📝 Project Report: Restaurant Recommendation System

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1. Project Title

Restaurant Recommendation System using Content-Based Filtering with Streamlit Interface

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2. Project Overview

This project aims to develop an intelligent restaurant recommendation system that provides personalized suggestions based on user preferences (cuisine, budget, and location). The system uses content-based filtering techniques and is deployed with an interactive interface using **Streamlit**.

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3. Objectives

- To collect and preprocess restaurant data.
- To implement a filtering and ranking algorithm based on content attributes.
- To build a user-friendly web interface using Streamlit.
- To enable user feedback collection and logging.
- To evaluate system performance based on qualitative metrics.

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4. System Components

4.1 Frontend (Streamlit UI)

- Sidebar for user input:
  - Cuisine selection

- o Budget level
- o Location
- Main panel displays:
  - o Recommended restaurants with details
  - o Feedback form (relevance, satisfaction score, and comments)
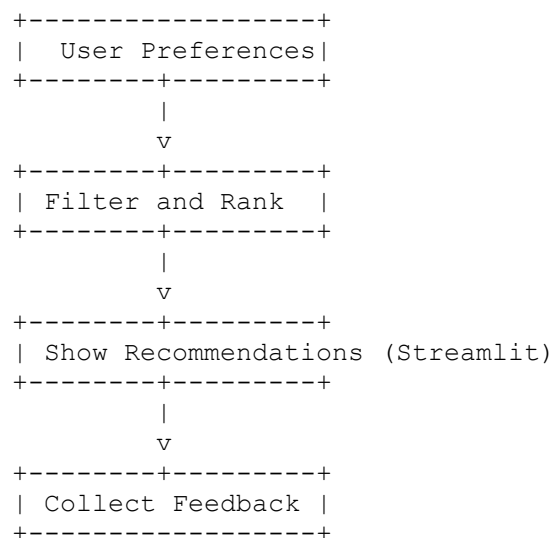
4.2 Backend (Python + Pandas)

- `recommendation.py` contains:
  - o `filter_and_rank()` – filters data based on user preferences and ranks restaurants.
  - o `explain()` – generates a textual explanation for each recommendation.

4.3 Data Storage

- `feedback.csv`: stores user feedback.
- `recommendation_results.csv`: stores selected recommendations for tracking.

5. Workflow Diagram

```
+------------------+
|  User Preferences|
+--------+---------+
         |
         v
+--------+---------+
| Filter and Rank  |
+--------+---------+
         |
         v
+--------+---------+
| Show Recommendations (Streamlit)
+--------+---------+
         |
         v
+--------+---------+
| Collect Feedback |
+------------------+
```

6. Evaluation Metrics

6.1 Qualitative Evaluation

- Feedback form:
  - o Relevance (Yes/No)
  - o Satisfaction (1–5 scale)

   o Comments

6.2 A/B Testing (Future Work)

- Compare different ranking strategies (e.g., score-based vs. review-based).

6.3 Metrics Collected

- User satisfaction score
- Perceived relevance
- Usability comments

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7. Sample Output

🗣️ **Please give your feedback**

Was this recommendation relevant?

🔴 Yes

⚪ No

How satisfied are you? (1 to 5)

4

1   5

Any suggestions or comments?

☑ Submit Feedback

☑ Feedback saved successfully!

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8. Technologies Used

- **Python**
- **Streamlit**
- **Pandas**
- **CSV (for storage)**

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9. Deployment

- Ready for deployment on **Streamlit Community Cloud** or **Render**.
- Public access with feedback and recommendation logging.

10. requirements.txt

```
streamlit
pandas
```

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11. Future Improvements

- Add collaborative filtering for better personalization.
- Integrate maps to show restaurant locations.
- Store data in a real-time database (e.g., Firebase or PostgreSQL).
- Deploy via Docker for portability.

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12. Conclusion

This project demonstrates how intelligent systems can assist users in daily decisions such as restaurant selection. Using a lightweight interface and simple content-based filtering, the system achieves satisfactory usability and flexibility, and lays the groundwork for future intelligent recommendation features.

You can access and interact with the live restaurant recommendation system through the following link:

👉 https://knowledge-based-restaurant.streamlit.app/