Model Development Phase Template

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| Date | 21 June 2025 |
| Name | Shambhuraj Jaysing Patil |
| Project Title | Restaurant Recommendation System |
| Maximum Marks | 5 Marks |

Model Selection Report:

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| **Model** | **Description** |
| **Content-Based Filtering** | Content-based filtering recommends restaurants by comparing user preferences (e.g., cuisine type, price range, dietary restrictions) with restaurant attributes. It focuses on similarities between items and the user's profile without relying on other users’ data. This method is effective for users with unique tastes but may  struggle with limited user profiles (cold start). |
| **Collaborative Filtering** | Collaborative filtering leverages the preferences of similar users to make recommendations. It uses historical ratings and reviews to identify patterns. This model is effective in discovering new items but can suffer from sparsity and cold  start problems if data is limited. |
| **Hybrid Recommendatio n Model** | This combines content-based and collaborative filtering to overcome the limitations of each method. By integrating both user preference data and behavior of similar users, hybrid models improve recommendation accuracy, diversity, and scalability. It is particularly useful in scenarios with large, sparse datasets like  restaurant recommendations. |
| **Matrix Factorization** | Matrix factorization techniques decompose the user-item interaction matrix into latent features, capturing underlying patterns in user preferences. Singular Value Decomposition (SVD) is a common approach. It is computationally efficient and  works well for large datasets but requires enough ratings. |
| **Deep Learning (Neural Networks)** | Neural networks can be used to build recommendation systems by learning complex, non-linear relationships between users and restaurants from rich feature sets including reviews, preferences, and metadata. While powerful, they require large datasets and are computationally intensive. |

Conclusion:

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| **Model Selected** | |
| **Hybrid Recommenda tion Model** | The hybrid model was selected because it addresses the limitations of both content- based and collaborative filtering approaches. It effectively handles the cold start and sparsity issues by integrating multiple data sources such as user profiles, restaurant attributes, and behavioral data. This results in more personalized, diverse, and  accurate recommendations, making it highly suitable for a restaurant recommendation system with varying user preferences and data availability. |