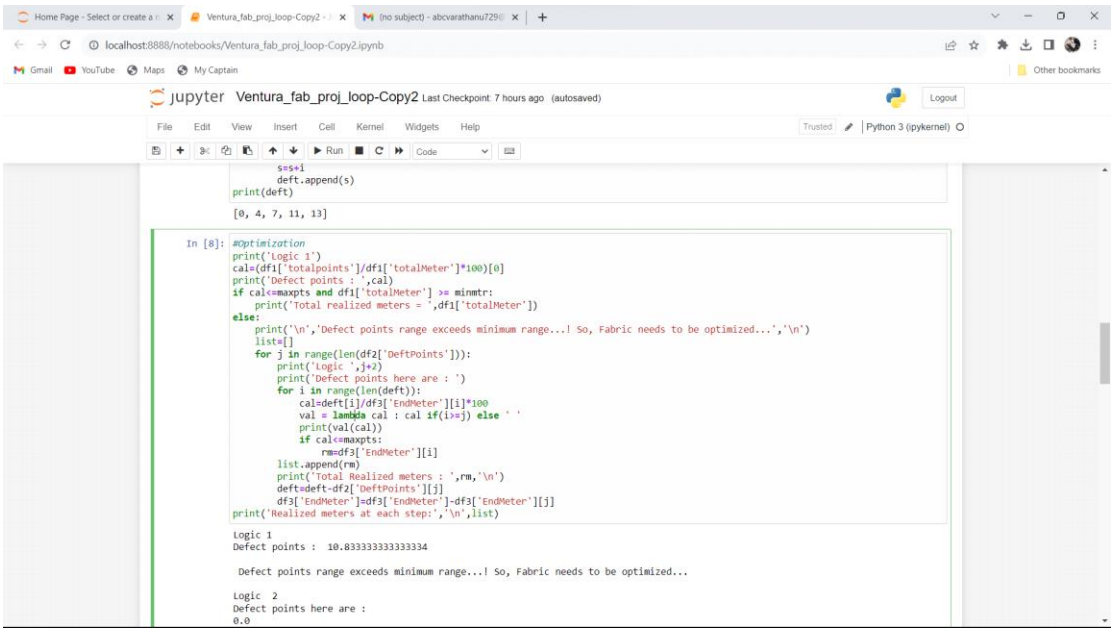


(Figure.6.5. Converting into pandas dataframe)

6.6.1. OPTIMIZATION :



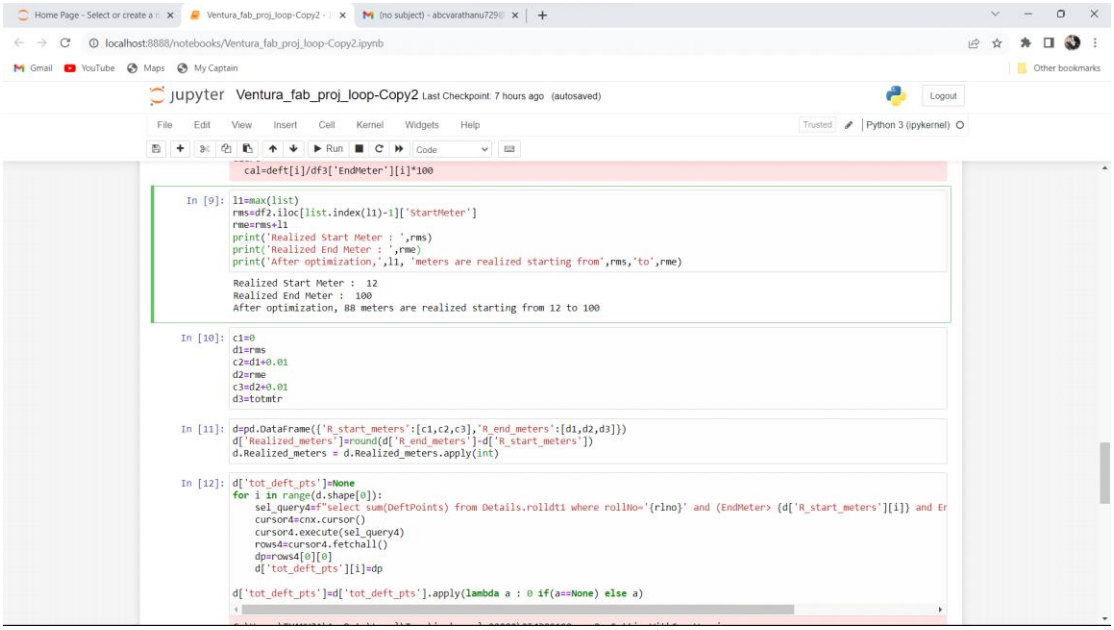
(Figure. 6.6. Storing necessary conditions in variables)



(Figure. 6.7. Optimization with certain logics)

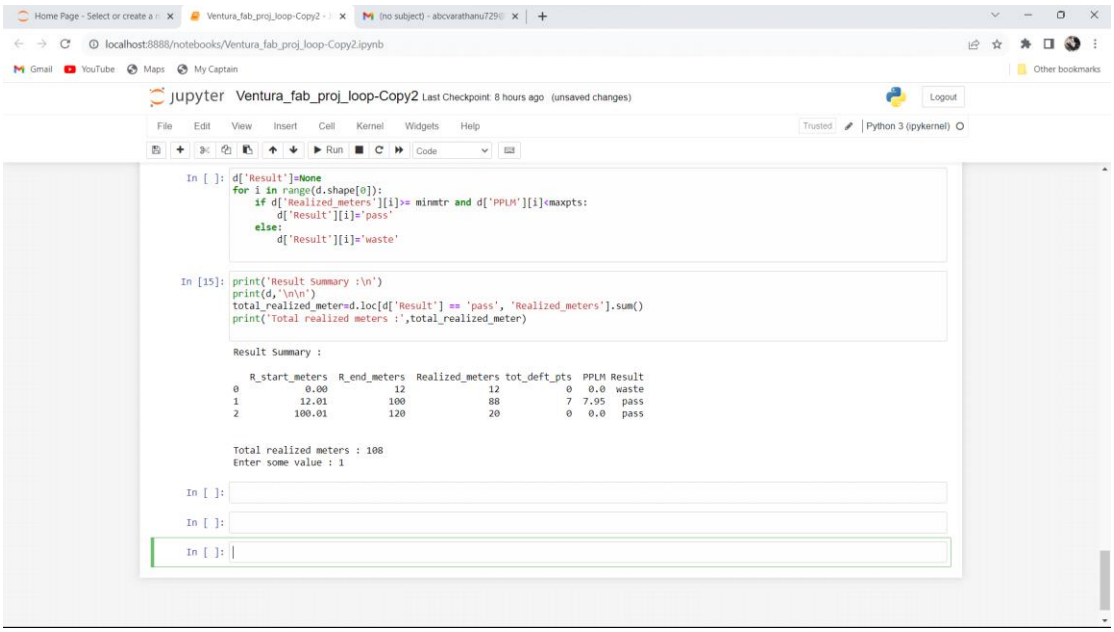
6.7. OUTPUT EXPLANATION

The program shows up the realized meters as the result. Before that, the realized start and end meters are displayed as shown in the following figure.



(Figure.6.8. Code for showing realized start and end meters)

After checking the conditions for the rest of the meters in the roll, the result summary is given as follows.



(Figure.6.9. Result Summary)

6.8. DEPLOYMENT :

Software deployment is all of the activities that make a software system available for use. The general deployment process consists of several interrelated activities with possible transitions between them. These activities occurs on the producer side.

To deploy a Jupyter Notebook as an executable file, you can use the nbconvert utility provided by Jupyter to convert the notebook to various formats, including Python script and executable formats.

6.8.1. NECESSARY LIBRARIES FOR DEPLOYMENT :

Install pyinstaller using "pip install pyinstaller".

6.8.2. CONVERT THE JUPYTER NOTEBOOK TO A PYTHON SCRIPT:

- Open a command prompt or terminal.
- Navigate to the directory where your Jupyter Notebook file (example.ipynb) is located.
- Run the following command to convert the notebook to a Python script:

  jupyter nbconvert --to script example.ipynb

This command will create a Python script named example.py in the same directory.

6.8.3. PACKAGE THE PYTHON SCRIPT AS AN EXECUTABLE:

Run the following command to create an executable from the Python script using pyinstaller:

pyinstaller --onefile example.py

This command will create a dist directory containing the executable file (example.exe on Windows).

6.8.4. TESTING THE EXECUTABLE:

Go to the dist directory where the executable file is located.

Run the executable file (example.exe) to test if it works correctly.

After the deployment, the program is ready as an application to use it more flexibly.

7. CONCLUSION

During this period, I as an intern in *Ventura Automation Service Inc.* , have acquired a lot of knowledge through how theoretical knowledge is put in practice and applied in real world problems. The period of time in Ventura has taught me valuable learnings in life.

I have been able to connect with the professional people that I am sure will be able to help me with great opportunities in future. My work experience has given me a range of effective skills.

Being a part of a this successful company, gave me a different perspective on the role and working of information in the workforce. Not only technological learning , this oppurtunity has also helped me to learn more valuable softskills in life.

The experience that I have gained from working there, was very educational and real time. I was able to work with real world problems and solve real world problems as much as I could. Being able to learn many of technical skills, combined with the knowledge to handle the tasks assigned.

On completion of this internship, I got a good idea and interest in learning on how the skills are applied in the professional field. Skill Development and Enhancement and Networking and Professional Relationships were the foremost benefits of this internship.

8. WEB REFERENCES

- **W3Schools (https://www.w3schools.com/)**
- **Geeks for Geeks (https://www.geeksforgeeks.org/)**
- **Stack Overflow (https://stackoverflow.com/)**
- **Medium (https://medium.com/)**