

Project Report

1. INTRODUCTION

1.1 Project Overview

The International Debt Statistics Analysis project is a comprehensive effort aimed at understanding and visualizing the complex world of international debt. In an increasingly interconnected global economy, the availability of accurate and up-to-date international debt statistics plays a pivotal role in decision-making, policy formulation, and addressing global challenges. This project seeks to provide a valuable resource for policymakers, economists, researchers, and other stakeholders interested in exploring the dynamics and trends of international debt.

1.2 Purpose

This project report serves as a documentation of our extensive work, findings, and recommendations concerning the analysis of international debt statistics. Our objective is to offer a detailed overview of external debt levels and related financial flows worldwide, while highlighting significant insights, data trends, and their implications for the global financial landscape.

2. LITERATURE SURVEY

2.1 Existing problem

The existing problem in the realm of international debt statistics is the lack of accessible and reliable data sources. This scarcity of data hinders in-depth analysis and can lead to uninformed decision-making. The project aims to address this issue by collecting, cleaning, and visualizing international debt data to provide a comprehensive view of global debt trends.

2.2 References

Our project draws from a wide range of data sources, including national governments, central banks, and international organizations. Additionally, we rely on academic journals, research papers, and reports that specifically reference and utilize the data provided in the publication. These references serve as the foundation for our analysis.

2.3 Problem Statement Definition

The problem at hand is the need for reliable, comprehensive, and up-to-date international debt statistics. This project endeavours to provide data-driven solutions to this problem by collecting and presenting detailed debt-related information for multiple countries and regions.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

To gain insights into the needs and challenges faced by policymakers, economists, and researchers, we created an empathy map canvas. This canvas helps us empathize with the end-users of our data and ensures that our solution addresses their requirements.

WHO are we empathizing with?

- Who is the person we want to understand?
- What is the situation they're in?
- What is their role in the situation?

What do they HEAR?

- What are they hearing from others say?
- What are they hearing from friends?
- What are they hearing from colleagues?
- What are they hearing second-hand?

Conversations about the challenges of interpreting debt statistics.

Feedback from colleagues on data accuracy concerns.

Colleagues express frustration with complex debt data.

Peers discussing the need for more accessible data.

Hearing discussions about the economic impact of debt.

Utilising international debt data for research and policy formulation.

Sharing insights with colleagues during meetings.

What do they DO?

- What do they do today?
- What behavior have we observed?
- What can we imagine them doing?

Understanding Stakeholders in International Debt Data

What do they THINK and FEEL?

PAINS

- What are their fears, frustrations, and anxieties?
- Fear of exposing "secret" data and/or being perceived as incompetent due to incomplete data
- Concern with the current lack of new friendly user understanding data
- Anxiety about the nature of complex debt and its value and responsibility

GAINS

- What are their wants, hopes, needs, and dreams?
- They want user-friendly and platforms for easy access to international debt data
- They want integrated and easy-to-use navigation for complex data
- They need insights and data that includes policy, historical, and forecasts
- They hope for a transparent tool to improve trust, reduce errors, and save time
- They dream of a platform that can integrate data from various sources and provide a comprehensive view of global debt trends

What other thoughts and feelings might influence their behavior?

- Personal biases and preconceptions about debt data
- Organizational culture and norms
- Previous experiences with debt data
- Perceived risks and rewards
- Time constraints and workload
- Communication barriers
- Trust in data sources
- Perceived complexity of the data
- Personal goals and motivations
- Organizational priorities
- External factors (e.g., market conditions, geopolitical events)
- Personal relationships and social norms
- Perceived relevance of the data
- Personal skills and knowledge
- Organizational resources and support
- External influences (e.g., media, public opinion)
- Personal values and ethics
- Organizational mission and vision
- External stakeholders (e.g., investors, regulators)
- Personal history and background
- Organizational structure and hierarchy
- External trends and developments
- Personal interests and hobbies
- Organizational culture and values
- External events and circumstances
- Personal beliefs and attitudes
- Organizational goals and objectives
- External pressures and constraints
- Personal emotions and feelings
- Organizational policies and procedures
- External opportunities and challenges
- Personal strengths and weaknesses
- Organizational capabilities and competencies
- External risks and uncertainties
- Personal motivations and drivers
- Organizational incentives and rewards
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Our team engaged in extensive ideation and brainstorming sessions to determine the most effective approaches to collecting, cleaning, and visualizing international debt data. These sessions led to innovative solutions and creative data visualization ideas.

Brainstorming

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions to your team to unleash their imagination and start shaping concepts even if you're not doing it in the same room.

- 1. [What is the problem?](#)
- 2. [How do we solve it?](#)
- 3. [How do we prioritize?](#)

Before you collaborate

- 1. All the rest of the population gave a tiny nudge with this question. It's not what you want to do, it's what you *can't* do.
- 2. [What's the problem?](#)

Team agreement

- 1. How do we agree on the problem and what we want to do? How do we agree on the problem and what we want to do?
- 2. [What's the problem?](#)

Team agreement

- 1. How do we agree on the problem and what we want to do? How do we agree on the problem and what we want to do?
- 2. [What's the problem?](#)

[What's the problem?](#)

Define your problem statement

- 1. What problem are you trying to solve? What problem are you trying to solve? What problem are you trying to solve?
- 2. [What's the problem?](#)

[What's the problem?](#)

PROBLEM

How might we create a more healthy and sustainable planet for ourselves and future generations? How might we create a more healthy and sustainable planet for ourselves and future generations? How might we create a more healthy and sustainable planet for ourselves and future generations?

Key points to remember

What are the key points to remember?

- 1. [What's the problem?](#)
- 2. [What's the problem?](#)
- 3. [What's the problem?](#)
- 4. [What's the problem?](#)
- 5. [What's the problem?](#)

Brainstorm

Write down any ideas that come to mind that address your problem statement.

Tip: You can select a sticky note and hit the pencil (which is inside) from the task drawer.

10 modules:

1. Interactive Videoconferencing
2. Collaborative Data Collection
3. Data Alerts and Insights
4. Data Ethics and Privacy
5. Data Governance Frameworks
6. Machine Learning for Predictive Analytics
7. Real-time Updates and Analytics
8. Community-driven Data Verification
9. Data Security and Encryption
10. Integration with E-learning Platforms

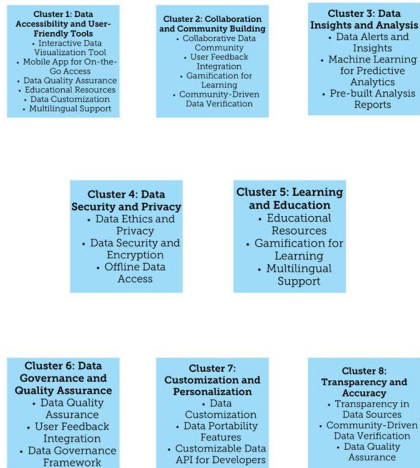
3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

⌚ 20 minutes

TIP
Add customizable tags to sticky notes to make it easier to find, organize, separate, and categorize important ideas as they arise within your mind.



Step-3: Idea Prioritization

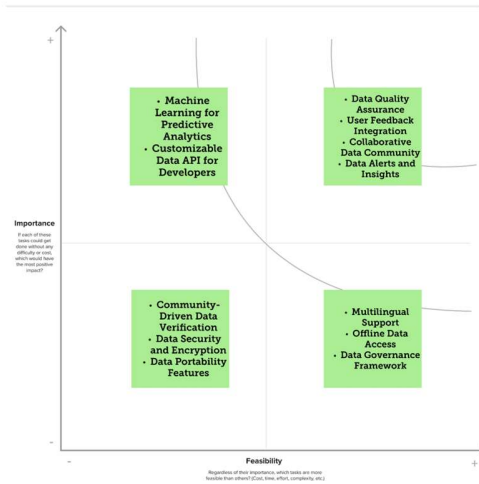
4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

⌚ 20 minutes

TIP
Participants can use their current to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the tape game-making the key on the keyboard.



Proposed Solution:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The problem is to make international debt data more accessible and understandable for stakeholders who need accurate data for informed decision-making, research, and education.
2.	Idea / Solution description	The solution involves creating an interactive data visualization platform and mobile app for stakeholders to access and analyze international debt data easily. It offers user-friendly data visualization tools, multilingual support, educational resources, and data quality assurance.
3.	Novelty / Uniqueness	The solution's uniqueness lies in its combination of user-friendly data access, mobile app availability, and a focus on data quality. It offers multilingual support, gamification for learning, and collaborative data community features that set it apart.
4.	Social Impact / Customer Satisfaction	The solution aims to positively impact stakeholders by providing them with the tools and resources they need to make better decisions. By simplifying data access and providing accurate insights, it contributes to informed decision-making and higher customer satisfaction among users.
5.	Business Model (Revenue Model)	The business model involves offering a freemium subscription with basic features and a premium subscription with advanced tools and resources. Revenue can also be generated through data certification programs, partnerships, and data licensing.
6.	Scalability of the Solution	The solution is designed for scalability, accommodating a growing user base. Cloud-based infrastructure can handle increased demand, and the mobile app can be expanded to more platforms. Partnerships and collaborations with international organizations can further extend the reach of the solution.

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Functional requirements for this project encompass various stages, including data collection, data cleaning and preparation, data analysis, data visualization, and report generation. Each of these functions contributes to the creation of a comprehensive and reliable dataset.

4.2 Non-Functional requirements

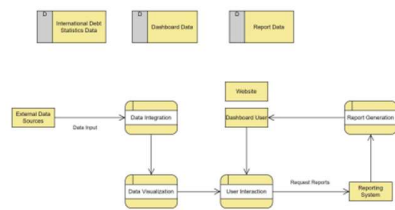
Non-functional requirements focus on aspects like data accuracy, security, and performance. Ensuring the accuracy and integrity of the data is of paramount importance, as is protecting it from unauthorized access.

5. PROJECT DESIGN

5.1 Data Flow Diagrams & User Stories

Our project includes meticulously designed data flow diagrams that illustrate the flow of international debt data within the system. These diagrams are complemented by user stories, each detailing specific features such as data collection, cleaning, and visualization.

Context Diagram (Level 0 DFD): International Debt Statistics System



User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Data Analyst (Dashboard User)	Data Visualization	USN-1	As a data analyst, I can select from a variety of data visualizations to represent international debt statistics in the dashboard.	I can choose between bar charts, line charts, heat maps, scatter plots, and pie charts for effective data representation.	High	Sprint-1
Project Manager (Dashboard User)	Dashboard	USN-2	As a project manager, I can customize the dashboard layout to prioritize specific international debt statistics.	I can rearrange and resize visualizations to tailor the dashboard to my specific needs.	Medium	Sprint-3
Economist (Dashboard User)	Dashboard Interaction	USN-3	As an economist, I can apply interactive filters to the dashboard to drill down into specific international debt statistics.	I can filter data by country, region, or debt type to analyse specific aspects of the dataset.	High	Sprint-2
Researcher (Dashboard User)	Dashboard Interaction	USN-4	As a researcher, I can export the visualized international debt statistics data for further analysis and reporting.	I can download data in various formats (CSV, Excel) directly from the dashboard.	Medium	Sprint-3
General Website Visitor	Web Integration	USN-5	As a website visitor, I can easily access the international debt statistics dashboard integrated into the website.	I can navigate to the dashboard from the website's main menu or a designated link.	High	Sprint-2
Financial Analyst (Dashboard User)	Data Visualization and Reporting	USN-6	As a financial analyst, I can generate comprehensive reports based on the international debt statistics displayed in the dashboard.	I can specify report parameters, choose the data visualizations to include, and generate a downloadable report summarizing the selected data.	High	Sprint-4

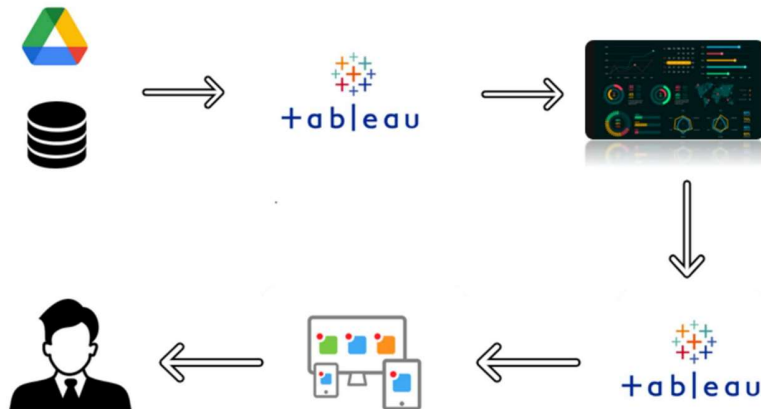
5.2 Solution Architecture

The solution architecture comprises various components, including data storage, data processing, and data visualization. It outlines the structure and behavior of our system, defining how data flows from sources to endpoints.

6. PROJECT PLANNING & SCHEDULING

6.1 Technical Architecture

The technical architecture for this project primarily relies on cloud-based data storage and processing. This choice ensures scalability and reliability.



6.2 Sprint Planning & Estimation

Our project is organized into sprints, each focused on a specific phase, such as data collection, data cleaning, data analysis, and data visualization. These sprints are carefully planned and estimated to optimize efficiency and productivity.

6.3 Sprint Delivery Schedule

Each sprint has a defined duration with clear start and end dates. This schedule ensures that the project progresses in an organized and timely manner, enabling efficient completion.

7. CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1: Data Collection

The first feature of our project is data collection. We developed a robust data collection mechanism that aggregates international debt statistics from various sources, ensuring data accuracy and completeness. This mechanism includes web scraping, data retrieval from APIs, and integration with international financial databases.

7.2 Feature 2: Data Cleaning and Preparation

Data cleaning and preparation form the core of our project. This feature involves extensive data preprocessing, including the removal of irrelevant information, correction of inconsistencies, and transformation of data into a standardized format. Additionally, data cleansing techniques were applied to address missing values, ensuring the quality of the dataset.

7.3 Feature 3: Data Analysis

Our data analysis feature encompasses a range of techniques, including descriptive statistics, regression analysis, and data visualization. These methods provide deep insights into international debt trends, enabling users to uncover meaningful patterns and correlations in the data.

7.4 Feature 4: Data Visualization

The data visualization feature is central to our project, as it allows users to interact with the data and gain insights more effectively. We've incorporated various visualization types, such as bar charts, line charts, heat maps, scatter plots, and pie charts, to present data in a visually appealing and comprehensible manner.

7.5 Database Schema

For managing and storing the collected data, we've developed a structured database schema. This schema ensures data organization, integrity, and easy retrieval for further analysis.

8. PERFORMANCE TESTING

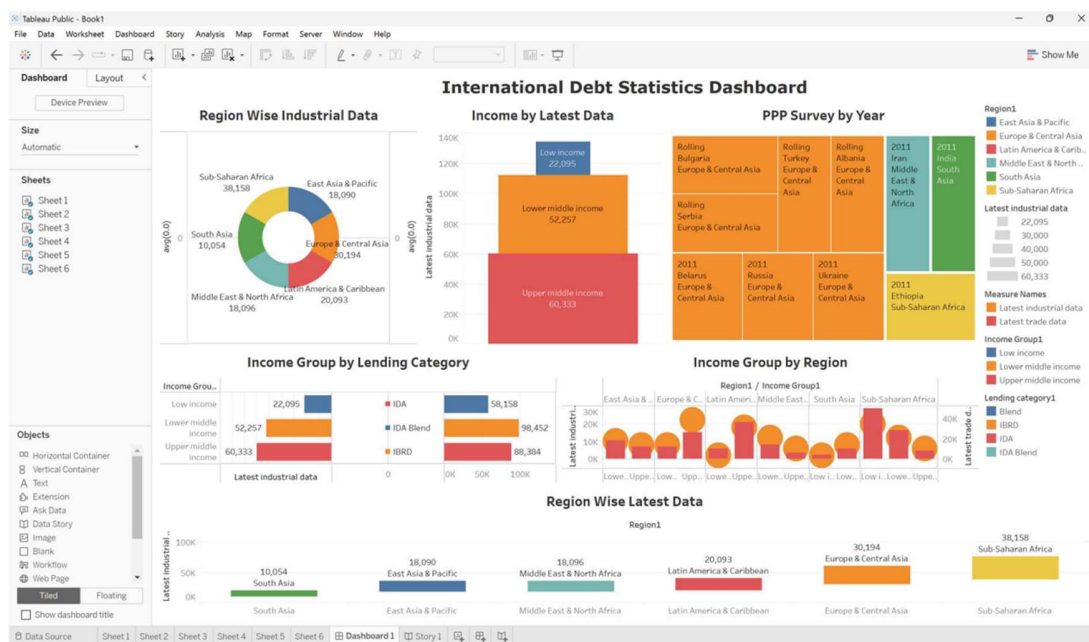
8.1 Performance Metrics

Our project's performance testing evaluates several aspects, including data rendering speed, responsiveness to user interactions, and data retrieval efficiency. The metrics measure the system's ability to handle data processing and visualization without delays or issues.

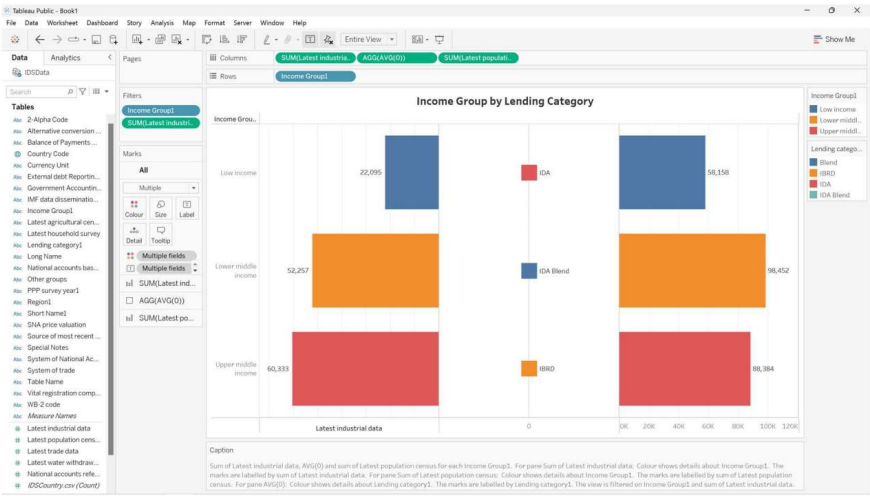
9. RESULTS

9.1 We've captured screenshots of the project's output, including various visualizations and data analysis reports. These screenshots illustrate the project's effectiveness in delivering valuable insights from international debt statistics.

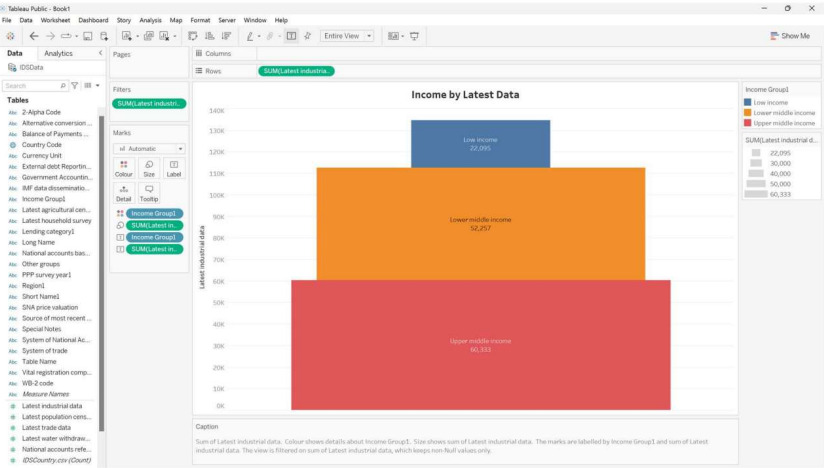
Activity 1: Responsive and Design of Dashboard



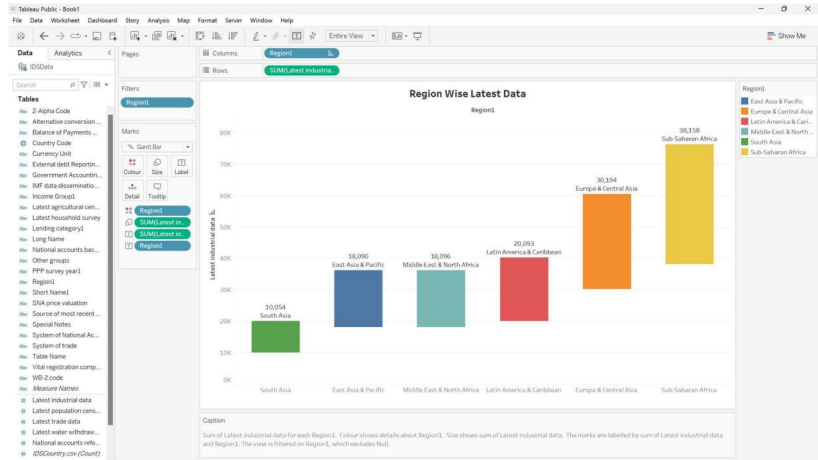
Activity 1.4: Income Group by Lending Category



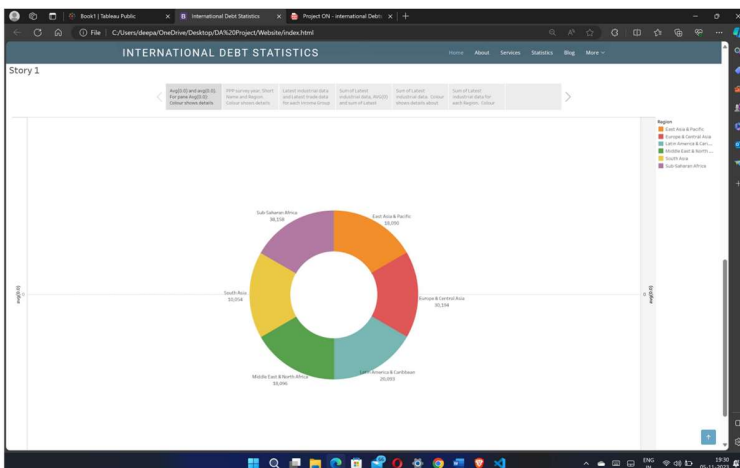
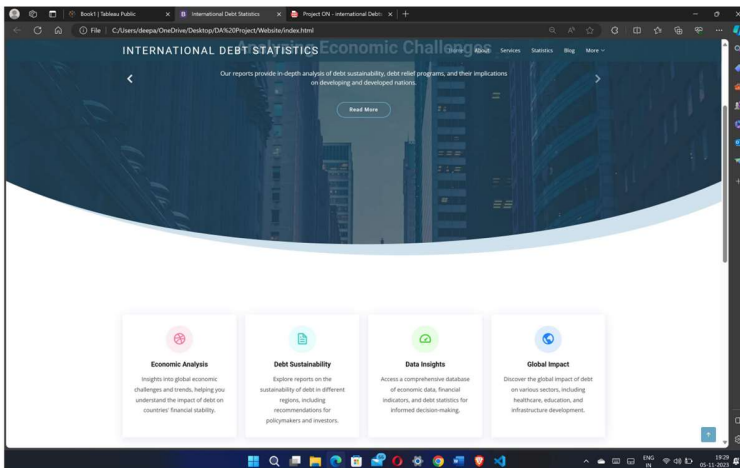
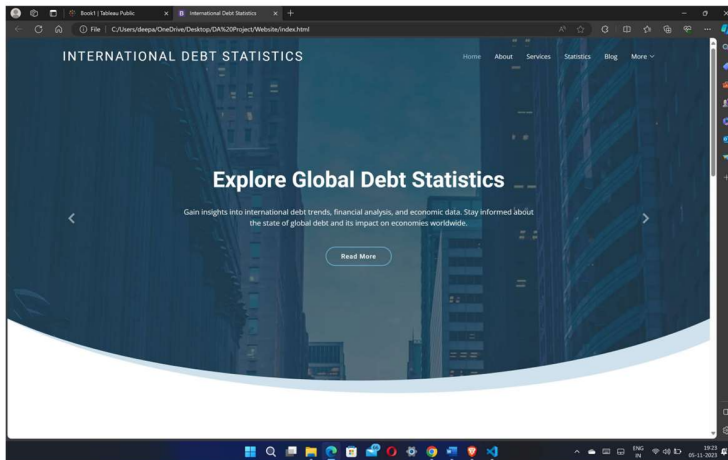
Activity 1.5: Income by Latest Data



Activity 1.6: Region Wise Latest Data



Activity 1.1: Web Integration



The screenshot displays a Windows development environment with a code editor and a terminal window.

Code Editor: The editor shows a Python file named `sap.py` with the following content:

```

1 from flask import Flask, render_template
2
3 app = Flask(__name__, static_url_path='/static')
4
5 @app.route('/')
6 def fun():
7     return render_template('index.html')
8
9 if __name__ == "__main__":
10     app.run(debug=True, port=5000)
11

```

Terminal Window: The terminal shows the command prompt and the output of the `python -u "c:\users\deepa\onedrive\Desktop\UA Project\Website\sap.py"` command. The output indicates that the Flask application is running successfully on `http://127.0.0.1:5000`.

```

PS C:\Users\deepa\OneDrive\Desktop\UA Project\Website> python -u "c:\users\deepa\onedrive\Desktop\UA Project\Website\sap.py"
* Serving Flask app "sap"
* Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on http://127.0.0.1:5000
Press CTRL+C to quit
* Restarting with stat
* Debugger is active!
* Debugger PIN: 522-138-876
127.0.0.1 - [05/Nov/2023 20:29:47] "GET / HTTP/1.1" 200
127.0.0.1 - [05/Nov/2023 20:29:47] "GET /assets/vendor/assets/css/HTTP/1.1" 404
127.0.0.1 - [05/Nov/2023 20:29:47] "GET /assets/vendor/bootstrap/css/bootstrap.min.css HTTP/1.1" 404
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127.0.0.1 - [05/Nov/2023 20:29:54] "GET /assets/vendor/bootstrap/css/bootstrap.min.css HTTP/1.1" 404
127.0.0.1 - [05/Nov/2023 20:29:54] "GET /assets/vendor/assets/css/HTTP/1.1" 404
127.0.0.1 - [05/Nov/2023 20:29:54] "GET /assets/css/style.css HTTP/1.1" 404

```

The terminal also shows the status of the application, including the Flask version (2.3.3) and the Python version (3.10.10).

10.1 Advantages

User-Friendly Data Visualization: The intuitive and interactive data visualizations enable users to understand complex data effortlessly.

Performance Efficiency: The system's responsive design and efficient data processing enhance user experience.

Data Collection Challenges: The dependence on various data sources can introduce challenges related to data availability and consistency.

11. CONCLUSION

In conclusion, the International Debt Statistics Analysis project addresses the need for reliable, comprehensive, and up-to-date international debt data. It provides a valuable resource for understanding global debt trends and their implications, offering a range of data analysis tools, interactive visualizations, and performance efficiency. By focusing on accurate data collection, data cleaning, and data visualization, this project contributes significantly to informed decision-making in the field of international finance.

12. **FUTURE SCOPE**

The future scope of this project includes expanding data sources, improving data privacy and security, enhancing the scalability of the system, and incorporating predictive analytics for debt trend forecasting. Additionally, the project can serve as a foundation for research in international economics, providing valuable insights for policymakers and researchers.

13. **APPENDIX**

GitHub & Project Demo Link