CAPSTONE PROJECT

ANALYZING DEMOGRAPHIC AND REGIONAL DISPARITIES IN TELE-LAW CASE REGISTRATIONS FOR INCLUSIVE LEGAL ACCESS

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OUTLINE

- Problem Statement
- Proposed System/Solution
- System Development Approach
- Algorithm & Deployment
- Result
- Conclusion
- Future Scope
- References

PROBLEM STATEMENT

Despite the expansion of the Tele-Law initiative across India, there remains a lack of insight into the demographic utilization patterns. Gender, caste, and regional disparities in legal aid access persist, especially among SC, ST, and OBC groups. Some districts also have very low outreach, raising concerns over inclusivity and equity.

PROPOSED SOLUTION

The system analyzes **Tele-Law registration data** to uncover **gender-wise, caste-wise, and geographic disparities** in legal aid access. It uses **IBM Watson Studio (Lite)** for data-driven insights.

- **Data Collection**:
  District-wise data (gender, caste, CSC count, total registrations) from data.gov.in.
- **Preprocessing**:
  Cleaned missing/invalid data and added a new feature:
  Registrations per CSC = Total Registrations / No. of CSCs
- **Analysis**:
  - Gender-wise and caste-wise totals
  - State and district-level registration rankings
  - Districts with lowest registrations per CSC
- **Visualization**:
  Used matplotlib to generate bar graphs and highlight disparities.
- **Platform**:
  Entire analysis is implemented in Python notebooks on IBM Watson Studio Lite.
- **Outcome**:
  Clear insights into inequitable outreach among SC/ST groups, low female participation, and regional gaps in CSC effectiveness.

SYSTEM APPROACH

The system was developed using a structured, data-driven pipeline and cloud-based tools. Below are the key steps and technologies involved:

1. Platform Used
   - IBM Watson Studio (Lite Plan): For cloud-based development and notebook execution
   - IBM Cloud Object Storage (optional): For data access and management
2. Programming Language & Libraries
   - Python: Core language for data analysis
   - Pandas: Data manipulation and transformation
   - Matplotlib: Data visualization (bar charts, plots)
3. Data Source
   - Dataset obtained from data.gov.in
4. Development Process
   - Imported CSV dataset directly in Watson Studio notebook
   - Cleaned and preprocessed the data
   - Derived insights and metrics (e.g., gender-wise, caste-wise, CSC efficiency)
   - Visualized results using graphs for intuitive understanding

ALGORITHM & DEPLOYMENT

1. Algorithmic Approach
   - Descriptive Analytics using Python to explore and summarize the dataset
   - Aggregation:
     - GroupBy operations for gender-wise, caste-wise, district-wise, and state-wise analysis
     - Normalization: Computed Registrations per CSC for fairness across districts
   - Visualization:
     - Bar and horizontal bar plots created using Matplotlib for clear presentation
     - Highlighted top-performing and low-performing regions
2. Analytical Metrics Extracted
   - Total registrations by gender and caste
   - Top 10 districts with highest registrations
   - Districts with lowest outreach per CSC
   - States with highest total registrations
3. Deployment
   - Not Deployed as an API or App
     - Analysis conducted within IBM Watson Studio Notebook
     - Visual outputs saved as PNGs for reporting
   - IBM Cloud environment used only for development and execution

RESULT

	Category	States/UT's	Districts	No. of CSCs	Female	Male	Total	General	OBC	SC	ST	Total.1
0	Case Registered	Andaman and Nicobar	Nicobar	5	615	852	1467	557	315	546	49	1467
1	Case Registered	Andaman and Nicobar	North and Middle Andaman	37	765	1114	1879	199	187	1436	57	1879
2	Case Registered	Andaman and Nicobar	South Andaman	31	340	251	591	42	89	430	30	591
3	Case Registered	Andhra Pradesh	Alluri Sitharama Raju	430	6370	6828	13198	3585	4660	3176	1777	13198
4	Case Registered	Andhra Pradesh	Anakapalli	646	6311	6267	12578	3532	4196	4347	503	12578
5	Case Registered	Andhra Pradesh	Anantapur	577	10050	21628	31678	9189	8651	12245	1593	31678
6	Case Registered	Andhra Pradesh	Annamayya	501	2039	1181	3220	1173	776	1118	153	3220
7	Case Registered	Andhra Pradesh	Bapatla	461	1756	1960	3716	1729	680	1120	187	3716
8	Case Registered	Andhra Pradesh	Chittoor	724	24254	12256	36510	19944	8818	7115	633	36510
9	Case Registered	Andhra Pradesh	East Godavari	300	5908	7332	13240	7032	3230	2370	608	13240

```
Index(['Category', 'States/UT's', 'Districts', 'No. of CSCs', 'Female', 'Male',
       'Total', 'General', 'OBC', 'SC', 'ST', 'Total.1',
       'Registrations_per_CSC'],
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          Category          States/UT's                Districts  \
0  Case Registered  Andaman and Nicobar                  Nicobar
1  Case Registered  Andaman and Nicobar  North and Middle Andaman
2  Case Registered  Andaman and Nicobar             South Andaman
3  Case Registered       Andhra Pradesh     Alluri Sitharama Raju
4  Case Registered       Andhra Pradesh                Anakapalli

   No. of CSCs  Female  Male  Total  General   OBC    SC    ST  Total.1  \
0            5     615   852   1467      557   315   546    49     1467
1           37     765  1114   1879      199   187  1436    57     1879
2           31     340   251    591       42    89   430    30      591
3          430    6370  6828  13198     3585  4660  3176  1777    13198
4          646    6311  6267  12578     3532  4196  4347   503    12578

   Registrations_per_CSC
0             293.400000
1              50.783784
2              19.064516
3              30.693023
4              19.470588
```

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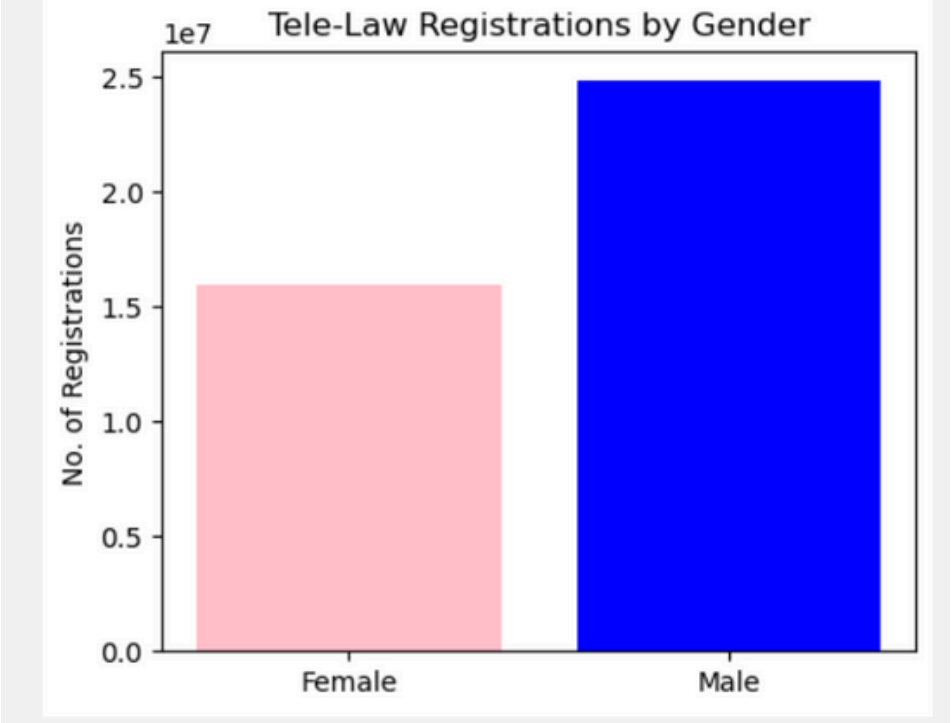
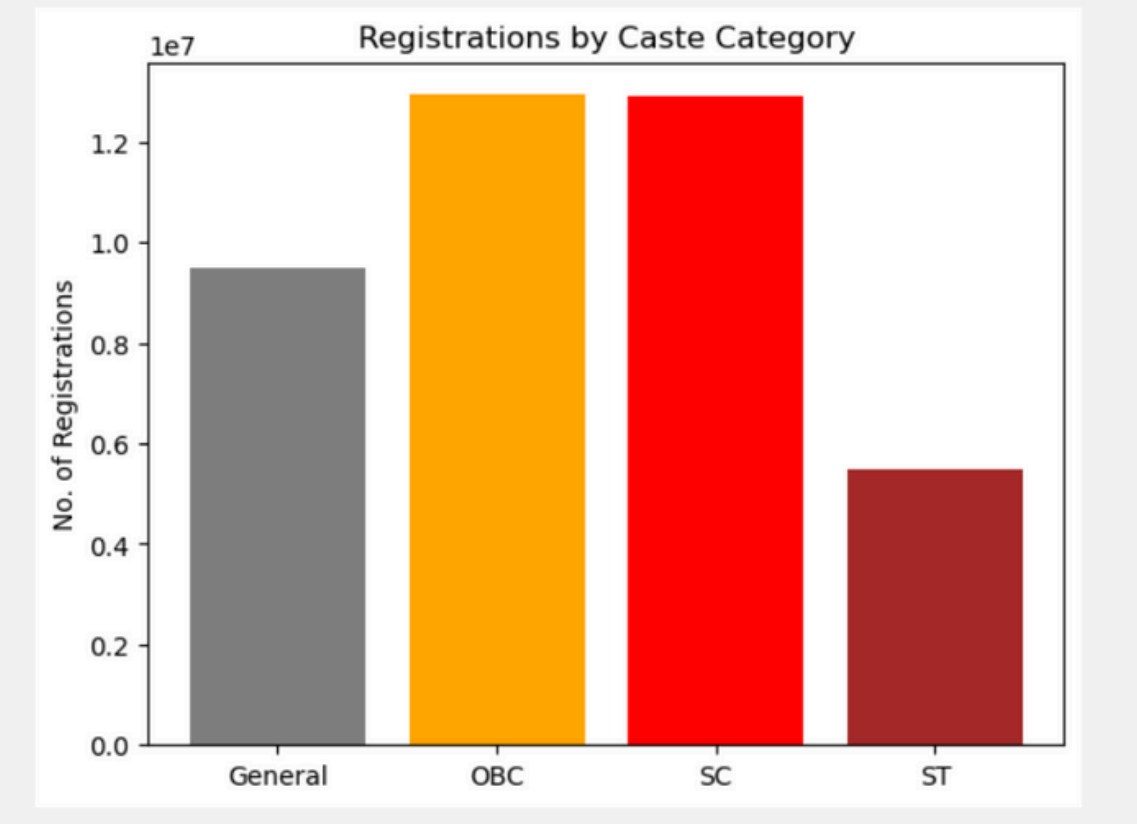
RESULT





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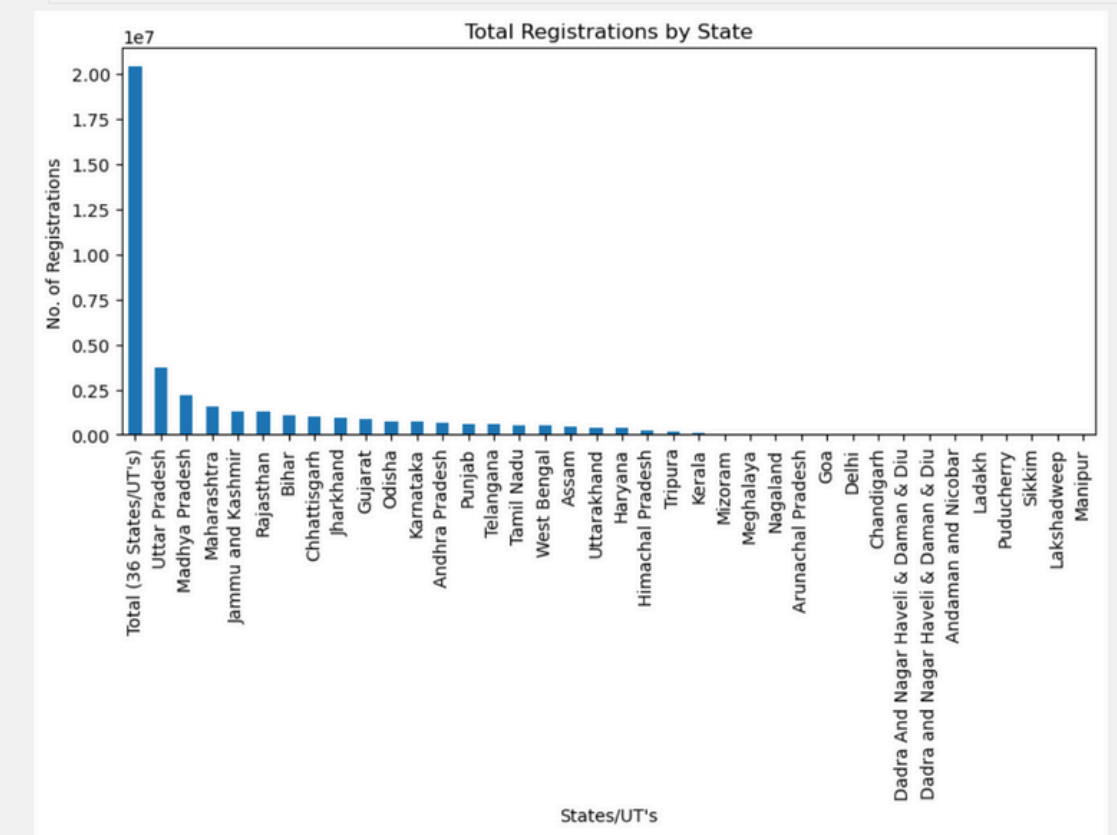
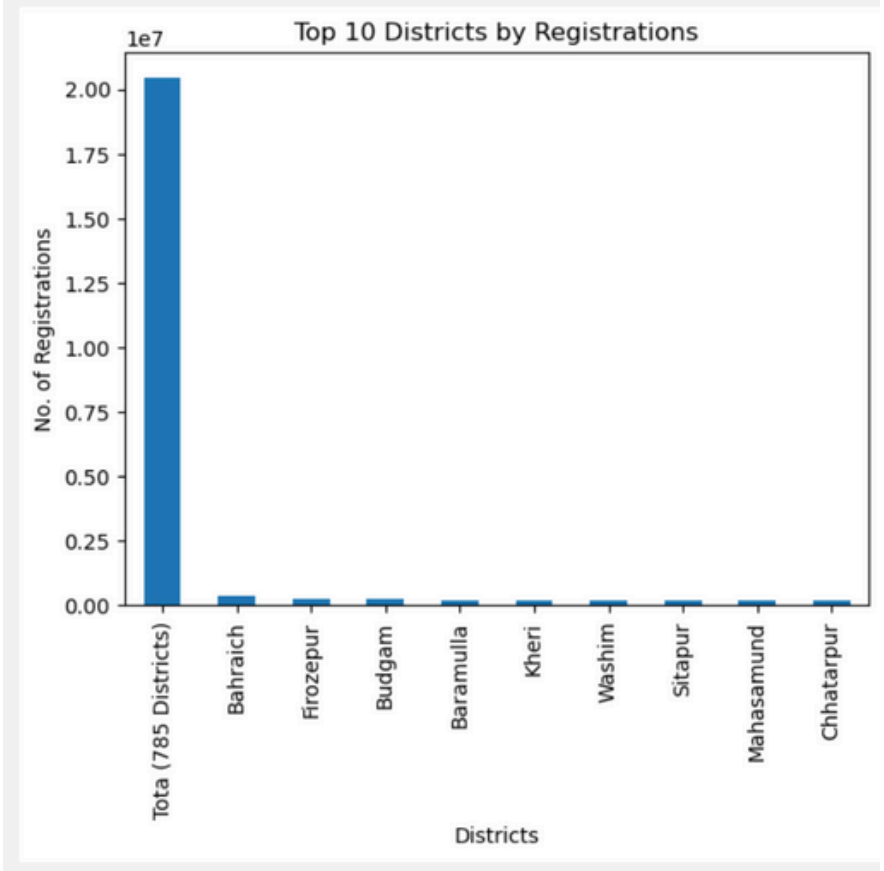
RESULT





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CONCLUSION

The analysis of Tele-Law registration data across Indian districts provided several important insights:

- Gender Disparity: Male registrations were consistently higher than female, indicating a need for targeted awareness among women regarding legal aid services.
- Caste Representation: General and OBC categories dominated the registrations. SC and ST communities showed significantly lower participation, raising concerns about inclusivity.
- Geographic Variation: Certain districts and states recorded high registration volumes, while others, despite having Common Service Centres (CSCs), showed minimal usage.
- CSC Efficiency: The normalized metric, Registrations per CSC, revealed districts with underutilized infrastructure, highlighting the need for strategic interventions.

Overall, the system provides a data-driven framework to assess the equity and effectiveness of the Tele-Law scheme and supports better policy planning to improve outreach.

FUTURE SCOPE

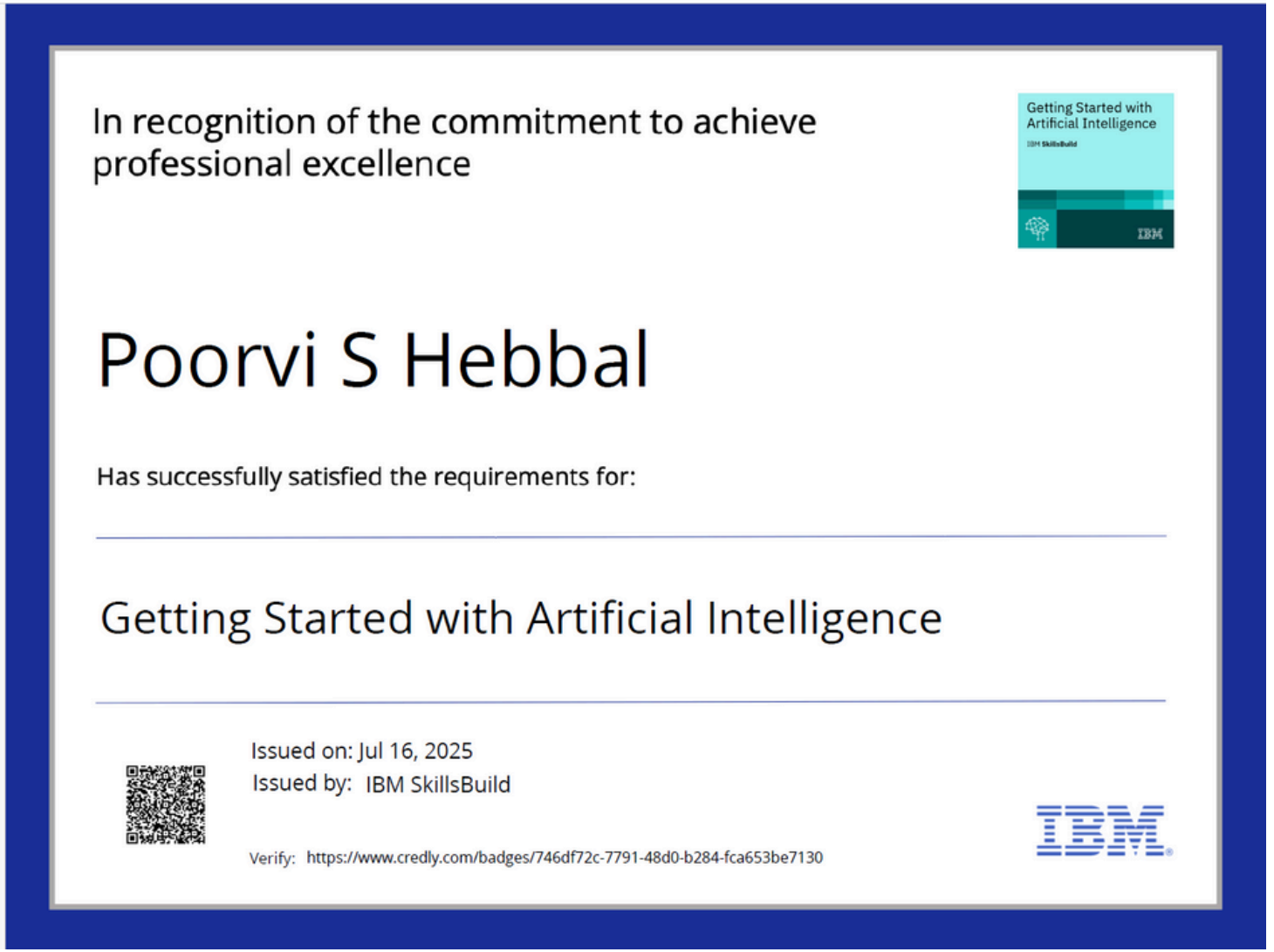
The current system lays a strong foundation for analyzing service utilization in the Tele-Law initiative. Future enhancements can expand its capabilities in the following directions:

1. Time-Series Analysis
   - Incorporate monthly or yearly trends to monitor growth, seasonal variation, and long-term progress.
2. Real-Time Data Integration
   - Connect with live Tele-Law databases or APIs to enable dynamic dashboards and up-to-date insights.
3. Geospatial Visualization
   - Implement district and state-level mapping using tools like Plotly or GIS libraries for more intuitive regional insights.
4. Feedback and Satisfaction Analysis
   - Include citizen feedback data to assess the quality and impact of legal assistance provided.
5. Advanced Machine Learning
   - Introduce classification or clustering techniques to identify underserved user segments or predict regions needing more outreach.
6. Dashboard Deployment
   - Develop a web-based dashboard using IBM Watson Studio, IBM Cloud Foundry, or IBM Watsonx for continuous monitoring and reporting by policymakers.

REFERENCES

- Government Dataset:
- District-wise Tele-Law Case Registration and Advice Data FY 2021–22—2024–25,
- https://www.data.gov.in/resource/district-wise-tele-law-case-registration-and-advice-enabled-data-fy-2021-22-2024-25
- IBM Cloud Lite: https://cloud.ibm.com/
- IBM Watson Studio: https://dataplatform.cloud.ibm.com/
- pandas: https://pandas.pydata.org/
- matplotlib: https://matplotlib.org/
- Tele-Law Scheme: https://tele-law.in/

IBM CERTIFICATIONS



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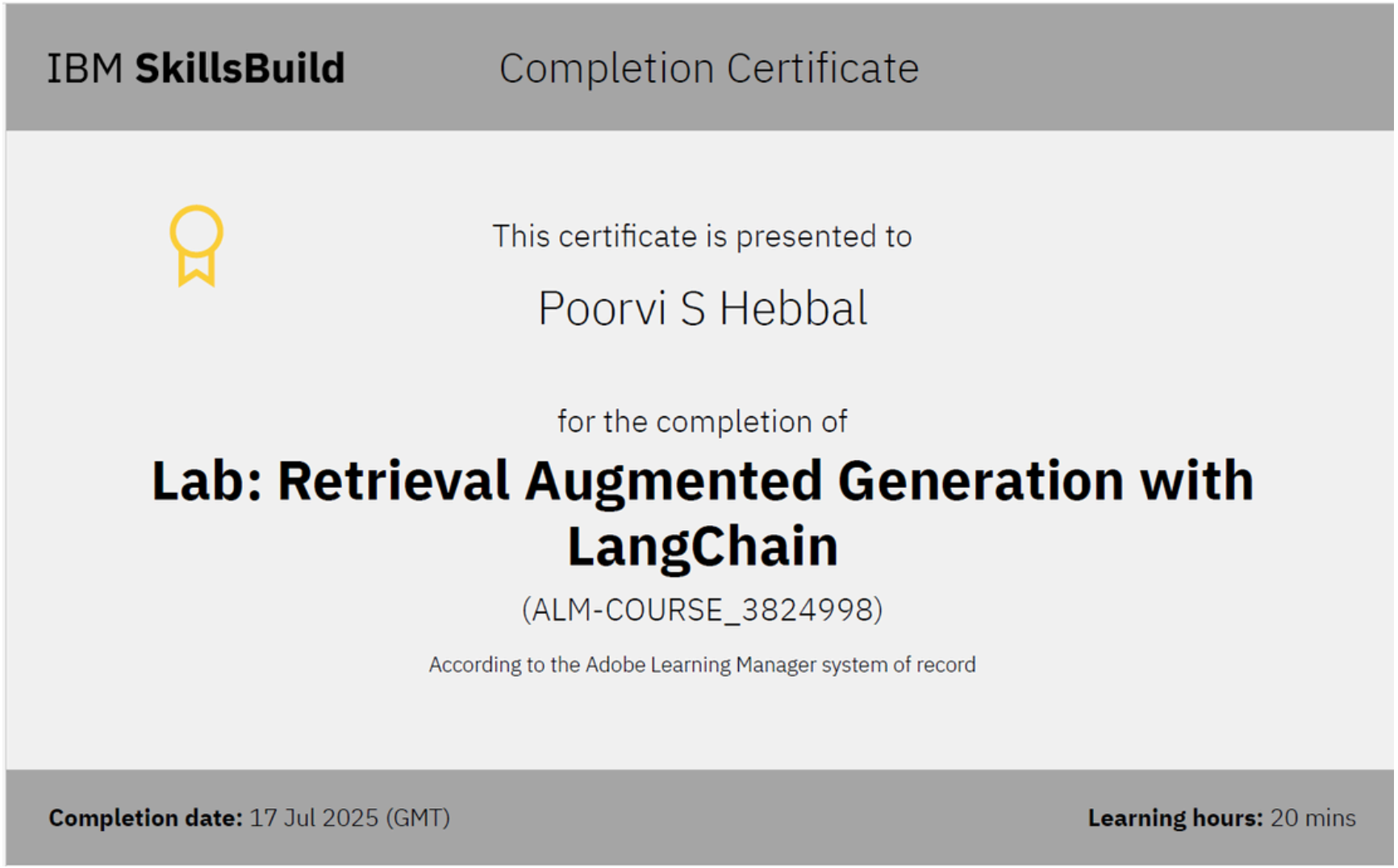

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