

RNS INSTITUTE OF TECHNOLOGY

Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi
Approved by AICTE, New Delhi, Accredited by NAAC with 'A+' Grade
Channasandra, Dr. Vishnuvardhan Road, Bengaluru - 560 098
Ph: (080) 28611880 / 1; www.rnsit.ac.in



ESTD: 2001
An Institute with a difference

Internship (MINT403)

Report on

CREDIT RISK ANALYTICS DASHBOARD USING POWER BI

**Submitted in partial fulfillment of the Requirements of the 2nd Year in
MASTER OF COMPUTER APPLICATIONS**

By
DEVARAJU K G
1RN24MC021

Under the Guidance of

Dr. NAGESH B S
Associate Professor and Head,
Department of MCA
RNS Institute of Technology
Bengaluru-98

Mr. VISHAL ANGADI
Key Account Manager,
Anudip Foundation for Social Welfare,
Electronic City, Bengaluru-560100



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Department of Master of Computer Applications

INTERNSHIP CERTIFICATE

This is to Certify that **Mr. Devaraju K G** bearing USN: 1RN24MC021, student of **2nd Year MCA** has satisfactorily completed the **Internship work – MINT403** entitled “**CREDIT RISK ANALYTICS DASHBOARD USING POWER BI**” in the academic year **2025-2026** as prescribed by VTU for IV Semester of Master of Computer Applications.

Internship Guide

Dr. Nagesh B S
Assoc Professor and Head
Department of MCA
RNS Institute of Technology
Bengaluru-98

Head of the Department

Dr. Nagesh B S
Assoc Professor and Head
Department of MCA
RNS Institute of Technology
Bengaluru-98

Principal

Dr. Ramesh Babu H S
Principal
RNS Institute of Technology
Bengaluru-98

EXTERNAL VIVA-VOCE

	Name	Signature with date
Examiner -1		
Examiner-2		

CERTIFICATE

OF INTERNSHIP

It is certified that **Mr. Devaraju K G** bearing USN **1RN24MC021** of **RNS Institute Of Technology** carried out his/her internship from **22/Jan/2026** to **15/May/2026** in **Data Visualization** with Hands on Projects offered by Anudip Foundation.

In recognition of exemplary regularity, punctuality, commitment to learning, collaborative spirit, practical proficiency, and the successful accomplishment of internship objectives, he/she is hereby awarded a score of **96** out of **100**.

Date: 15/May/2026

Name of Mentor: Vishal Angadi
Designation: Key Account Manager
Address: Anudip Foundation for Social Welfare, Electronic City, Bengaluru
Email: vishal.angadi@anudip.org


Signature of Mentor
VISHAL ANGADI


Key Account Manager
Anudip Foundation For Social Welfare



Anudip Foundation for Social Welfare

Mira Towers, 8th & 9th Floor, Block DN, Plot 27, Sector-V, Salt Lake City, P.S. Bidhannagar, Kolkata-700091, West Bengal

☎ 033 4062 4187 / 4060 8484 | 📞 8145111444 | ✉ info@anudip.org | www.anudip.org

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DECLARATION

I, **Devaraju K G (USN:1RN24MC021)** student of **2nd Year**, Department of MCA, RNS Institute of Technology, Bengaluru-98, declare that the Internship entitled “**CREDIT RISK ANALYTICS DASHBOARD USING POWER BI**” is a record of the original work done by me under the guidance and supervision of **Dr. Nagesh B S**, Associate Professor and Head, Department of MCA, RNSIT and this project work has not formed the basis of any Degree/Diploma/Fellowship or similar title to any candidate of any university.

Name: Devaraju K G

USN: 1RN24MC021

Signature of the candidate

ACKNOWLEDGEMENT

I would like to place on record my gratitude to all those people who have helped me in making this **Internship work** a reality. Our Institution has played a prominent role in guiding in the right direction.

I express my sincere words of gratitude to the **Management of RNS Institute of Technology** for providing such a healthy environment for the successful completion of this Internship work.

I would like to thank our beloved Principal, **Dr. Ramesh Babu H S**, for providing the necessary facilities to carry out this work.

I am extremely grateful to our beloved HoD, **Dr. Nagesh B S**, Associate Professor and Head, Department of MCA, RNSIT for having accepted to patronize me in the right direction with all his wisdom.

I would also express my heartfelt thanks to my guide, **Dr. Nagesh B S**, Associate Professor and Head, Department of MCA, RNSIT for their continuous guidance and valuable suggestions for this Internship work.

It's my pleasure to thank Company name for providing me the best platform to complete the internship work.

I also express my heartfelt thanks to all the teaching and nonteaching staff members of MCA Department for their encouragement and support throughout this work.

Devaraju K G

1RN24MC021

ABSTRACT

The internship was undertaken at Anudip Foundation under the DeepTech program with the objective of gaining practical exposure to data analytics, business intelligence, and dashboard development using modern analytical tools and technologies. The internship focused on applying theoretical knowledge to real-world business problems through data-driven analysis and visualization techniques.

As part of the internship, a project titled “**Credit Risk Analytics Dashboard Using Power BI**” was developed to analyze loan portfolio performance, credit risk exposure, and default behavior using business intelligence methodologies. The project was based on a banking credit risk dataset containing more than 12,000 records and multiple financial attributes related to borrowers, loans, income levels, credit scores, debt-to-income ratios, loan purposes, and loan status information.

The primary objective of the project was to transform raw financial data into meaningful insights that could support credit risk assessment and decision-making. The implementation involved data collection, preprocessing, transformation, risk analysis, KPI development, and dashboard visualization. Microsoft Excel was used for initial data preparation, while Power Query was utilized for data transformation and cleaning. Power BI served as the primary business intelligence platform for dashboard development, and DAX was used for creating risk-related calculations and performance indicators. Python libraries such as Pandas, Matplotlib, Seaborn, and NetworkX were used for advanced statistical analysis and customized visualizations.

The developed dashboard consists of multiple analytical modules including Executive Credit Risk Overview, Regional Risk & Portfolio Dynamics, Advanced Credit Risk Intelligence, and Advanced Statistical & Relationship Analysis. These modules provide insights into loan portfolio value, default rates, credit score distribution, regional risk exposure, debt-to-income impact, customer risk categories, and financial variable relationships.

The successful implementation of the Credit Risk Analytics Dashboard demonstrates the effectiveness of data analytics and business intelligence techniques in supporting financial risk assessment and organizational decision-making. The project highlights how interactive dashboards can help financial institutions monitor credit risk, improve portfolio management, and make informed lending decisions.

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Chapter-1

INTRODUCTION

1.1. Aim of the Internship

The primary aim of this internship is to gain practical exposure to data analytics, business intelligence, and financial data visualization using modern analytical tools and technologies. The internship was designed to bridge the gap between academic learning and industry requirements by providing hands-on experience in data processing, risk analysis, dashboard development, and business intelligence reporting.

In today's data-driven financial environment, organizations generate large volumes of customer, transaction, and loan-related data. Analyzing this information effectively is essential for identifying financial risks, improving operational efficiency, and supporting strategic decision-making. This internship focuses on developing practical skills required to collect, clean, transform, analyze, and visualize financial data in an interactive and meaningful format.

The internship provided an opportunity to work with various analytical tools such as Microsoft Excel, MySQL, Python, Power Query, DAX, and Power BI. Through these technologies, practical knowledge was gained in different stages of the analytics lifecycle including data preprocessing, transformation, modeling, visualization, and dashboard reporting.

The major objective of the internship project was to design and develop a Credit Risk Analytics Dashboard capable of analyzing loan portfolio performance, default risk patterns, credit score distribution, regional risk concentration, debt-to-income impact, and customer risk categories. The dashboard was developed to convert complex banking data into meaningful insights that can support credit risk assessment and lending decisions.

The specific objectives of the internship are:

- To understand the fundamentals of data analytics and business intelligence.
- To gain practical knowledge in financial data cleaning and transformation.
- To develop skills in data visualization and dashboard design using Power BI.
- To learn DAX calculations and data modeling techniques.
- To analyze credit risk factors and loan portfolio performance.
- To identify patterns associated with loan defaults and risk exposure.

-
- To create interactive reports for financial analysis and decision-making.
 - To improve analytical thinking, problem-solving, and reporting skills.
 - To understand how business intelligence tools support risk management in financial institutions.
 - To develop professional skills such as communication, teamwork, discipline, and time management.

Overall, the internship served as an excellent learning platform for acquiring technical expertise and professional exposure in the fields of business intelligence, financial analytics, and credit risk assessment.

1.2 Internship description

The internship was carried out under Anudip Foundation as part of the DeepTech Program, which focuses on developing industry-relevant skills in data analytics, business intelligence, and modern data visualization technologies. The internship was designed to provide practical exposure to analytical tools, data processing techniques, and dashboard development methodologies used in real-world business environments.

The internship followed a structured learning approach consisting of technical training, practical assignments, project implementation, and professional skill development. The training program covered multiple technologies including Microsoft Excel, MySQL, Python Programming, Power BI, Power Query, and DAX. These tools were used extensively throughout the internship to understand various stages of the data analytics lifecycle.

The initial phase of the internship focused on understanding data fundamentals and spreadsheet-based analysis using Microsoft Excel. Activities such as data cleaning, data formatting, sorting, filtering, formula implementation, pivot tables, and chart generation were performed to develop a strong foundation in data handling and reporting.

The next phase involved learning Python programming for analytical applications. Python libraries such as Pandas, NumPy, Matplotlib, Seaborn, and NetworkX were introduced for data manipulation, statistical analysis, and advanced visualization. These tools helped in understanding relationships within data and extracting meaningful insights from large datasets.

Database concepts were introduced through MySQL, where practical exercises were conducted on database creation, query execution, filtering operations, grouping records, and relational data retrieval. This provided exposure to structured data management practices commonly used in organizations.

Power BI was the primary platform used for project implementation. Training included data import, Power Query transformations, data modeling, DAX calculations, KPI development, dashboard creation, and interactive report generation. Practical sessions focused on developing professional dashboards capable of presenting meaningful business insights.

The major project assigned during the internship was the development of a **Credit Risk Analytics Dashboard Using Power BI**. The project was based on a banking credit risk dataset containing more than 12,000 records and multiple financial attributes related to customers, loans, income levels, credit scores, debt-to-income ratios, loan purposes, and loan status information.

The project implementation involved several stages including data collection, preprocessing, transformation, risk analysis, dashboard development, testing, and documentation. Various analytical techniques were applied to identify risk patterns, default trends, portfolio performance, and financial indicators. The final dashboard consisted of multiple analytical modules such as Executive Credit Risk Overview, Regional Risk and Portfolio Dynamics, Advanced Credit Risk Intelligence, and Advanced Statistical Analysis.

Apart from technical learning, the internship also emphasized professional development through regular assignments, project reviews, mentor interactions, teamwork, and self-learning activities. These experiences enhanced both technical competency and workplace readiness.

Overall, the internship provided valuable practical exposure to business intelligence implementation, financial analytics, risk assessment methodologies, and dashboard development, thereby strengthening both technical and professional skills.

1.3 Scope of the Internship

The scope of this internship is centered on developing practical knowledge and technical skills in the areas of data analytics, business intelligence, financial reporting, and risk analysis. The internship provides hands-on exposure to modern analytical tools and methodologies used by organizations to transform raw data into meaningful business insights. Through practical

implementation and project-based learning, the internship helps bridge the gap between academic concepts and industry requirements.

One of the major areas covered during the internship is business intelligence and dashboard development. Organizations generate large volumes of operational and financial data every day, making it difficult to extract meaningful information through manual analysis. Business intelligence tools such as Power BI help convert complex datasets into interactive dashboards that support monitoring, reporting, and decision-making. The internship provides practical exposure to these technologies and their real-world applications.

The internship also focuses on financial analytics and credit risk assessment. Financial institutions rely heavily on data-driven approaches to evaluate customer creditworthiness, monitor loan portfolios, identify risk factors, and reduce financial losses. The Credit Risk Analytics Dashboard developed during the internship demonstrates how data analytics can be used to assess loan performance, analyze default patterns, evaluate borrower behavior, and support lending decisions.

The scope of the internship extends to various analytical activities including data collection, preprocessing, transformation, modeling, visualization, and reporting. Learners gain practical experience in handling structured datasets, identifying patterns, performing statistical analysis, and presenting findings through professional dashboards. These skills are highly relevant in modern organizations where data-driven decision-making plays a crucial role.

Another important aspect of the internship is exposure to multiple analytical technologies. Microsoft Excel, MySQL, Python, Power Query, DAX, and Power BI were used throughout the internship to perform different stages of the analytics lifecycle. Learning these technologies improves technical competency and prepares students for careers in business intelligence, data analytics, financial analytics, and reporting.

The internship also provides opportunities to develop professional skills such as communication, teamwork, project planning, documentation, problem-solving, and self-learning. These skills are essential for adapting to professional work environments and successfully handling industry projects.

From a career perspective, the knowledge gained during the internship can be applied in various domains such as banking, finance, insurance, risk management, business intelligence, consulting,

and data analytics. The practical experience gained through the Credit Risk Analytics Dashboard project enhances understanding of financial data analysis and strengthens industry readiness.

Future applications of the concepts learned during the internship include credit risk prediction, loan approval analysis, fraud detection, portfolio management, customer segmentation, financial forecasting, and advanced business intelligence solutions. With the increasing adoption of analytics and artificial intelligence in the financial sector, the skills acquired during this internship provide a strong foundation for further learning and professional growth.

Overall, the internship has broad technical, professional, and industry-oriented scope, making it highly beneficial for developing expertise in data analytics, business intelligence, and financial risk assessment.

Chapter-2

COMPANY PROFILE

2.1 Organization structure

Anudip Foundation for Social Welfare is a non-profit organization established with the mission of creating sustainable livelihood opportunities for underserved youth and women through market-aligned digital and professional skill development programs. The organization focuses on bridging the skill gap between academic education and industry expectations by offering structured training, career readiness support, and placement assistance. Anudip's DeepTech program specifically focuses on advanced technology skill development in areas such as programming, cloud, analytics, and digital transformation to prepare learners for technology-driven careers.

The organizational structure of Anudip Foundation follows a systematic and hierarchical framework to ensure effective management, training delivery, program execution, and student support. The structure is designed to coordinate operations across multiple training centers and programs efficiently.

At the highest level of the organizational structure is the **Board of Directors and Executive Leadership Team**, which is responsible for strategic planning, policy formulation, organizational governance, and long-term program expansion. This leadership team ensures that the organization's objectives align with its mission of social and economic empowerment.

Below the executive leadership is the **Program Management Division**, which oversees the planning, implementation, and monitoring of different skill development initiatives such as DeepTech, AI Academy, and employability-focused training programs. This division ensures curriculum relevance, quality delivery, and alignment with industry needs.

The **Training and Curriculum Development Team** is responsible for designing technical learning modules, selecting training methodologies, updating course content, and ensuring learners receive industry-relevant technical education. In the DeepTech program, this includes training in technologies such as Python, Java, cloud computing, analytics, and modern development tools.

The **Technical Mentoring and Instruction Team** consists of trainers, mentors, and subject matter experts who deliver practical sessions, assignments, project guidance, and technical assessments. They directly interact with learners and provide hands-on implementation support.

The **Student Support and Operations Team** manages learner enrollment, attendance, communication, progress tracking, scheduling, and operational coordination for training programs. This team ensures smooth functioning of day-to-day activities.

The **Placement and Career Services Department** plays an important role in preparing learners for employment opportunities through resume building, mock interviews, communication training, aptitude preparation, and recruitment coordination with industry partners.

The **Monitoring and Evaluation Department** continuously tracks learner performance, course completion, assessment outcomes, and program effectiveness. This department helps maintain quality standards and improve training delivery.

The organization also includes **Administration, Finance, HR, and IT Support Departments**, which provide internal operational support and infrastructure management.

Thus, the organizational structure of Anudip Foundation ensures efficient coordination between leadership, training delivery, student development, and career placement services.

2.2 Different Departments and Functions

Anudip Foundation operates through several specialized departments, each responsible for specific organizational functions that collectively support skill development, technical education, and employability enhancement.

1. Program Development Department

This department is responsible for designing and structuring training programs based on current industry requirements. It identifies skill gaps, develops technical curriculum frameworks, and ensures that the content delivered is relevant to market demands. In the DeepTech program, this department focuses on designing advanced technical learning pathways.

Functions:

- Curriculum planning

- Program design
- Learning module development
- Industry skill alignment
- Course updates and improvements

2. Training and Instruction Department

This department consists of trainers, mentors, and instructors responsible for delivering classroom and practical sessions. They conduct technical teaching, assignments, demonstrations, project mentoring, and skill evaluations.

Functions:

- Technical instruction
- Practical training delivery
- Assignment evaluation
- Project mentoring
- Student skill development

3. Technical Support Department

The technical support team manages software tools, lab environments, infrastructure readiness, and technology resources required for practical learning.

Functions:

- Software installation
- System configuration
- Technical troubleshooting
- Lab environment support
- Tool access management

4. Student Support Department

This department manages learner engagement, academic coordination, attendance tracking, communication, and progress monitoring.

Functions:

- Student registration
- Attendance management
- Communication support
- Scheduling coordination
- Academic assistance

5. Placement and Career Services Department

This department prepares students for industry employment opportunities through career guidance and recruitment readiness training.

Functions:

- Resume preparation
- Interview preparation
- Soft skills development
- Placement coordination
- Employer engagement

6. Monitoring and Evaluation Department

This department tracks learning outcomes, assessments, course progress, and overall program effectiveness.

Functions:

- Performance monitoring
- Assessment evaluation
- Progress tracking
- Feedback analysis
- Quality improvement

7. Human Resources Department

The HR department manages organizational staffing, employee administration, recruitment, and policy implementation.

Functions:

- Recruitment
- Staff management
- Performance monitoring
- Employee coordination
- Administrative support

8. Finance and Administration Department

This department manages financial operations, infrastructure administration, budgeting, and institutional coordination.

Functions:

- Financial planning
- Budget allocation
- Administrative operations
- Procurement support
- Facility management

Together, these departments ensure effective functioning of the organization and successful execution of technical training programs.

2.3 Job process / Services / Facilities

Anudip Foundation provides a structured learning and employability ecosystem designed to help students acquire technical skills and transition into professional careers successfully.

The organization offers multiple services including technical training, career guidance, digital literacy development, placement support, and project-based learning opportunities. Through the DeepTech initiative, learners receive exposure to advanced technologies and industry-aligned skill development programs.

Job Process Followed During Internship

The internship followed a structured process consisting of multiple stages:

1. Enrollment and Orientation

Students were initially enrolled into the internship program and provided orientation regarding internship objectives, learning expectations, schedules, project requirements, and evaluation criteria.

2. Technical Training

Learners underwent structured technical training in:

- Microsoft Excel
- Python Programming
- MySQL Database
- Power BI Dashboard Development
- Data Visualization Techniques
- Business Intelligence Reporting

This training combined theoretical learning with practical implementation.

3. Assignment and Skill Practice

After completion of each module, practical assignments were given to reinforce understanding. Students practiced data cleaning, dashboard building, SQL querying, and Python-based analysis.

4. Project Allocation

Students were assigned a practical project based on workforce analytics. The assigned project involved development of an Employee Insights and Workforce Analysis Dashboard.

5. Project Development

The implementation stage included:

- Dataset collection
- Data preprocessing
- Data transformation
- Visualization creation
- Dashboard design
- KPI generation
- Testing and validation

6. Review and Mentor Guidance

Regular mentor interactions were conducted for technical guidance, issue resolution, feedback, and performance monitoring.

7. Evaluation and Certification

After project completion, student performance was evaluated based on practical implementation, assignments, discipline, attendance, and project quality.

Facilities Provided

The facilities provided during the internship included:

- Computer systems for practical work
- Internet-enabled learning environment
- Access to Microsoft Excel
- Python programming environment
- MySQL database tools
- Power BI Desktop software
- Digital learning resources
- Project datasets
- Mentor support
- Career readiness assistance
- Placement guidance
- Technical documentation support

The learning environment was designed to promote practical exposure, technical confidence, and project implementation capabilities.

Overall, Anudip Foundation provides a comprehensive skill development ecosystem that combines technical education, practical implementation, professional development, and employability enhancement.

Chapter – 3

TOOLS AND TECHNOLOGY

3.1 Tools / Technology Used by Company

During the internship, various modern tools and technologies were used for financial data analysis, credit risk assessment, visualization, and dashboard development. The internship provided practical exposure to industry-relevant technologies that are widely used in business intelligence, financial reporting, and analytics environments. The Credit Risk Analytics Dashboard project involved multiple stages such as data collection, preprocessing, transformation, database handling, risk analysis, statistical modeling, and dashboard implementation. Different tools were utilized at each stage depending on the analytical and reporting requirements.

The major technologies used during the internship include Microsoft Excel, Python programming, MySQL database management system, Power BI, Power Query, and DAX. These tools collectively supported the complete workflow of credit risk analytics and business intelligence implementation. The combination of these technologies enabled efficient handling of financial datasets, identification of risk patterns, calculation of key performance indicators, and development of interactive dashboards for decision-making.

3.1.1 Microsoft Excel

Microsoft Excel was used during the internship for initial data preparation, validation, and preprocessing of the banking credit risk dataset. Excel provided an efficient environment for organizing raw financial records, identifying inconsistencies, handling missing values, and performing preliminary analysis before importing the data into advanced analytical tools.

The credit risk dataset contained information related to customer demographics, loan details, income levels, credit scores, debt-to-income ratios, loan purposes, and loan status. Excel was used to verify data quality, remove duplicate records, standardize formats, and prepare the dataset for further transformation.

The following table presents major Excel functions used during the internship.

Function / Feature	Application
SUM()	Total loan calculations
AVERAGE()	Average credit score analysis
COUNT()	Record counting

IF()	Conditional financial analysis
VLOOKUP()	Data retrieval
Pivot Tables	Loan portfolio summarization
Conditional Formatting	Risk category highlighting

Excel played an important role in improving data quality and ensuring accuracy before analytical processing.

3.1.2 Python Programming

Python was used for advanced statistical analysis and visualization of financial risk data. It provided powerful capabilities for analyzing relationships between variables and identifying patterns associated with loan defaults and credit risk.

Several Python libraries were used during the internship for data analysis and visualization.

Library	Purpose
Pandas	Data manipulation and preprocessing
NumPy	Numerical computation
Matplotlib	Graphical visualization
Seaborn	Statistical analysis and plots
NetworkX	Relationship and network analysis

Python enabled implementation of advanced analytical visuals such as correlation heatmaps, pair plots, violin plots, and network graphs. These visualizations helped identify relationships between borrower attributes and financial risk indicators.

3.1.3 MySQL Database Management System

MySQL was used to understand structured data management and database operations within financial analytics environments. Banking and financial organizations typically store large volumes of customer and loan-related data in relational databases.

MySQL concepts learned during the internship included database creation, data retrieval, filtering, aggregation, and relational querying.

Concept	Description
CREATE TABLE	Creates database tables
INSERT	Adds records
SELECT	Retrieves data

UPDATE	Modifies records
DELETE	Removes records
JOIN	Combines related tables
GROUP BY	Groups financial records
Aggregate Functions	Statistical calculations

Understanding database concepts helped in managing structured datasets effectively.

3.1.4 Power BI

Power BI was the primary business intelligence platform used for implementation of the Credit Risk Analytics Dashboard. It enabled transformation of raw financial data into interactive reports and analytical dashboards.

Power BI was used for:

- Data import and integration
- Data modeling
- KPI generation
- Dashboard development
- Financial reporting
- Credit risk analysis

The dashboard developed during the internship included modules such as Executive Credit Risk Overview, Regional Risk and Portfolio Dynamics, Advanced Credit Risk Intelligence, and Statistical Analysis.

Feature	Application
Data Import	Dataset integration
Power Query	Data transformation
Data Modeling	Relationship creation
DAX	Financial KPI calculations
KPI Cards	Risk indicator display
Slicers	Interactive filtering
Charts	Credit risk visualization

Power BI served as the core platform for project implementation.

3.1.5 Power Query

Power Query was used extensively for preprocessing and transforming financial datasets before dashboard implementation.

The banking dataset required several transformations including removal of duplicate records, handling missing values, correcting data formats, and standardizing field structures.

Transformation	Purpose
Remove Duplicates	Eliminates repeated records
Change Data Type	Standardizes financial fields
Filter Rows	Removes invalid entries
Replace Null Values	Handles missing data
Split Columns	Separates combined information
Merge Queries	Combines datasets

Power Query improved data reliability and analytical accuracy.

3.1.6 DAX (Data Analysis Expressions)

DAX was used to create calculated columns, measures, and key performance indicators within Power BI.

Several risk-related calculations were implemented to support credit risk analysis and portfolio monitoring.

Examples of KPIs developed include:

- Total Loans Issued
- Total Portfolio Value
- Default Rate
- Average Credit Score
- High-Risk Customer Count
- Regional Risk Exposure

DAX significantly enhanced the analytical capability of the dashboard by enabling dynamic calculations and interactive reporting.

3.1.7 Data Visualization Techniques

Data visualization played a crucial role in communicating financial insights and risk patterns. Different visualization techniques were used depending on the analytical objective.

Visualization Type	Purpose
KPI Cards	Financial performance metrics
Bar Charts	Loan comparison
Line Charts	Portfolio trends
Scatter Plots	Risk relationship analysis
Heatmaps	Correlation analysis
Pie Charts	Risk category distribution
Violin Plots	Statistical distribution analysis
Network Graphs	Relationship analysis

These visualizations improved interpretation of credit risk indicators and supported decision-making.

3.1.8 System Environment

Component	Specification
Operating System	Windows 10 / Windows 11
Processor	Intel Core i5 or higher
RAM	8 GB minimum
Storage	256 GB SSD
Spreadsheet Tool	Microsoft Excel
Programming Tool	Python
Database Tool	MySQL
BI Tool	Power BI Desktop

Overall, the tools and technologies used during the internship provided practical exposure to business intelligence, financial analytics, risk assessment, and dashboard development. These technologies collectively contributed to the successful implementation of the Credit Risk Analytics Dashboard and strengthened both analytical and technical competencies.

Chapter – 4

INTERNSHIP WORK

4.1 Task Assigned

During the internship, various practical tasks were assigned to develop technical knowledge and hands-on experience in data analytics, financial reporting, and business intelligence. The internship followed a structured learning approach where tasks were introduced progressively, beginning with data preparation and gradually advancing towards dashboard development and risk analysis.

The initial tasks involved working with a banking credit risk dataset containing customer information, loan details, credit scores, income levels, debt-to-income ratios, and loan status records. These activities included data cleaning, removal of duplicate records, handling missing values, and standardizing data formats to ensure consistency and reliability.

Further tasks involved analyzing customer financial behavior and identifying factors influencing credit risk. Statistical analysis was performed to understand relationships between variables such as income, credit score, debt-to-income ratio, loan amount, and default status. Python libraries were used to perform exploratory data analysis and generate advanced analytical visualizations.

The internship also included practical exposure to database concepts through MySQL, where structured financial data was organized and queried for analysis. SQL operations such as filtering, sorting, aggregation, and grouping were used to retrieve meaningful information from large datasets.

The major task assigned during the internship was the development of a Credit Risk Analytics Dashboard using Power BI. This involved transforming raw banking data into interactive dashboards capable of monitoring loan portfolio performance, identifying risk patterns, and supporting financial decision-making. The implementation process included data transformation, KPI development, dashboard design, testing, and documentation.

These activities provided practical exposure to the complete lifecycle of a business intelligence project and strengthened analytical, technical, and problem-solving capabilities.

4.2 Project Assigned

The primary project assigned during the internship was the development of a **Credit Risk Analytics Dashboard Using Power BI**. The project was designed to analyze banking credit risk data and provide meaningful insights into loan portfolio performance, borrower behavior, and default risk patterns through interactive visualization and business intelligence techniques.

The project utilized a banking credit risk dataset containing more than 12,000 records and multiple financial attributes including customer demographics, loan amount, annual income, credit score, debt-to-income ratio, loan purpose, loan status, and regional information. The objective was to transform raw financial data into a comprehensive analytical dashboard that could support credit risk assessment and decision-making.

The project implementation began with data collection and preprocessing. The raw dataset was examined for missing values, duplicate entries, and formatting inconsistencies. Data cleaning and transformation were performed using Excel and Power Query to improve data quality and prepare the information for analytical processing.

After preprocessing, data modeling techniques were applied within Power BI to establish relationships between different financial variables. DAX measures were created to calculate key risk indicators such as Total Loans Issued, Portfolio Value, Default Rate, Average Credit Score, and Risk Category Distribution.

The dashboard was developed with multiple analytical modules, including Executive Credit Risk Overview, Regional Risk and Portfolio Dynamics, Advanced Credit Risk Intelligence, and Advanced Statistical Analysis. These modules provide detailed insights into portfolio health, borrower characteristics, regional risk exposure, and financial relationships.

The project demonstrates how business intelligence tools can be used to monitor credit risk, identify potential defaults, and support data-driven lending decisions within financial institutions.

4.3 Application Developed Using Modern Tools

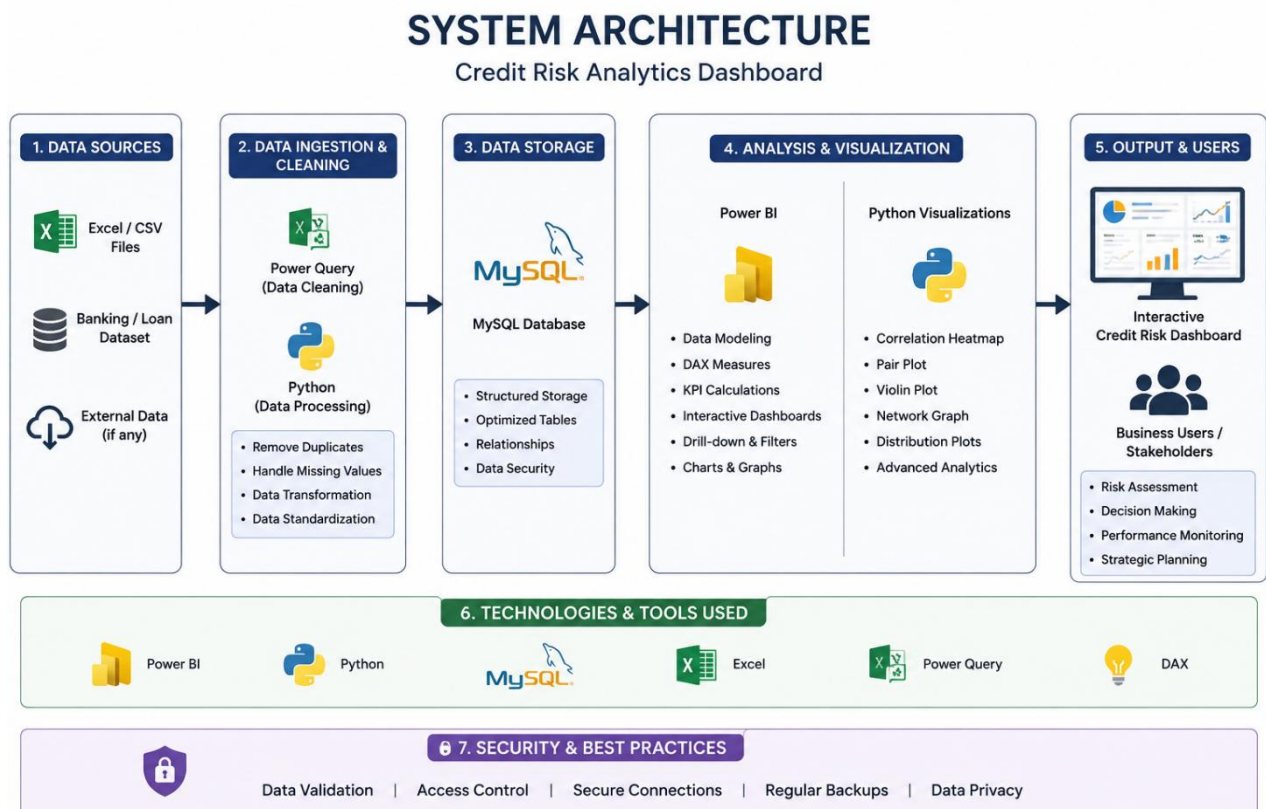
The application developed during the internship was an interactive business intelligence solution titled **Credit Risk Analytics Dashboard Using Power BI**. The dashboard was designed to analyze banking and loan-related data and provide meaningful insights into credit risk, borrower behavior, portfolio performance, and default trends. The application serves as a centralized analytical

platform that enables financial institutions to monitor risk exposure and make informed lending decisions using data-driven approaches.

The dashboard was developed by integrating multiple modern technologies used in data analytics and business intelligence. Microsoft Excel was used for initial data preparation and validation, while Python was utilized for advanced statistical analysis and visualization. MySQL was used to understand structured data storage and management concepts. Power Query was employed for data cleaning and transformation, and Power BI served as the primary platform for dashboard development and interactive reporting. DAX (Data Analysis Expressions) was used to create calculated measures, key performance indicators, and dynamic analytical metrics.

The application was developed following a structured architecture that ensures smooth flow of data from collection to visualization. The architecture integrates data sources, preprocessing tools, database systems, analytical components, and reporting mechanisms to generate meaningful business insights.

Figure 4.1: System Architecture of Credit Risk Analytics Dashboard



Architecture Explanation

The system architecture of the Credit Risk Analytics Dashboard represents the complete workflow followed during project implementation. It illustrates how raw financial data is collected, processed,

transformed, analyzed, and finally converted into interactive dashboards for business users and decision-makers.

The first layer of the architecture consists of **data sources**, which include Excel files, CSV datasets, banking loan records, and other structured financial data sources. These datasets contain customer-related information such as annual income, loan amount, credit score, debt-to-income ratio, loan purpose, loan status, and regional details. These data sources form the foundation of the analytical process and provide the information required for credit risk assessment.

The second layer is the **data ingestion and cleaning layer**. In this stage, Power Query and Python are used to preprocess the raw data before analytical implementation. Various data quality operations such as removal of duplicate records, handling of missing values, correction of inconsistent formats, data standardization, and transformation are performed. Data preprocessing improves the reliability and accuracy of the analytical results generated by the dashboard.

The third layer consists of **data storage and modeling** using MySQL. This layer is responsible for organizing structured financial data and maintaining relationships between different data entities. Proper data modeling ensures efficient analytical processing and improves dashboard performance. It also supports retrieval of information in a structured and meaningful format.

The fourth layer focuses on **analysis and visualization**. Power BI serves as the central business intelligence platform where data modeling, KPI generation, DAX calculations, dashboard creation, and interactive reporting are performed. Various analytical visuals such as KPI cards, bar charts, line charts, scatter plots, heatmaps, and risk distribution charts are used to present information effectively. Python visualizations such as correlation heatmaps, pair plots, violin plots, and network graphs are integrated to provide deeper statistical analysis and advanced analytical insights.

The fifth layer represents **report consumption and decision support**. The developed dashboard is accessed by business users, analysts, managers, and decision-makers who utilize the generated insights for evaluating portfolio health, monitoring credit risk, identifying high-risk borrowers, and supporting lending decisions. The dashboard provides an efficient platform for understanding financial risk patterns and improving decision-making processes.

The architecture also incorporates security and best-practice measures such as data validation, access control, secure connections, regular backups, and privacy protection. These practices ensure the integrity, confidentiality, and reliability of financial information throughout the analytical process.

The application includes multiple analytical modules designed to provide comprehensive insights into credit risk and portfolio performance. The **Executive Credit Risk Overview** module presents high-level indicators such as total loans issued, portfolio value, default rate, and average credit

score. The **Regional Risk and Portfolio Dynamics** module focuses on geographical risk analysis and regional portfolio performance. The **Advanced Credit Risk Intelligence** module provides insights into risk drivers, borrower behavior, and debt-to-income impact. The **Advanced Statistical and Relationship Analysis** module utilizes Python-based visualizations to explore relationships between financial variables and identify hidden risk patterns.

Interactive filtering and drill-down capabilities were implemented to improve usability and analytical flexibility. Users can dynamically explore information based on loan purpose, region, risk category, credit score distribution, and borrower characteristics. These interactive features enable detailed investigation of financial data and enhance decision-making efficiency.

DAX measures were extensively used to create key performance indicators such as Total Loans Issued, Total Loan Portfolio Value, Default Rate, Average Credit Score, High-Risk Customer Percentage, and Risk Category Distribution. These calculations provide real-time analytical insights and improve dashboard responsiveness.

The developed application successfully demonstrates the practical implementation of modern business intelligence technologies in the field of financial analytics and credit risk assessment. By integrating Excel, Python, MySQL, Power Query, DAX, and Power BI, the dashboard provides a comprehensive analytical solution for monitoring loan portfolios, assessing credit risk, and supporting data-driven financial decision-making. The project reflects industry-oriented business intelligence practices and highlights the importance of analytics in modern financial management systems.

4.4 Professional Learning (Discipline, Attitude, Planning, Group Work, Self-Assessment, etc.)

The internship provided valuable opportunities for professional development in addition to technical learning. Working on the Credit Risk Analytics Dashboard project helped in developing workplace skills, analytical thinking, communication abilities, and professional discipline. The internship environment simulated real-world industry practices and enabled practical exposure to project planning, execution, and reporting activities.

One of the most significant learning outcomes was the development of **discipline and time management skills**. Throughout the internship, assignments, project milestones, and review sessions were conducted within defined timelines. Managing these activities required proper planning, prioritization, and consistent effort. This experience improved the ability to complete tasks efficiently while maintaining the quality of work.

The internship also strengthened **analytical thinking and problem-solving abilities**. Credit risk analysis involves working with large datasets, identifying patterns, interpreting financial indicators, and understanding relationships between multiple variables. During project implementation, several challenges related to data preprocessing, visualization design, and analytical interpretation were encountered. Addressing these challenges improved logical reasoning and encouraged a systematic approach to problem-solving.

Another important learning outcome was **project planning and execution**. The Credit Risk Analytics Dashboard was developed through multiple stages including data collection, cleaning, transformation, analysis, visualization, testing, and documentation. Successfully managing these activities required careful planning and coordination. This experience enhanced project management skills and improved understanding of structured development methodologies.

The internship also emphasized the importance of **continuous learning and adaptability**. Modern data analytics technologies evolve rapidly, requiring professionals to continuously update their skills. During the internship, exposure to tools such as Power BI, Power Query, Python, MySQL, and DAX encouraged independent learning and exploration of new concepts. This helped in developing confidence in learning and applying emerging technologies.

Communication and documentation skills were also enhanced during the internship. Preparing reports, explaining analytical findings, documenting project activities, and presenting dashboard insights improved the ability to communicate technical information effectively. These skills are essential for interacting with stakeholders and presenting analytical results in professional environments.

The internship encouraged **self-assessment and performance evaluation**. Regular review of completed tasks helped identify strengths as well as areas requiring improvement. This process promoted continuous improvement and helped in developing a growth-oriented mindset. Self-evaluation also improved confidence in handling analytical projects independently.

Furthermore, the internship provided exposure to professional work ethics and responsibility. Working with financial data highlighted the importance of data accuracy, confidentiality, reliability, and ethical handling of information. Understanding these responsibilities contributed to professional maturity and awareness of industry standards.

Overall, the internship significantly contributed to both technical and professional development. It enhanced discipline, time management, analytical thinking, problem-solving ability, communication skills, project planning capability, and self-learning habits. These experiences have strengthened preparedness for future career opportunities in data analytics, business intelligence, financial analytics, and technology-driven decision-making environments.

Chapter-5

IMPLEMENTATION

5.1 Screen shots

The implementation phase of the Credit Risk Analytics Dashboard focused on transforming raw banking and loan-related data into meaningful business intelligence reports using Power BI. The implementation involved data preprocessing, transformation, analytical modeling, KPI development, dashboard creation, and visualization of credit risk indicators. The developed dashboard provides a comprehensive view of loan portfolio performance, customer credit behavior, regional risk exposure, and financial risk assessment.

The banking credit risk dataset containing more than 12,000 records was imported into Power BI after undergoing data cleaning and transformation processes. Power Query was used to remove inconsistencies, standardize data formats, and prepare the dataset for analysis. DAX measures were developed to calculate important metrics such as Total Loans Issued, Portfolio Value, Default Rate, Average Credit Score, High-Risk Customer Percentage, and Risk Category Distribution.

The dashboard was divided into multiple analytical modules, each focusing on a specific aspect of credit risk analysis. These modules collectively provide detailed insights into portfolio health, borrower characteristics, regional trends, and statistical relationships among financial variables. The following screenshots represent the implementation of the developed Credit Risk Analytics Dashboard.

Figure 5.1: Executive Credit Risk Overview



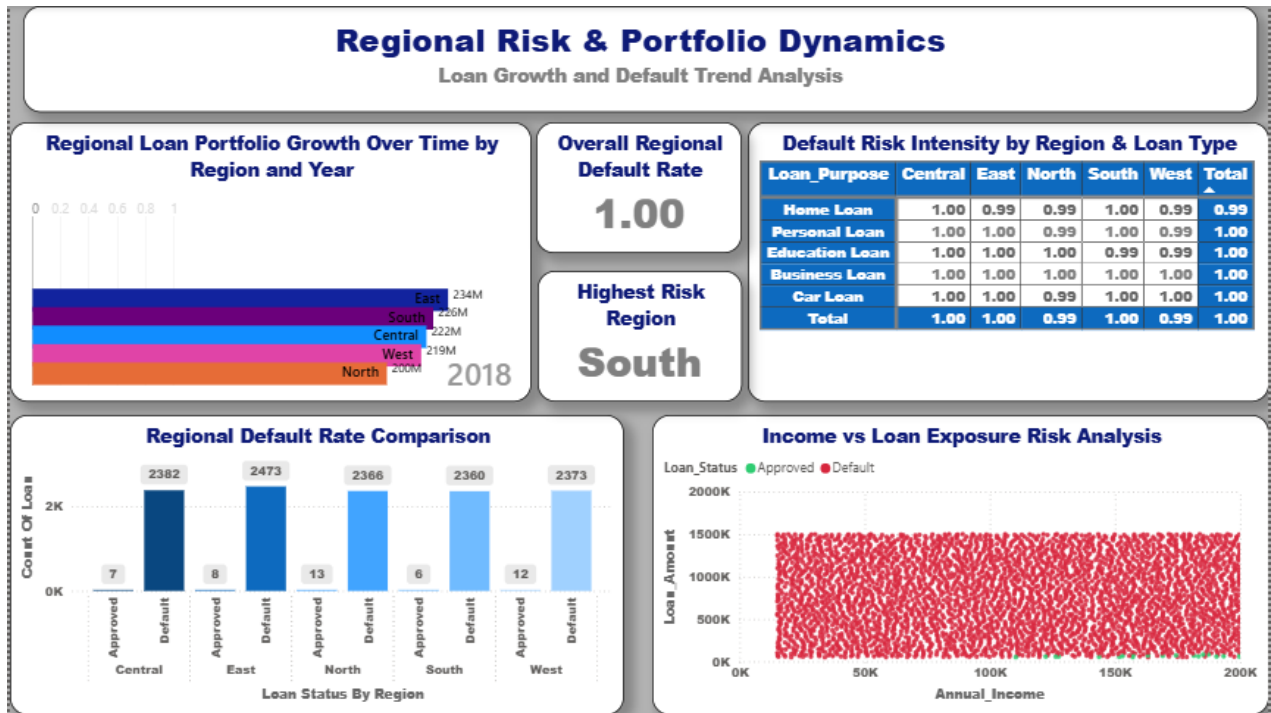
The Executive Credit Risk Overview dashboard serves as the primary reporting interface of the Credit Risk Analytics Dashboard. This dashboard provides a summarized view of key financial indicators and portfolio health metrics that help stakeholders quickly assess overall credit risk exposure.

The dashboard displays important key performance indicators including Total Loans Issued, Total Loan Portfolio Value, Default Rate, and Average Credit Score. These metrics provide a quick understanding of portfolio performance and the overall quality of issued loans.

A trend analysis visual showing the count of loans issued by year helps identify lending patterns over time and supports portfolio growth evaluation. The Credit Score Distribution chart illustrates the distribution of borrowers across different credit score ranges, enabling assessment of borrower creditworthiness.

The Loan Status Distribution visualization highlights the proportion of approved and defaulted loans within the portfolio. This information helps financial institutions monitor portfolio quality and identify potential risk concentrations. The dashboard provides a high-level overview that supports strategic decision-making and risk monitoring activities.

Figure 5.2: Regional Risk and Portfolio Dynamics



The Regional Risk and Portfolio Dynamics dashboard focuses on geographical analysis of loan portfolio performance and credit risk exposure. This module helps identify regional variations in lending activity and default behavior.

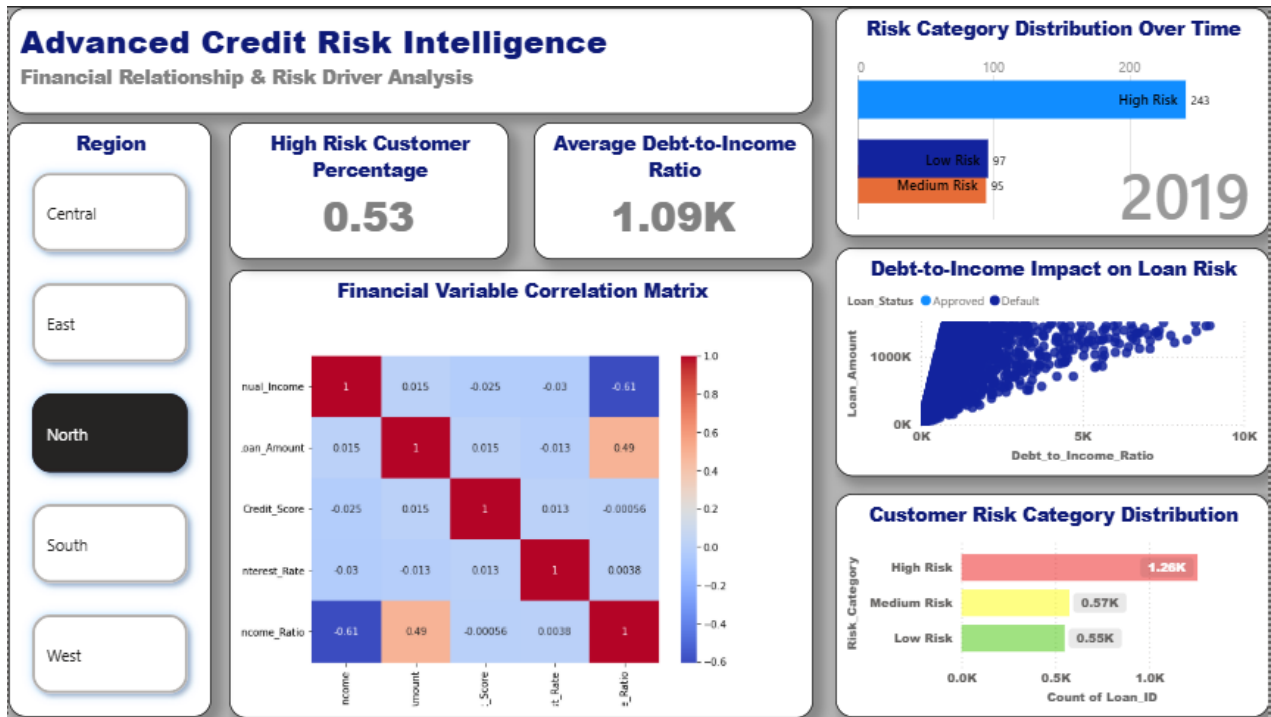
The dashboard includes regional loan portfolio growth analysis, which provides insights into lending trends across different geographical regions. By comparing regional loan performance, decision-makers can identify areas with stronger portfolio growth and areas requiring closer monitoring.

The Overall Regional Default Rate KPI summarizes the average default performance across all regions, while the Highest Risk Region indicator identifies the geographical area with the greatest concentration of credit risk.

A regional default comparison chart provides a detailed comparison of approved and defaulted loans across different regions. This visualization helps in identifying regional risk patterns and understanding how borrower behavior varies geographically.

The Income versus Loan Exposure Risk Analysis visual examines the relationship between borrower income and loan amount. This analysis helps financial institutions assess whether loan exposure levels are aligned with customer repayment capacity and identify potential lending risks. This dashboard supports regional risk management and contributes to more effective portfolio monitoring and lending strategies.

Figure 5.3: Advanced Credit Risk Intelligence



The Advanced Credit Risk Intelligence dashboard provides deeper analytical insights into the factors influencing credit risk and loan default behavior. This module focuses on identifying relationships among financial variables and evaluating borrower risk profiles.

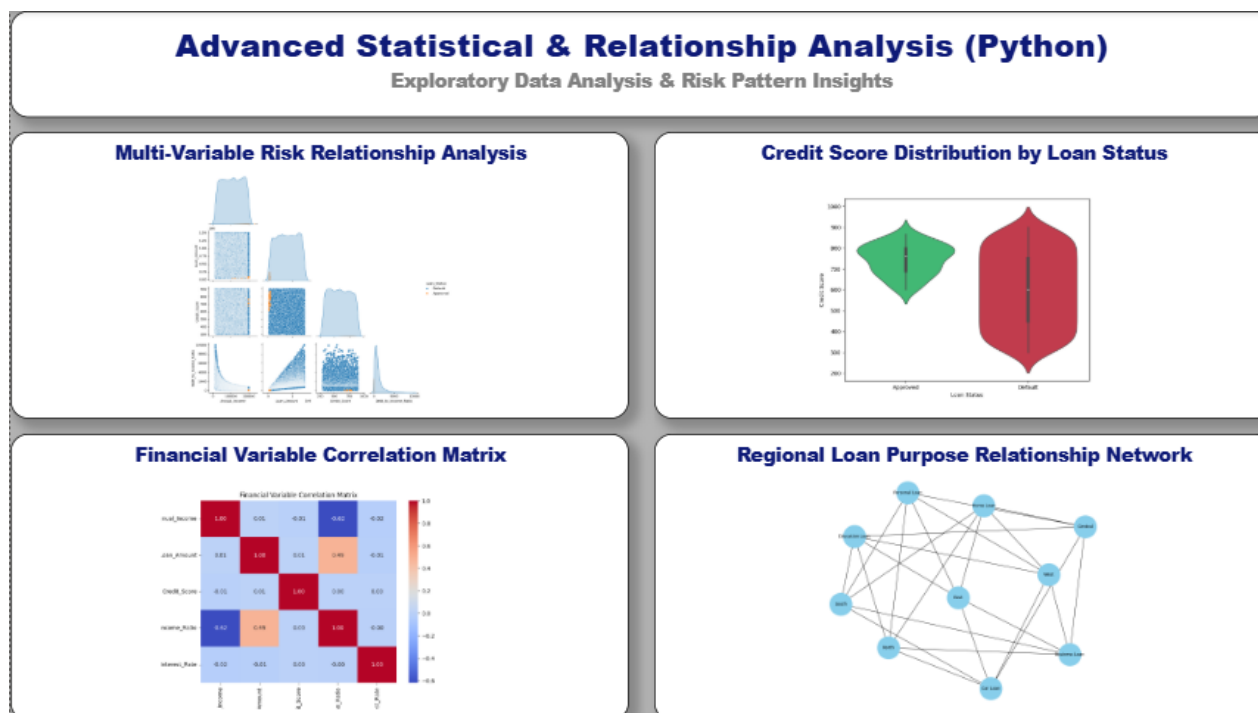
The dashboard includes a Financial Variable Correlation Matrix that measures relationships between important variables such as annual income, loan amount, credit score, interest rate, and debt-to-income ratio. Correlation analysis helps identify factors that may influence loan performance and borrower risk.

The High-Risk Customer Percentage KPI indicates the proportion of customers categorized as high risk based on predefined risk assessment criteria. This metric helps institutions monitor exposure to potentially risky borrowers.

The Debt-to-Income Impact on Loan Risk visualization examines how borrower debt obligations influence credit risk and default probability. Understanding this relationship supports more informed lending decisions and risk evaluation.

Risk Category Distribution charts classify borrowers into Low Risk, Medium Risk, and High Risk categories. This segmentation allows financial institutions to implement targeted risk management strategies and improve portfolio quality.

The dashboard provides valuable insights into risk drivers and supports proactive credit risk assessment practices.

Figure 5.4: Advanced Statistical and Relationship Analysis

The Advanced Statistical and Relationship Analysis dashboard integrates Python-based analytical visualizations into the Power BI environment. This module provides advanced exploratory data analysis and statistical insights that extend beyond traditional dashboard reporting.

The Multi-Variable Risk Relationship Analysis visualization utilizes pair plots to examine relationships among multiple financial variables simultaneously. This analysis helps identify trends, correlations, and potential patterns associated with loan performance.

A violin plot showing Credit Score Distribution by Loan Status provides a detailed representation of borrower credit score behavior across approved and defaulted loans. This visualization helps identify differences in credit quality between successful and defaulted borrowers.

The Financial Variable Correlation Matrix further explores statistical relationships among key financial attributes. By examining correlations, analysts can better understand the factors influencing credit risk and portfolio performance.

The Regional Loan Purpose Relationship Network visualization utilizes network analysis techniques to represent relationships between loan purposes and geographical regions. This approach provides unique insights into lending patterns and customer behavior.

The integration of Python visualizations demonstrates advanced analytical capabilities and highlights the importance of statistical analysis in modern financial decision-making.

The implementation phase successfully transformed raw banking data into an interactive and comprehensive business intelligence solution. The Credit Risk Analytics Dashboard provides meaningful insights into loan portfolio performance, borrower behavior, regional risk patterns, and

financial risk exposure. Through the integration of Power BI, Power Query, DAX, Python, and MySQL concepts, the project demonstrates the practical application of modern analytics technologies in the field of credit risk assessment and financial decision support.

Chapter-6

SOFTWARE TESTING

6.1 Sorts of Investigations / Test Cases

Software testing is an essential phase in the development of any business intelligence application, as it ensures the accuracy, reliability, and effectiveness of analytical outputs. For the Credit Risk Analytics Dashboard, testing was conducted to verify the correctness of data processing, KPI calculations, dashboard functionality, visualization accuracy, and overall system performance. The objective of testing was to ensure that the dashboard generated reliable credit risk insights and supported effective financial decision-making.

The testing process involved validating the complete workflow of the dashboard, beginning from data import and transformation to visualization and report generation. Particular attention was given to the accuracy of financial calculations since incorrect analytical results could lead to inaccurate risk assessment and business decisions.

Functional testing was performed to verify whether dashboard components operated according to the intended design. All visualizations, filters, slicers, KPI cards, and interactive reports were tested to ensure correct functionality. Data validation testing was carried out to compare dashboard outputs with the original dataset and verify the correctness of calculations.

Performance testing was also conducted to evaluate dashboard responsiveness, report loading speed, and interactive filtering efficiency. The objective was to ensure that users could access and analyze information without significant delays.

The following test cases were executed during project validation.

Table 6.1: Test Cases for Credit Risk Analytics Dashboard

Test Case ID	Test Description	Expected Result	Actual Result	Status
TC01	Verify dataset import into Power BI	Dataset should load successfully without errors	Dataset loaded successfully	Pass

TC02	Validate Total Loans Issued KPI	Total loan count should match dataset records	KPI displayed correct value	Pass
TC03	Validate Total Portfolio Value KPI	Portfolio value should be calculated accurately	Correct portfolio value generated	Pass
TC04	Verify Default Rate calculation	Default rate should match actual loan status records	Accurate default rate displayed	Pass
TC05	Validate Average Credit Score KPI	Average credit score should be computed correctly	KPI generated correctly	Pass
TC06	Test regional filtering functionality	Dashboard visuals should update according to selected region	Visuals updated correctly	Pass
TC07	Verify Risk Category Distribution	Borrowers should be categorized accurately	Risk categories displayed correctly	Pass
TC08	Validate DAX calculations	Calculated measures should generate accurate outputs	All calculations verified	Pass
TC09	Test Python visual integration	Python-generated visuals should display correctly	Visualizations rendered successfully	Pass
TC10	Verify dashboard loading performance	Dashboard should load and respond efficiently	Performance within acceptable limits	Pass

The results of testing confirmed that all major dashboard functionalities operated correctly and produced accurate analytical outputs. KPI calculations, visualizations, filters, and reporting components successfully generated results consistent with the underlying dataset. The integration of Power BI, DAX, Power Query, and Python visualizations functioned as expected without significant issues.

Testing also confirmed the reliability of credit risk indicators such as default rate, portfolio value, risk category distribution, and credit score analysis. These metrics are critical for financial risk assessment and therefore required careful validation before final implementation.

Overall, the software testing process ensured that the Credit Risk Analytics Dashboard met its functional requirements and delivered reliable analytical insights. The successful completion of testing improved the quality, accuracy, and usability of the application, making it suitable for practical use in credit risk monitoring, portfolio analysis, and financial decision support systems.

Chapter-7

CONCLUSION AND FUTURE ENHANCEMENTS

Conclusion

The internship carried out under the Anudip Foundation DeepTech Program provided valuable practical exposure to data analytics, business intelligence, and financial risk assessment using modern analytical tools and technologies. The internship successfully bridged the gap between theoretical knowledge and real-world implementation by providing hands-on experience in data processing, visualization, dashboard development, and business intelligence reporting.

The major outcome of the internship was the successful development of the **Credit Risk Analytics Dashboard Using Power BI**. The project focused on analyzing banking credit risk data and transforming large volumes of financial information into meaningful business insights through interactive visualizations and analytical reports. The dashboard enabled effective monitoring of loan portfolio performance, borrower characteristics, credit score distribution, regional risk exposure, and loan default patterns.

The project involved multiple stages including data collection, preprocessing, transformation, analysis, visualization, testing, and documentation. Various technologies such as Microsoft Excel, MySQL, Python, Power Query, DAX, and Power BI were utilized throughout the implementation process. These tools helped in performing data cleaning, statistical analysis, KPI development, risk assessment, and dashboard creation.

The developed dashboard successfully provides insights into important financial indicators such as Total Loans Issued, Portfolio Value, Default Rate, Average Credit Score, Risk Category Distribution, and Regional Risk Analysis. Advanced analytical visualizations generated using Python further enhanced the ability to identify hidden relationships and patterns within the dataset.

The internship significantly contributed to both technical and professional development. Technical skills in business intelligence, data analytics, database management, financial reporting, and visualization were strengthened through practical implementation activities. Additionally, professional skills such as problem-solving, communication, project planning, time management, documentation, and self-learning were improved through continuous project execution and mentor guidance.

Overall, the internship successfully achieved its objectives by providing practical experience in credit risk analytics and business intelligence implementation. The Credit Risk Analytics Dashboard demonstrates the effective use of modern analytical technologies in supporting financial risk assessment, portfolio monitoring, and data-driven decision-making.

Future Enhancements

Although the developed Credit Risk Analytics Dashboard provides comprehensive analytical insights into loan portfolio performance and credit risk assessment, several enhancements can be incorporated in the future to further improve its functionality, scalability, and business value.

One potential enhancement is the integration of **real-time data connectivity** with banking databases. Currently, the dashboard operates on historical datasets; however, connecting it directly to live data sources would enable continuous monitoring of credit risk and provide real-time business insights.

The dashboard can also be enhanced by incorporating **machine learning and predictive analytics models**. Predictive algorithms can be used to estimate the probability of loan default, classify high-risk customers, and support proactive risk management. Such models would help financial institutions identify potential risks before they occur.

Another important enhancement is the implementation of **fraud detection analytics**. By integrating anomaly detection techniques and advanced analytical models, the system can identify suspicious transactions and unusual customer behavior, thereby strengthening financial security and risk control mechanisms.

Cloud deployment is another future enhancement that would improve accessibility and scalability. Hosting the dashboard on cloud-based platforms would allow authorized users to access reports from different locations and devices while ensuring centralized data management.

Advanced customer segmentation techniques can also be introduced to classify borrowers based on credit behavior, income levels, repayment history, and financial characteristics. This would help organizations design targeted lending strategies and improve customer relationship management.

Mobile-friendly dashboards and role-based access control mechanisms can further enhance usability and security. These features would allow managers, analysts, and executives to access relevant information securely while maintaining data confidentiality.

In the future, the dashboard can be extended to support broader financial analytics applications such as loan approval prediction, customer lifetime value analysis, portfolio optimization, market risk assessment, and integrated financial performance monitoring.

Overall, the incorporation of advanced analytics, artificial intelligence, cloud technologies, and real-time reporting capabilities can transform the Credit Risk Analytics Dashboard into a comprehensive financial intelligence and decision support system for modern banking and financial institutions.