“Olympic Readiness of India: A Comparative Cross-Country Analysis”

A

Project Report

submitted in partial fulfillment of the

requirements for the award of the degree of

MASTER OF COMPUTER APPLICATIONS

in

DATA SCIENCE

by

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CANDIDATE'S DECLARATION

We hereby certify that the project work entitled **" Olympic Readiness of India:A cross country analysis"** in partial fulfilment of the requirements for the award of the Degree of MASTER OF COMPUTER APPLICATION with specialization in Data Science and submitted to the Department of Systemics, School of Computer Science, University of Petroleum & Energy Studies, Dehradun, is an authentic record of our work carried out during a period from **August**, **2024** to **December,2024** under the supervision of **Dr.Pooja Sarin**.

The matter presented in this project has not been submitted by us for the award of any other degree of this or any other University.

This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Date: December,2024

Dr.Pooja Sarin
Project Guide

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ABSTRACT

The Olympic Games represent a global symbol of prestige, bringing economic, social, and political impacts to host nations. With discussions about India hosting a future Olympics gaining traction, this project examines the country's readiness for such an endeavor. It evaluates India's sports infrastructure, economic landscape, and socio-political environment by comparing these factors with those of past Olympic hosts. The study identifies key challenges, such as traffic congestion, accommodation capacity, and political stability, alongside opportunities like infrastructure development and global image enhancement.

Drawing from successful and struggling Olympic experiences, this research provides a data-driven perspective on India's capability to manage the complexities of hosting the event. Using systematic analysis, the project aims to contribute to the academic and policy-making discourse, offering actionable insights into India's potential for hosting the Olympics and the strategic steps required for success. By addressing gaps and leveraging strengths, this report outlines the framework necessary for India to achieve a successful Olympic hosting endeavor.

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1. INTRODUCTION

1.1 History

The Olympic Games represent the pinnacle of global sportsmanship, held every four years and bringing together elite athletes from across the world. While the Games symbolize exceptional athletic performances, they also promote international solidarity and cultural exchange. Beyond sports, the Olympics serve as a platform to showcase the hosting nation's strengths—be it in construction achievements, cultural heritage, or technological advancements.

However, hosting the Olympics is a massive undertaking, requiring extensive preparation in terms of infrastructure, logistics, and financial resources. It entails years of planning, significant investments, and comprehensive coordination among various stakeholders, making it a privilege that also brings with it monumental challenges. Many countries view hosting the Olympics as an opportunity to bolster their global reputation and foster unity, but the scale and scope of the event also place immense pressure on the host nation's economy, infrastructure, and governance.

1.2 Significance of Hosting the Olympics

The benefits of hosting the Olympics often extend beyond the Games themselves. Countries that have successfully hosted the Olympics—such as Japan (2021), China (2008), and the UK (2012)—gained international recognition, experienced a surge in tourism, and achieved accelerated infrastructure development. The legacy of the Olympics often includes improved sports facilities, urban development, and increased national pride.

However, the event's long-term economic and social impacts are not universally positive. Nations like Brazil (2016) and Greece (2004) struggled with financial burdens and underutilized infrastructure after the Games concluded. For instance, Greece's post-Olympic period was marked by economic stagnation, while Brazil faced widespread public dissatisfaction due to overspending on Olympic projects amidst domestic challenges. These examples underscore the complexities involved in bidding for and hosting the Olympics, as countries must weigh the potential benefits against substantial risks.

1.3 Relevance for India

India has increasingly been viewed as a potential candidate to host a future Olympic Games, given its robust economic growth, burgeoning urban infrastructure, and rising prominence in international sports. This prospect has sparked discussions among government authorities and sports organizations about the feasibility and advantages of such an endeavor. Hosting the Olympics offers India an unparalleled opportunity to solidify its position on the global stage, promote tourism, and foster a culture of sports excellence.

Despite these promising factors, significant challenges remain. India faces logistical hurdles such as traffic congestion, inadequate public transportation, and limited accommodation facilities. Political stability, economic readiness, and social inclusivity are additional factors that require comprehensive planning and analysis. Successfully addressing these challenges would not only enable India to host the Olympics but also leave a lasting legacy of development and international cooperation.

1.4.Main Objective

To assess the India's readiness to host a future Olympic Games by analyzing the factors that contributed to the success and failure of past Olympics and comparing them against India’s current and projected data. The project aims to offer data-driven recommendations on whether India is prepared to host the event and what areas need improvement.

1.5.Sub Objective

The sub-objectives of this project focus on developing a comprehensive framework for comparing the readiness of various Indian cities to host the Olympics. Key metrics such as infrastructure, economic capacity, governance efficiency, and public support will be identified for detailed city-level analysis. Data specific to cities, including transportation networks, sports facilities, and accommodation capacity, will be collected and analyzed. Advanced clustering techniques will be used to group cities with similar characteristics, enabling effective comparative analysis. The strengths and weaknesses of potential host cities will be evaluated to identify areas requiring improvement. Furthermore, Indian cities will be benchmarked against

past Olympic host cities to determine gaps in readiness. The project aims to identify the most suitable Indian city for hosting the Olympics based on analyzed data, supported by sentiment analysis to gauge public opinion regarding hosting the event in shortlisted cities. Finally, city-specific recommendations will be provided to address readiness challenges, accompanied by interactive visualizations to present comparative insights to stakeholders.

2. Literature Survey

2.1 Systematic Literature Review (SLR) on Olympic Readiness

To assess Olympic readiness, we conducted a *Systematic Literature Review (SLR)*, focusing on scholarly research that examines the critical factors influencing a country's preparedness to host the Olympics. This review aimed to identify global best practices, lessons learned, and potential challenges relevant to India.

Approach and Methodology:

1. Keyword Compilation:
   A comprehensive list of keywords was compiled to ensure an exhaustive review. These included terms such as *"Olympic readiness," "infrastructure readiness," "mega-event preparedness," "economic impact," "tourism development,"* and *"logistical challenges."*
2. Database Search:
   Searches were conducted on academic platforms, primarily Google Scholar and Scopus. These platforms provided access to high-quality journals and conference papers. The search yielded 2,233 documents spanning research articles, reviews, and case studies.
3. Article Filtering:
   The search results were refined using filters to focus on studies directly relevant to the topic. Criteria included:
   - Relevance to factors such as infrastructure development, economic considerations, governance models, and logistical execution.
   - Exclusion of papers unrelated to hosting mega-events or Olympic readiness.
4. This filtering process reduced the selection to 858 articles.
5. Journal Ranking:
   To ensure credibility, the shortlisted articles were cross-verified against scientific journal rankings, prioritizing those published in Q1 journals. Q1 journals are recognized for their high impact factors and rigorous peer-review processes, ensuring the reliability of their findings.

6. Final Selection:

   After a thorough evaluation, 174 articles and journals were selected for detailed analysis. These articles represent diverse global perspectives on Olympic readiness, providing insights into infrastructure planning, economic impacts, political stability, and logistical execution.

Key Findings from the SLR:

The reviewed literature highlights several critical themes:

- Infrastructure Development: Importance of modern sports facilities, transportation networks, and accommodation capacities in hosting the Olympics.
- Economic Considerations: The dual-edged impact of investment, including potential financial gains through tourism and trade versus the risk of economic strain from underutilized post-Olympic assets.
- Governance and Public Perception: The role of political stability, public support, and transparent governance in successful Olympic hosting.
- Logistical Challenges: Effective event management, crowd control, and security measures to ensure smooth operations during the Games.

These findings provide a robust framework for analyzing India's Olympic readiness. By addressing the identified challenges and leveraging global best practices, India can enhance its preparedness for hosting a mega-event of this magnitude.

This model will allow us to systematically analyze how different variables impact the decision-making process and the resulting outcomes for hosting an Olympic event, particularly in the Indian context. It provides a structured framework to assess the complex interplay between various factors.

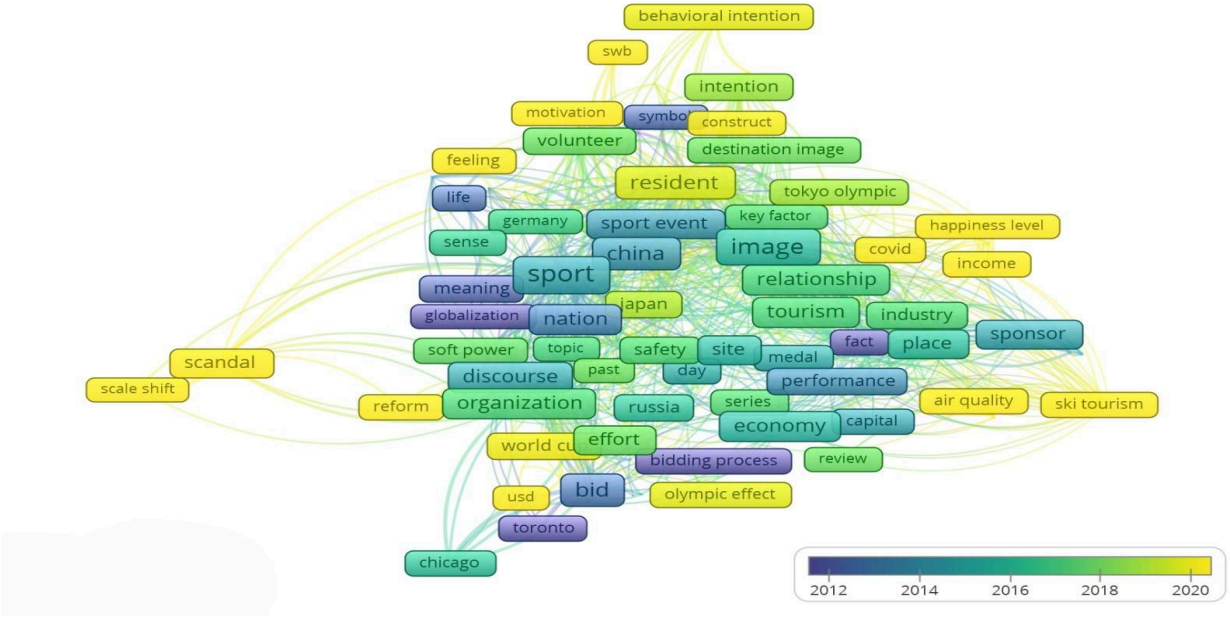


Fig.1: Abstract Analysis

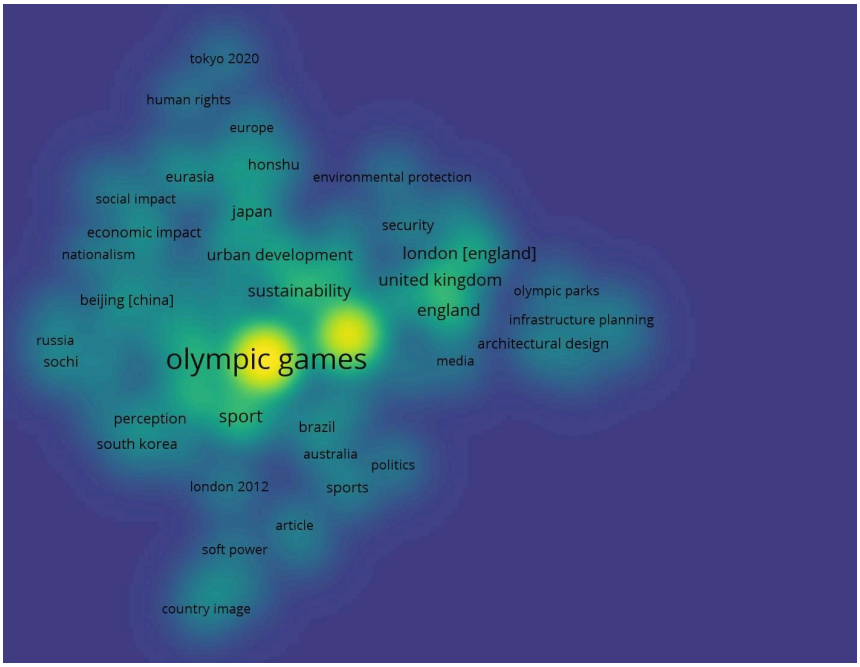


Fig.2: Density Visualization of keyword co-occurrences

3.REQUIREMENT ANALYSIS

3.1. Functional Requirements

These outline the primary functions the project must fulfill.

1. Data Collection and Analysis:
    a. Obtain data from previous Olympic hosts, focusing on infrastructure, economic stability, political climate, and governance.
    b. Collect India's relevant data, such as infrastructure reports, socio-economic indicators, and government policies.
2. Systematic Literature Review (SLR):
    a. Conduct a structured literature review using databases like Scopus to gather high-quality research articles on Olympic readiness.
3. Comparative Analysis:
    a. Develop frameworks to compare India with past Olympic hosts on key metrics such as infrastructure readiness, governance, and financial capacity.
4. Predictive Modeling:
    a. Use machine learning models to predict India's likelihood of successfully hosting the Olympics based on historical data.
5. Visualization:
    a. Create interactive visualizations and dashboards to present insights effectively to stakeholders.

3.2. Non-Functional Requirements

These define the quality and performance expectations of the project.

1. Accuracy:
    a. Ensure data collection and analysis yield results with a high degree of accuracy and reliability.
2. Scalability:

    a. Design the analytical tools and visualizations to handle large datasets, enabling their use for other mega-event analyses.
3. User Accessibility:
    a. Develop a user-friendly interface for presenting data and analysis results through a website.
4. Interoperability:
    a. Ensure compatibility of tools like Python, Tableau, and D3.js for data analysis and visualization.

3.3. Data Requirements

1. Historical data on past Olympic hosts:
    a. Economic performance before and after hosting the event.
    b. Infrastructure development timelines.
    c. Governance models and their outcomes.
2. India's current data:
    a. Urban development plans.
    b. Economic indicators like GDP and public expenditure.
    c. Public opinion through sentiment analysis from social media.

3.4. Tools Requirements

1. Programming and Data Analysis:
    a. Python.
2. Data Visualization:
    a. Tableau or Power BI for interactive dashboards.

3.5. Hardware Requirements

To run a data-driven project like assessing India's readiness for hosting the Olympics, you'll need both hardware and software that can handle large datasets, perform complex analyses, and create visualizations. Here’s a breakdown of the typical system requirements:

1. Processor (CPU):

- Minimum: Intel i5 or AMD Ryzen 5 (4 cores)
- Recommended: Intel i7/i9 or AMD Ryzen 7/9 (6–8 cores) for faster data processing.

2. Memory (RAM):
    - Minimum: 8 GB RAM
    - Recommended: 16–32 GB RAM for handling large datasets and performing multiple tasks simultaneously.
3. Storage:
    - Minimum: 256 GB SSD
    - Recommended: 512 GB or more SSD (Solid State Drive) for faster data access. Additional HDD storage (1TB) for long-term data storage.
4. Graphics Card (GPU):
    - Minimum: Integrated Graphics
    - Recommended: Dedicated GPU (NVIDIA GTX 1650 or higher) for running intensive machine learning models and visualizations.
5. Monitor:
    - Full HD (1080p) or higher resolution recommended for better data visualization and multitasking.
6. Operating System:
    - Windows 10/11 (64-bit), macOS (latest version), or Linux (Ubuntu, CentOS).
7. Internet Connection**:**
    - Minimum: 10 Mbps for research and cloud services.
    - Recommended: 50 Mbps or higher for faster cloud-based data analysis.

3.6.Software Requirements:

1. Operating System:
    - Windows 10/11, macOS, or a Linux distribution like Ubuntu for flexibility with open-source tools.
2. Data Analysis Tools:

- Python: With libraries such as pandas, NumPy, scikit-learn, matplotlib, and TensorFlow for data handling, analysis, and machine learning.
- Jupyter Notebooks or PyCharm: For developing and running scripts.

3. Data Visualization Tools:
    - Tableau/Power BI: For creating interactive visualizations.
4. Version Control:
    - Git/GitHub/GitLab: For collaborative work and version control.
5. Document Writing/Editing:
    - Microsoft Office (Word, Excel, PowerPoint): For documentation, reporting, and presentation.

These requirements will provide a stable and efficient setup for handling research, data analysis, and predictive modeling tasks.

3.7. Stakeholder Requirements

1. Academicians and Researchers:
    a. Require data-driven insights into India's readiness for hosting the Olympics.
2. Government and Policy Makers:
    a. Need actionable recommendations based on predictive models and comparative analysis.
3. Sports Authorities and Event Planners:
    a. Require insights on logistical and infrastructural improvements needed for event readiness.

4.Proposed System

The existing system refers of the current state of infrastructure, governance, and readiness in India concerning large-scale events like the Olympics. Several Indian cities have hosted national and international events in the past, but the scale and complexity of the Olympics demand a higher level of preparedness. Infrastructure such as transportation networks, sports facilities, accommodation, and security systems must be evaluated for their capacity to handle the influx of global visitors, athletes, and media personnel.

Current systems and frameworks are being analyzed for their capacity to meet the Olympic requirements. This includes the current status of urban infrastructure, governance, and political stability, along with the existing sports facilities. Challenges like traffic congestion, pollution, lack of efficient public transport, and inadequate accommodation facilities are being considered.

The proposed system seeks to evaluate India’s Olympic readiness in a structured manner. It will leverage a combination of data analysis, comparative modeling, and city-level evaluations to provide insights into India's potential to successfully host the Games. The system will compare India’s current status with that of past hosts, identifying key areas where the country may need to make improvements.

This system will include:

- A framework for assessing the readiness of Indian cities by considering key metrics such as infrastructure, governance, and economic capacity.
- A comparative model using data from previous Olympic hosts.
- Predictive modeling techniques to estimate India's chances of success in hosting the Olympics.
- Visualization tools for presenting the findings in an accessible way to stakeholders.

5.Motivation

The motivation for this project stems from the recent success of the Paris 2024 Olympics, which has set a benchmark for future Olympic Games. India has shown increasing interest in hosting the 2036 Olympics, and the government's bid has sparked significant debate and analysis regarding the country's readiness. India’s rapid urbanization, expanding economy, and rising prominence on the global stage make it a strong contender for the Games.

However, hosting the Olympics is a monumental challenge requiring thorough preparation. The analysis will identify the opportunities and risks associated with hosting the event, using lessons learned from past Olympic hosts. This project aims to provide a comprehensive data-driven assessment of India's preparedness, focusing on areas that require improvement to ensure a successful Olympic experience for India in 2036.

6.Implementation Details

6.1. Linear Dirichlet Allocation on Constructs and Variables

The implementation of this project began with the use of Linear Dirichlet Allocation to classify and allocate the variables and constructs derived from the data collected in the initial stages of the project. This allocation method helped identify the key constructs that would form the basis of the analysis.

- Linear Dirichlet Allocation:

  Latent Dirichlet allocation is one of the most popular methods for performing topic modeling. Each document consists of various words and each topic can be associated with some words. The aim behind the LDA to find topics that the document belongs to, on the basis of words contains in it. It assumes that documents with similar topics will use a similar group of words. This enables the documents to map the probability distribution over latent topics and topics are probability distribution.
  This method involves categorizing data into predefined classes or groups, using a linear allocation strategy. In this case, the variables were assessed based on their relevance and contribution to the constructs that define Olympic readiness. The Linear Dirichlet Allocation method helped in determining which constructs were most significant in analyzing the preparedness of India for hosting the Olympics.

- Constructs Identified:
  After applying the Linear Dirichlet Allocation on the constructs and variables, five primary constructs emerged as key factors for analyzing India's readiness:

1. Economic Impact: Focused on evaluating the potential economic benefits and costs associated with hosting the Olympics, such as GDP growth, job creation, and business development.
2. Development of Infrastructure: Focused on assessing the readiness of India's infrastructure, including transportation, sports venues, and the overall urban infrastructure.

3. Urban Tourism: Focused on the potential for tourism development, including both short-term increases in visitors and long-term benefits from improved tourism infrastructure.
4. Environmental Sustainability: Analyzed the ecological footprint of hosting the Olympics, such as sustainability efforts in venue construction, waste management, and energy use.
5. Public Sentiment and Governance: Captured the political stability and public perception surrounding India's readiness to handle the logistical challenges of hosting the Olympics, including governance structures and public support.

6.2. Use of Power BI for Data Analysis and Visualization

Once the key constructs were identified, we turned to Power BI to analyze and visualize the data. Power BI was chosen due to its ability to handle large datasets and generate interactive, insightful visualizations that could be easily understood by stakeholders.

- Data Import and Cleaning:
  The relevant data was imported from Official government Websites, which contained detailed information on infrastructure, economics, tourism, and environmental factors. Data was cleaned by removing duplicates, handling missing values, and ensuring consistency across the dataset.
- Data Modeling and Relationships:
  Relationships between the variables and constructs were mapped out in Power BI, allowing for a deeper understanding of how each factor (e.g., infrastructure development) influences the overall Olympic readiness. This helped us to uncover hidden insights by linking various metrics together.
- Visualization:
  Power BI allowed us to create a variety of visualizations that helped represent complex relationships in a simple manner:
    a. Bar and Clustered Bar Charts: These were used to compare different Indian cities based on key metrics such as infrastructure readiness, economic potential, and environmental sustainability.

b. Heatmaps: To visually represent areas of high or low investment in infrastructure or tourism development across India.
c. Scatter Plots: To showcase relationships, such as the connection between economic investment and tourism growth, helping to identify cities with high potential.
d. Line Charts: To track trends over time, such as the growth of infrastructure investment or tourism capacity in selected cities.

- Interactive Dashboards:

  Power BI's interactive dashboards enabled users to filter the data by specific cities or metrics, offering a hands-on approach to exploring the findings. Stakeholders could easily navigate through the data to identify key areas of improvement for each city, or assess how Indian cities compare to past Olympic hosts.

- Key Insights:

  Through the analysis, we were able to draw several important conclusions:

  a. Economic Impact: There was a clear positive correlation between investment in infrastructure and economic growth, similar to patterns seen in past Olympic host cities.
  b. Infrastructure Development: Some Indian cities showed gaps in terms of transportation networks and sports venue development, areas that would require substantial investment to meet Olympic standards.
  c. Environmental Sustainability: Several cities lacked initiatives for sustainable building practices or green energy, which would be necessary to meet the environmental expectations of the International Olympic Committee (IOC).
  d. Tourism Development: While some cities were better equipped for a tourism surge, others needed improvements in accommodation and transport to handle the Olympic influx.

6.3. Analysis

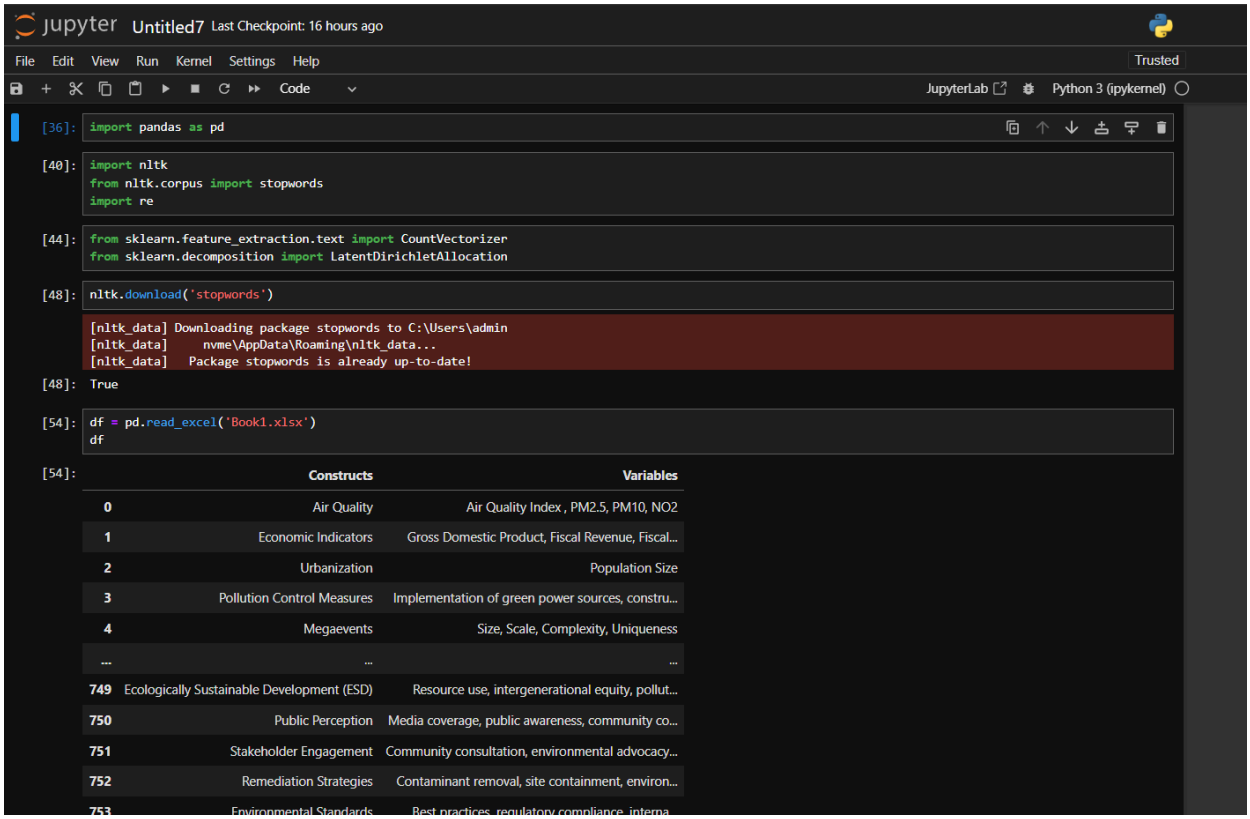
Based on the constructs identified and the visualizations created using Power BI, the next steps will involve:

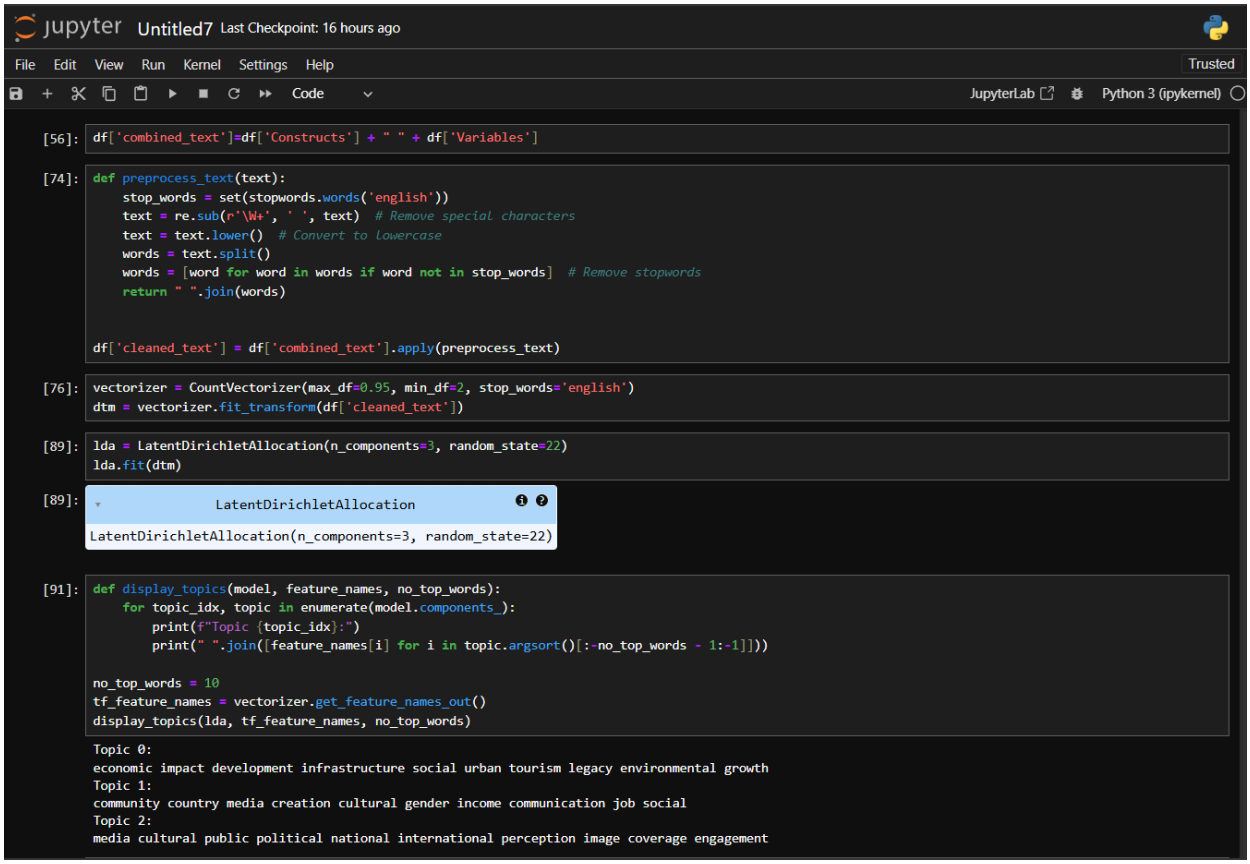
- Comparing Indian Cities: We will continue to compare different Indian cities against the identified constructs and determine which city is most prepared to host the Olympics.
- Refinement and Policy Recommendations: The analysis will help generate recommendations on improving infrastructure, governance, and tourism in the selected cities. These recommendations will be aimed at making India's cities more Olympic-ready for 2036.
- Further Analysis: Statistical techniques, including regression analysis, will be applied in future work to test the relationships between key constructs and fine-tune the analysis.

7.Result and Discussion

7.1.Working snapshot

Linear Dirichlet Allocation





Output:

```
Topic 0:
economic impact development infrastructure social urban tourism legacy environmental growth
Topic 1:
community country media creation cultural gender income communication job social
Topic 2:
media cultural public political national international perception image coverage engagement
```

Result:

The application of Latent Dirichlet Allocation (LDA) on the dataset revealed three distinct topics that capture the key thematic groupings within the constructs and variables provided. The first topic focuses on economic and infrastructural development, emphasizing themes such as economic growth, urban infrastructure, environmental considerations, tourism promotion, and the long-term legacy of development initiatives. This topic reflects the tangible and measurable impacts of large-scale events on cities and regions. The second topic highlights community and

social dynamics, with an emphasis on community engagement, cultural representation, gender and income inclusivity, job creation, and the role of media in fostering communication and cohesion. This topic underscores the social and cultural implications of such initiatives, including their ability to bring diverse groups together. The third topic revolves around media, politics, and public perception, capturing the influence of media coverage at national and international levels, the interplay of cultural and political narratives, and efforts to shape public opinion and image-building strategies. Together, these topics provide a nuanced understanding of the dataset, offering valuable insights into the economic, social, and political dimensions of urbanization, policymaking, and event impacts. These results can inform strategic planning and decision-making processes in urban development and large-scale event management.

Power BI Dashboard

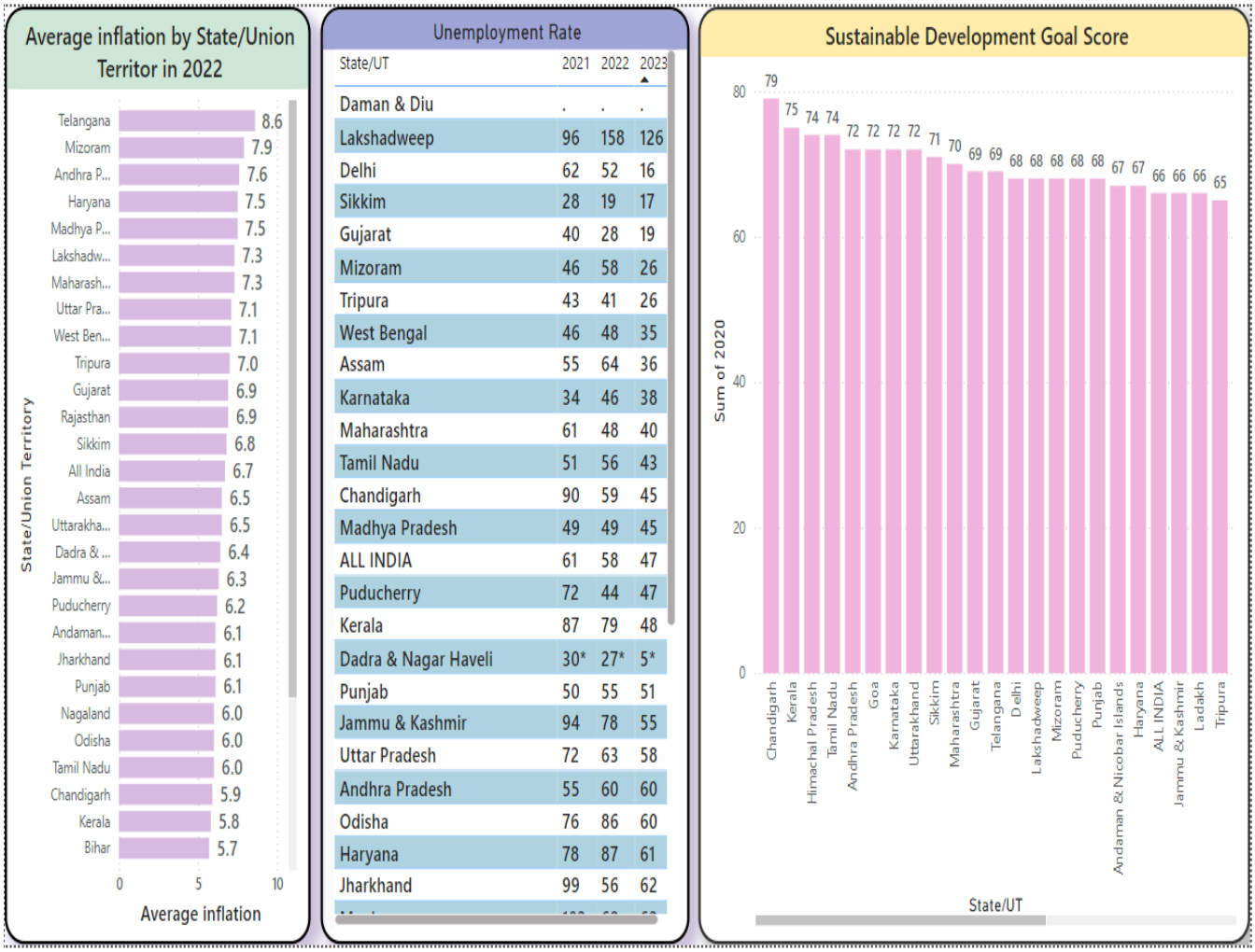
Page1-

Insight-

Delhi is performing well in the ease of doing business compared to Gujarat, Maharashtra, Telangana, and Karnataka. However, it lags behind in the Air Quality Index. This issue could be addressed by installing air filters.

The fact that Delhi has received fewer funds for calamities could indicate that the region historically experiences fewer severe climatic disasters compared to other states.

Page 2-



Insight-

Delhi has the lowest inflation rate as compare to Gujarat, Maharashtra, Telangana, and Karnataka. It will be helpful for us to host olympics in minimum cost.

Delhi's low unemployment rate means most people have jobs, so there's a skilled workforce to help organize the Olympics. It also shows the city's economy is stable, making it easier to manage the event smoothly.

Delhi's good score on the Sustainable Development Goals (SDG) indicates strong efforts toward environmental, social, and economic sustainability, making it capable of hosting the Olympics responsibly and efficiently.

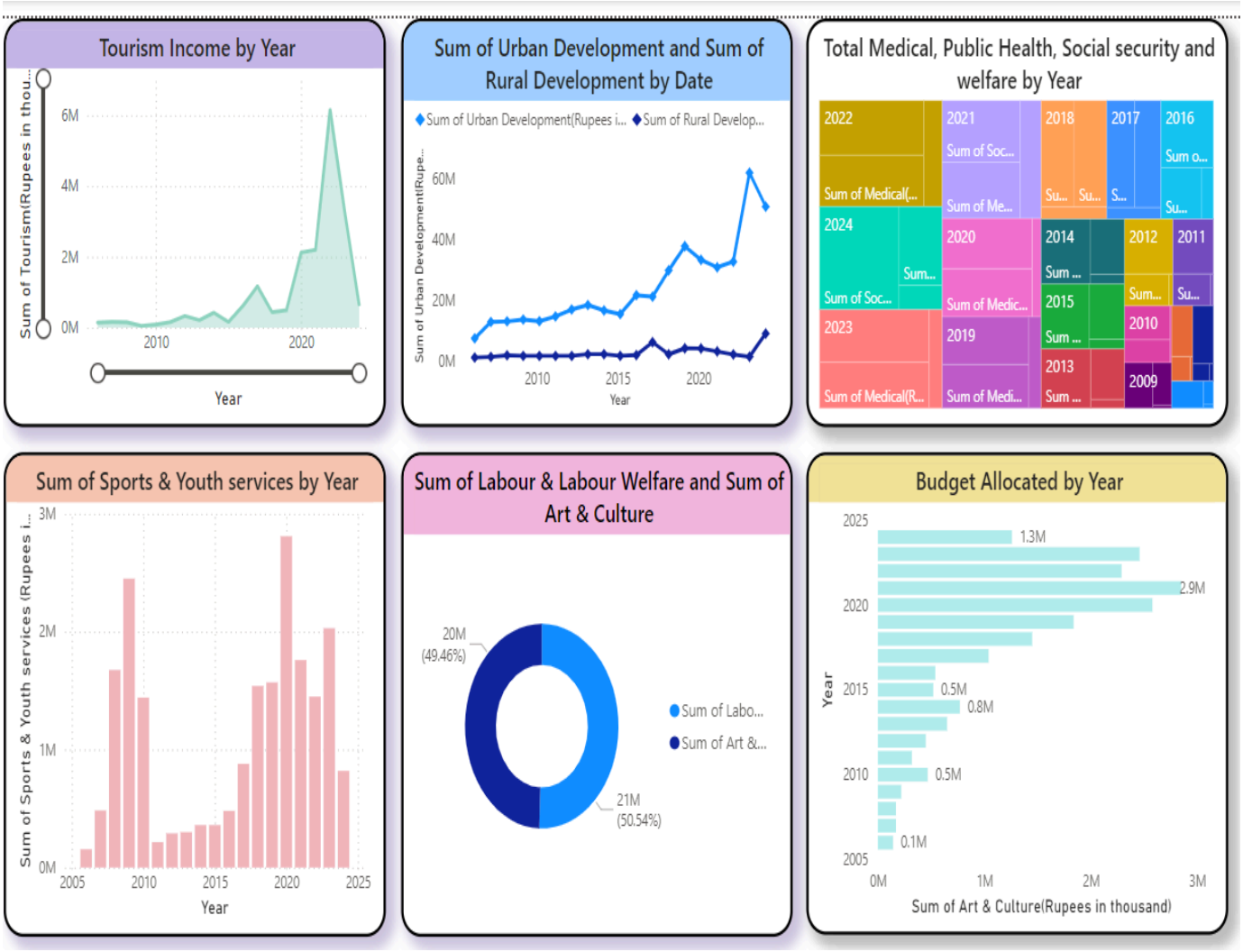
Page3-

Insight-

Delhi is the only city in India that has hosted multi-sport events like the Commonwealth Games and Asian Games in 2010, showcasing its significant experience in organizing such tremendous events. It also has a higher number of stadiums, although Ahmedabad boasts the stadium with the highest capacity. Additionally, Delhi receives more funds for sports infrastructure compared to other cities.

With the highest population among these cities, Delhi offers a large potential audience. It also has better connectivity and greater global recognition, making it a favorable location for hosting major events.

Page 4- Analysis of Delhi



Insight-

Tourism income in Delhi dropped after 2022, presenting the Olympics as an opportunity to revitalize tourism.

The focus on urban development shows that Delhi is prepared for the event, with potential for further growth.

Declines in art, culture, and welfare budgets offer a chance to strengthen these areas in preparation for the Olympics.

The equal budget for labor welfare and art & culture helps improve workers' conditions for the Olympics and also promotes Delhi's culture, balancing both social and cultural

Result:

After comparing New Delhi, Mumbai, Ahmedabad, and Hyderabad, New Delhi emerges as the top contender for hosting the Olympics due to its extensive stadium infrastructure, experience hosting multisport events, excellent connectivity, and significant sports funding. Mumbai follows with strong global recognition and robust transportation but faces challenges like traffic congestion. Ahmedabad and Hyderabad show potential but lag behind in infrastructure, experience, and global visibility compared to Delhi and Mumbai. Overall, New Delhi is the most prepared city for hosting the Olympics.

8.Conclusion

The report "Olympic Readiness of India: A Comparative Cross-Country Analysis" provides a comprehensive evaluation of India's preparedness to host the Olympic Games. By systematically analyzing critical factors such as infrastructure, economic capacity, governance, and public sentiment, the study identifies both challenges and opportunities unique to India. Drawing comparisons with previous Olympic hosts, the findings emphasize the need for significant improvements in transportation networks, accommodation facilities, and sustainability initiatives to meet international standards.

The analysis highlights New Delhi as the most suitable city for hosting the Olympics, citing its existing infrastructure, experience with large-scale events, and connectivity. However, challenges such as traffic congestion and environmental sustainability remain pressing issues. The report also underscores the potential benefits of hosting the Olympics, including economic growth, enhanced global recognition, and infrastructure development, while cautioning against the financial and logistical risks involved.

In conclusion, while India demonstrates significant potential and ambition to host the Olympic Games, achieving readiness will require a strategic and data-driven approach. Investments in infrastructure, governance reforms, and robust planning mechanisms are crucial for addressing existing gaps and ensuring a successful hosting experience. This report serves as a valuable resource for stakeholders, providing actionable recommendations to enhance India's preparedness and maximize the long-term benefits of such a monumental event.

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