



Visualizing Sustainability: A Cognos-based Analysis of Global Trends (2000-2023)

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Platform used: IBM Cognos Analytics on Cloud

INTRODUCTION

Overview

The Sustainable Development Report (SDR) reviews progress made each year on the Sustainable Development Goals since their adoption by the 193 UN Member States in 2015. At the halfway mark to 2030, the Sustainable Development Report 2023 takes stock of progress made and discusses priorities to restore and accelerate SDG progress. Published on the eve of the 2023 Paris Summit for a New Global Financial Pact, this year's edition focuses specifically on the need to scale up development finance and to reform the global financial architecture to support the SDGs.

Business Problem

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LITERATURE SURVEY

The literature on visualizing sustainability underscores the critical role that effective visual representations play in advancing our understanding and addressing complex environmental, social, and economic challenges. Scholars emphasize the need for innovative visualization techniques to bridge the communication gap among diverse stakeholders, ranging from policymakers and businesses to the general public. Existing research highlights the challenges associated with conveying the intricacies of sustainability through conventional means and advocates for the integration of advanced technologies, data analytics, and standardized metrics. Furthermore, studies emphasize the importance of real-time, interactive dashboards that facilitate continuous monitoring and adaptation in response to dynamic changes. Collaboration between data scientists, sustainability experts, and visualization designers is recognized as pivotal for creating impactful visualizations that resonate with audiences. The literature survey reveals a growing recognition of the potential of visual storytelling and the urgent need for unified platforms that amalgamate diverse data sources, visualization tools, and educational resources to foster a holistic understanding of sustainability.

Proposed solution

1. IBM Cognos can be used to analyze past data such as goals achieved by different countries in specified years, analysis on sustainability with respect to life on land, under water, quality education, reduced inequalities etc with various visualizations with the help of bar charts, bubble charts, combined column chart, line chart, tree map, pie chart etc.

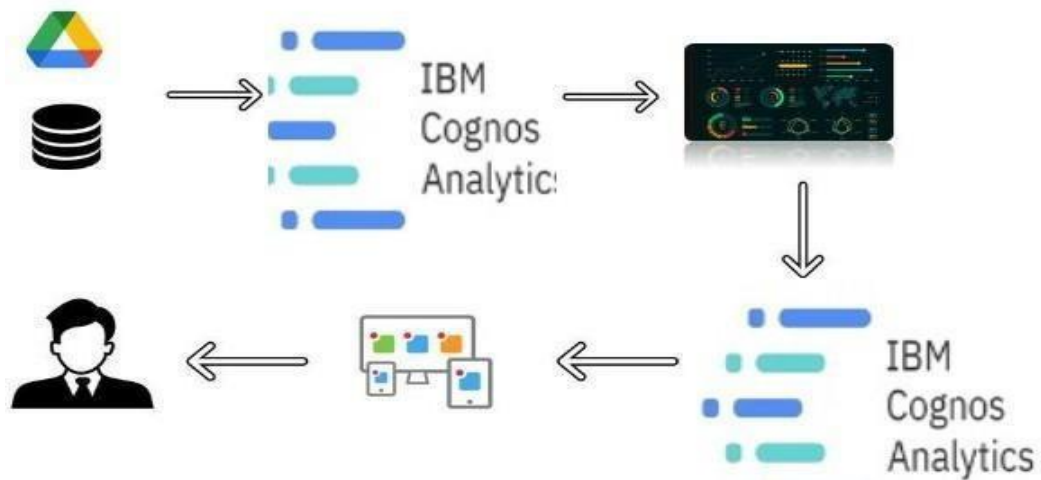
2. A brief analysis of the following factors can also be presented:

- Analysis on Sustainability SDG Index
- Analysis On Sustainability No Poverty
- Analysis On Sustainability Industry, Innovation and Infrastructure
- Analysis On Sustainability Partnerships for the Goals

3. **Analysis of various variables can be displayed through dashboards, story and report. These observations can be embedded into web applications using FLASK.**

THEORETICAL ANALYSIS

Block diagram



Hardware / Software

designing Hardware:

Operating system: Linux- Ubuntu 16.04 to 17.10, or Windows 7 to 10, with
2GB RAM (4GB preferable)

Software:

Python,

Python For Data Analysis,

Python For Data Visualization,

IBM Cognos Analytics

Exploratory Data Analysis,

EXPERIMENTAL INVESTIGATIONS

Research Question Formulation: Define clear research questions or hypotheses that you want to investigate through experiments. These questions could relate to student engagement, learning outcomes, user satisfaction, etc.

Experimental Design:

Controlled Variables: Identify the variables that you will control during the experiment to maintain consistency.

Independent Variable: Determine the variable you are manipulating, such as different teaching methods or interface designs.

Dependent Variables: Identify the variables you will measure as outcomes, like student performance, engagement metrics, etc.

Participant Selection:

Sample Size: Determine the number of participants needed for statistical significance.

Randomization: Randomly assign participants to different experimental conditions to reduce bias.

Data Collection:

Quantitative Data: Gather quantitative data, such as test scores, completion rates, time spent on tasks, etc.

Qualitative Data: Collect qualitative data through surveys, interviews, or focus groups to understand user experiences and perceptions.

Experiment Execution: Administer the experiment to participants, ensuring consistent procedures across all conditions. Use the virtual classroom platform to deliver educational content and interactive activities.

Data Analysis: Analyze the collected data using appropriate statistical methods. Compare outcomes across different experimental conditions to assess their impact.

Interpretation of Results: Interpret the statistical findings to answer the research questions or test the hypotheses. Consider both quantitative and qualitative data to provide a comprehensive understanding.

Discussion and Conclusion: Discuss the implications of the results for the effectiveness of the virtual classroom platform. Address any limitations and suggest areas for further research or improvements.

Reporting: Compile your findings in a research report, academic paper, or presentation. Clearly present the methodology, results, and conclusions of the experimental investigations.

Iterative Process: If necessary, refine your research questions or experimental design based on the results obtained.

Ethical Considerations: Ensure that the experimental investigations adhere to ethical guidelines, especially when involving human participants.

Peer Review: Consider submitting your findings to peer-reviewed journals or conferences in the field of education or technology.

FLOWCHART



RESULT

Fig.1 Report – Analysis on Sustainability – SDG index and No Poverty

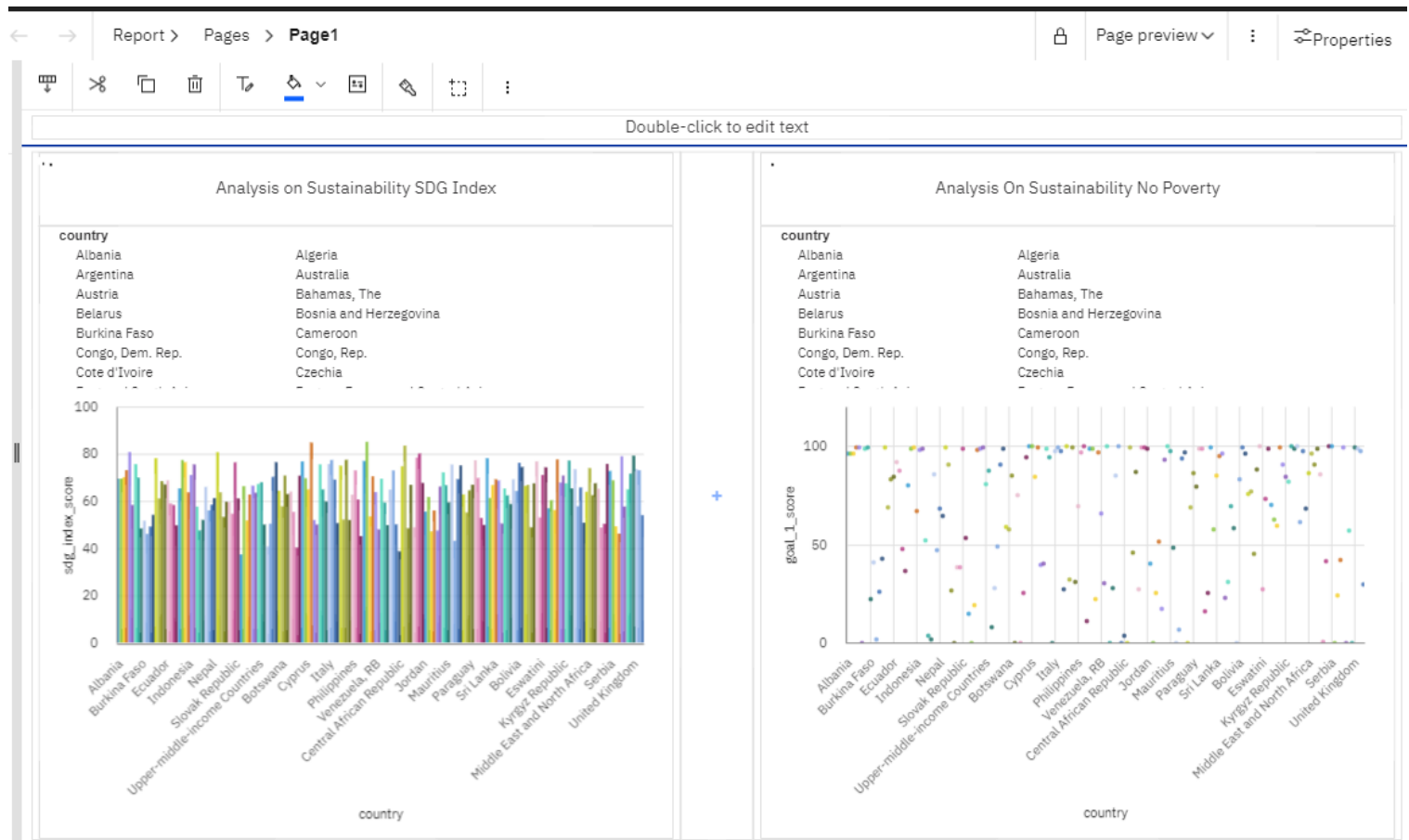


Fig.1 Report – Industry, Innovation and Infrastructure and Partnership on Goals

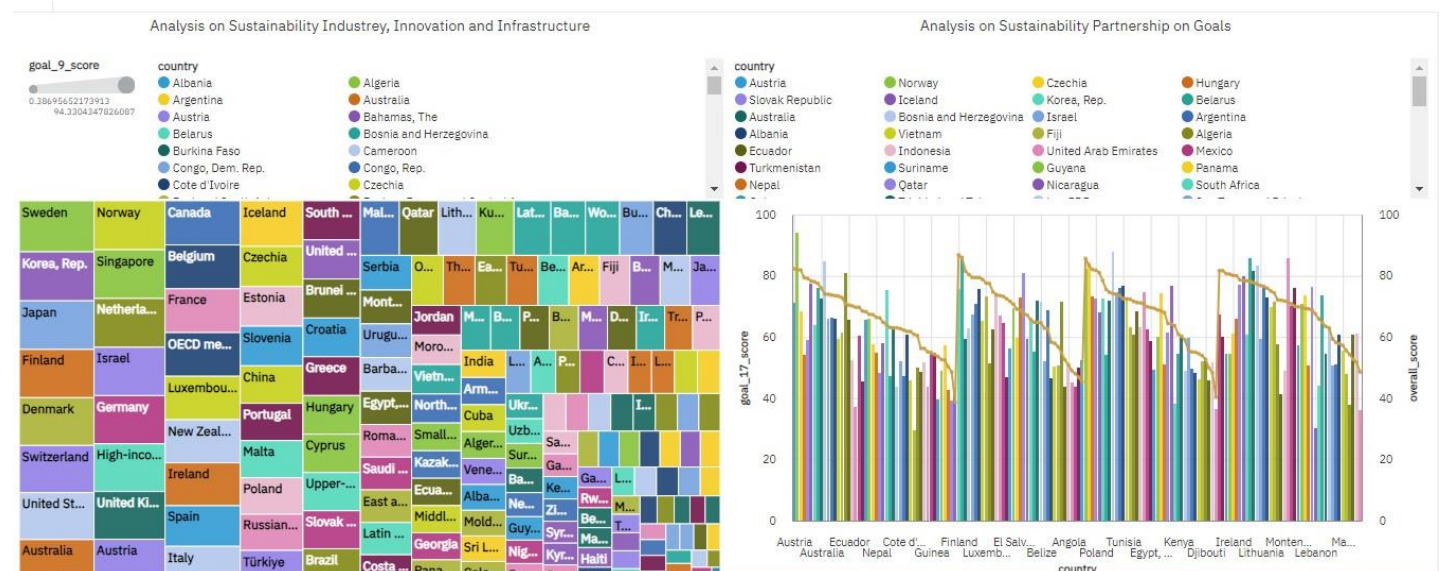
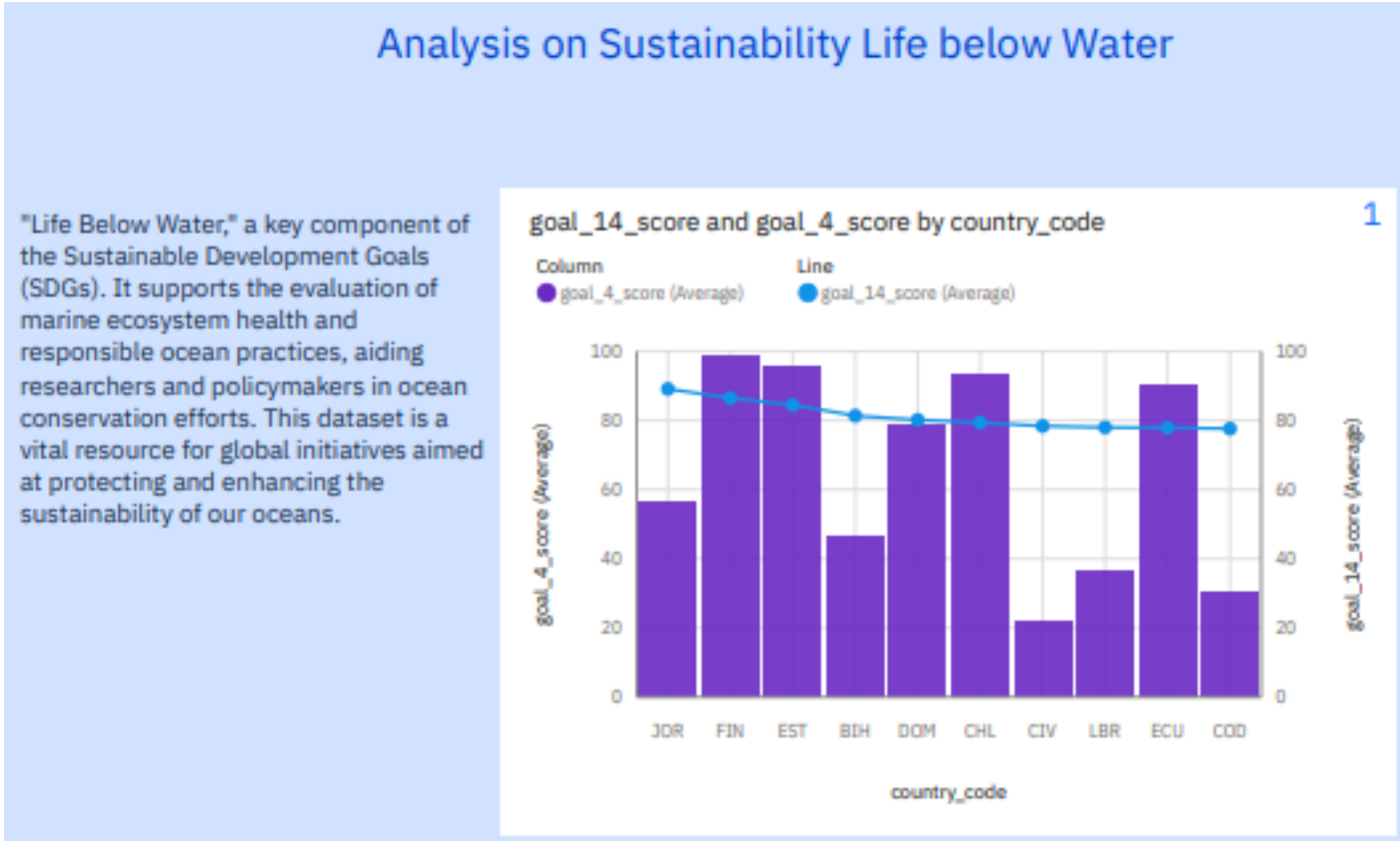


Fig:3 Dashboard

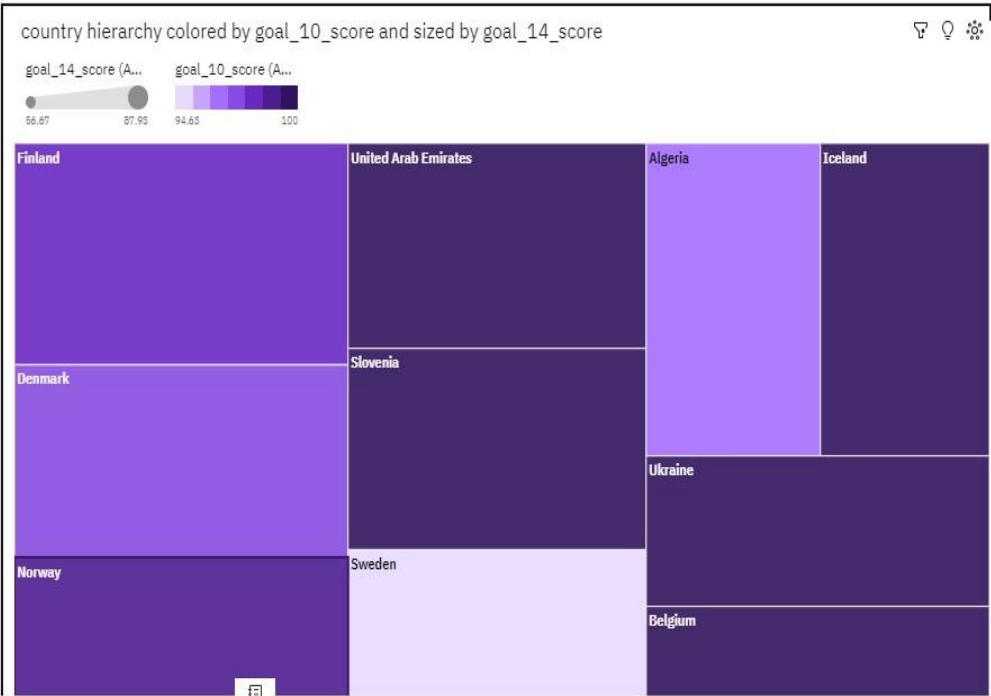
Tab 1



Fig: Story Section



- "Reduced Inequalities" a key component of sustainable Development Goals (SDG's).
- It offers a comprehensive view of disparities and socio-economic inabilities between countries, aided researchers and policymakers in their efforts to create more equitable societies world wide.
- This dataset plays a pivot role in prompting social justice and ensuring inclusive development.

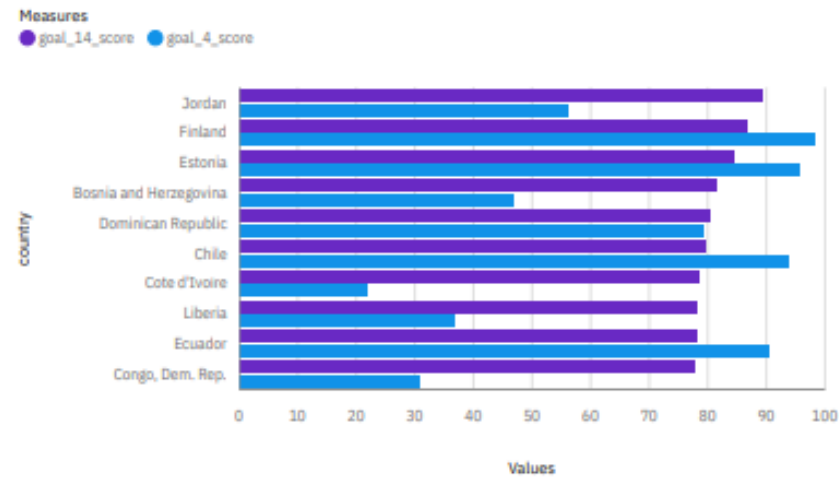


Analysis on Sustainability on Quality Education

• "Quality Education," a fundamental Sustainable Development Goal (SDG). This dataset is a valuable resource for assessing educational access, quality, and equality across countries. Researchers, policymakers, and educational institutions can utilize this data to monitor progress, identify areas for improvement, and develop strategies for enhancing global education standards. By focusing on "Quality Education," this dataset plays a significant role in advancing the mission of ensuring inclusive, equitable, and quality education for all.

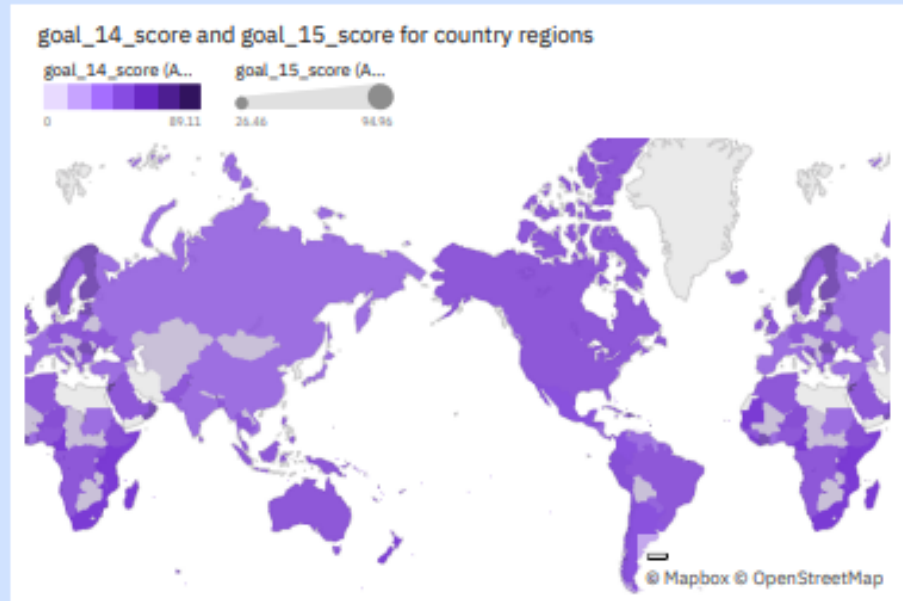
goal_14_score and goal_4_score by country

1



Analysis on Sustainability Life on Land

"Life on Land," offering a detailed view of sustainability and progress towards the related SDGs. This data aids researchers, policymakers, and environmental organizations in monitoring and enhancing land ecosystem health and biodiversity. It plays a crucial role in global efforts to preserve terrestrial environments and achieve sustainable development goals.



ADVANTAGES & DISADVANTAGES

Advantages:

Accessibility: Since the dataset can be stored on the cloud, the user can access and analyze it easily.

Flexibility: Cloud access provides flexibility to the user to access and process in the IBM Cognos tool from anywhere and through any platform.

Global Reach: It provides global availability.

Diverse Analyzing Resources: Various types of explorations allows the user to analyze various types of data.

Personalization: Efficient analysis can be made through dashboard, story and report.

Disadvantages:

Digital Divide: Not all users have equal access to necessary resources.

Isolation: Lack of face-to-face interaction can lead to feelings of isolation.

Technical Challenges: Technical issues such as connectivity problems, software glitches, and compatibility issues can disrupt analysis.

Lack of Hands-On Experience: A lack of knowledge regarding resources of Cognos Tool may suffer in a virtual environment.

Dependence on Technology: Technical failures can halt the analysis process and create frustration for users.

Screen Fatigue: Extended screen time can lead to digital eye strain and other health issues.

APPLICATION

Due to the digital era, a huge amount of data is generated which leads to a tedious process of analysis of data. This problem can be solved using IBM Cognos tool. This tool provides efficient analysis of huge data with the help of various explorations, dashboards, stories and reports.

CONCLUSION

Virtual Faculty Build-A-Thon is a project development activity where participants are enrolled in a project listed under distinct technology categories after acquiring crucial knowledge on the IBM cloud services and open source technologies in the Bootcamp. Thus, under this activity a project on IBM cognos was built where various data visualization and exploration was learnt.

The dashboard, story and reports created in IBM cognos were integrated with the UI using flask in VS Code and run on the system localhost.

FUTURE SCOPE

In future, an AI supported chatbot can be embedded which would automate the task of analysis of various data.

APPENDIX

A. Source Code (Important Snippets)

```
<main id="main">

  <!-- ===== About Section ===== -->
  <section id="about" class="about">
    <div class="container">

      <div class="row content">
        <div class="col-lg-6">
          <h2>Eum ipsam laborum deleniti velitena</h2>
          <h3>Voluptatem dignissimos provident quasi corporis voluptates sit assum
perenda sruen jonee trave</h3>
        </div>
        <iframe
src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FVisualizing%2BSustainab
ility%2BReport&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&a
mp;shareMode=embedded&action=run&format=HTML&prompt=false" width="1100"
height="1000" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe>
      </div>
    </section><!-- End About Section -->

    <!-- ===== Services Section ===== -->
    <section id="services" class="services">
      <div class="container">
```

```

        <iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FVisualizing%2BSustainability%2Bdashboard%2B1&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model0000018cb4b2b2a2_00000000" width="1100" height="1000"
frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

    </div>
</div>

</div>
</section><!-- End Services Section -->

```

```

<!-- ===== Portfolio Section ===== -->
<section id="portfolio" class="portfolio">
    <div class="container">

        <iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.my_folders%2FVisualizing%2BSustainability%2BStory%2B1&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&sceneId=model0000018cb51a373c_00000000&sceneTime=5000" width="1100" height="1000" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

    </div>

</div>

</div>
</section><!-- End Portfolio Section -->

```