
Simply Cooking

AI based recommendations for recipes

Presented By:

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About our Project

Goal:

To create an AI based recommendation tool that suggests recipes based on basic available ingredients.

Importance:

- Simplifies cooking: Recommends easy-to-follow recipes based on available ingredients
- Reduces food waste: Helps users make the most of what's in their fridge and pantry
- Supports portion management: Guides users in using and portioning existing food effectively
- Streamlines meal planning: Eases decision-making with personalized suggestions

Data/Methodology

Dataset

Source: RecipeNLG dataset from Kaggle, containing recipe titles, ingredient lists, and metadata

Features used:

- Recipe Titles: For user-friendly recommendations
- Ingredient Lists: Core feature for training the model and clustering
- Clusters: Grouped recipes for improved recommendation accuracy

Preprocessing Steps

1. **Standardized Ingredient Lists:**

- Code removes units and common words via `units` and `common_words` lists in the `preprocess_ingredient` function
- Ensures consistency across recipes for better training.

2. **Text Cleaning:**

- Removed numbers and special characters
- Converted ingredient names to lowercase for uniformity

3. **Data Transformation:**

- Ingredients were tokenized into lists for use in the Word2Vec model

Data/Methodology

AI Techniques:

Word2Vec

- Trained on preprocessed ingredient lists to create embedding vectors for each ingredient
- Recipe vectors are computed by averaging ingredient vectors, enabling similarity-based recommendations

K-Means Clustering

- Recipes are grouped into 10 clusters based on ingredient vector similarity
- Improves personalized recommendations by organizing recipes into meaningful categories

Cosine Similarity

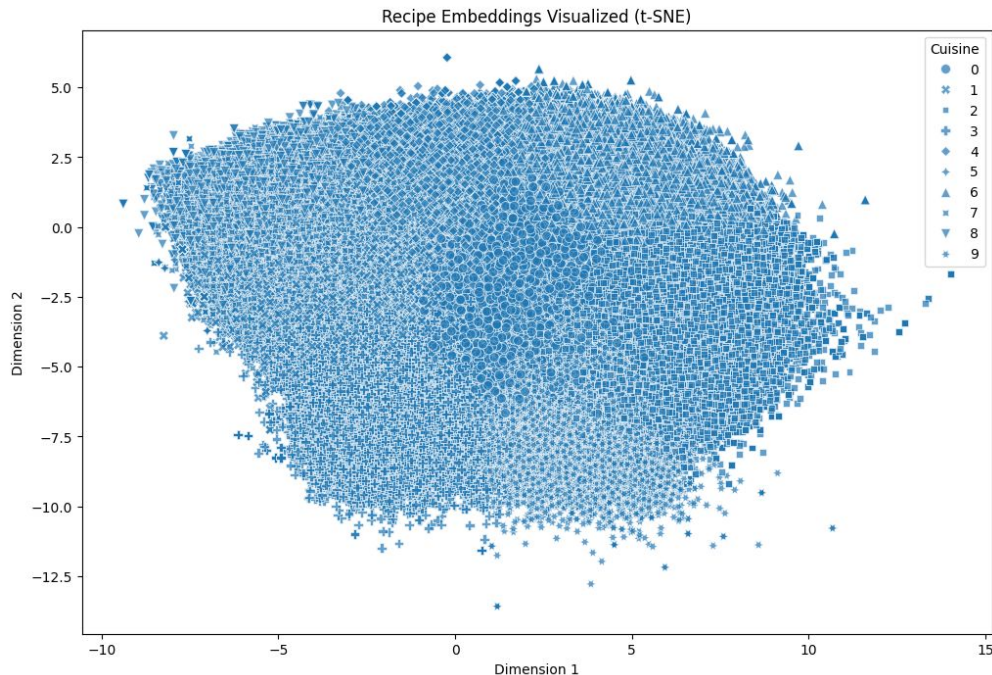
- Measures similarity between:
 1. User provided ingredient vectors and recipe vectors
 2. Recipe vectors within the same cluster, when recommending recipes similar to a favorite dish
- Ensures most relevant recipes are suggested to the user

Experimental Result

While our system primarily uses unsupervised learning, we evaluated performance through:

- **Cosine Similarity Scores:** Used to measure how well user-provided ingredients align with recipe vectors. High similarity scores indicate closer matches.
- **Cluster Visualization:** t-SNE scatter plots qualitatively demonstrate the effectiveness of K-Means clustering in grouping similar recipes.

Visualization:



Discussion

Interpretation of Results

- Recipes with high similarity scores were more aligned with user-provided ingredients.
- Cluster-based grouping enhanced personalized suggestions.

Challenges

- Cleaning Ingredient Data - Removing quantities/units, enforcing similarity
- Training Time - too slow on laptop, used Google Colab instead
- RAM Usage - Even with Colab, RAM can be exhausted (>13GB!)
- Limited ingredient overlap for uncommon recipes.

Future Directions

- Add calorie and macro analysis for dietary recommendations.
- Expand dataset to include more recipes or global cuisines.

Conclusion

Key Findings

- Successfully implemented an AI-driven recipe generator.
- Demonstrated the use of Word2Vec, K-Means clustering, and cosine similarity for effective recommendations.

Learning Experiences

- Gained hands-on experience in preprocessing, embedding creation, and clustering.
- Learned the importance of clean data and intuitive model implementation

Implications

Real-world potential for personalized meal planning apps.

Appendix

Recipe Recommendation System

Find recipes by entering ingredients or a recipe ID

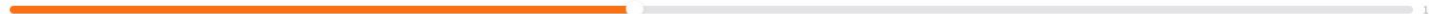
Recommend by Ingredients

Recommend by Recipe ID

Enter ingredients (comma-separated)

Number of recommendations

1



5

10

Get Recommendations

Recommended Recipes

1	2	3

Starting point of project. Find recipes by either listing ingredients or through the Recipe ID. Select how many recommendations to list.

Recommend by Ingredients

Recommend by Recipe ID

Enter Recipe ID

100

Number of recommendations

1

3

↺

10

Get Recommendations

Recommended Recipes

title ▲	similarity ▲	cluster ▲
Buttermilk Pancakes	0.9999999556336122	5
Old Fashioned Tea Cakes	0.9956831459335639	5
6 Week Muffins	0.9946545560212001	5

Example with Recipe ID 100 and listing 3 recipes.

Recipe Recommendation System

Find recipes by entering ingredients or a recipe ID

Recommend by Ingredients

Recommend by Recipe ID

Enter ingredients (comma-separated)

Number of recommendations

1

10

5


Get Recommendations


Recommended Recipes

1	2	3

Typing some ingredients as an example.

Number of recommendations is set to 5.

Number of recommendations 

1  10

Get Recommendations

Recommended Recipes

title	similarity	cluster
Chicken Caesar Pasta	0.8924194023137006	7
Brunswick Stew	0.8888197843085412	3
Homemade Chicken Stew	0.888117583350718	3
Chicken Pot Pie	0.8838010345770333	3
Corn Soup Ala Taikotari'S Mama	0.8835751632783954	7

[Use via API](#) · Built with [Gradio](#)

After submitting the list of ingredients, 5 possible recipes are listed to match what can be made with the ingredients.

Enter ingredients (comma-separated)

cheese, flour, pepperoni, red sauce

Number of recommendations

5

↺

1

10

Get Recommendations

Recommended Recipes

title	similarity	cluster
Pizza	0.9163819404076866	4
Stromboli	0.8803509509741629	4
Pepperoni Appetizers	0.8674455718425003	0
Skillet Fried Pizza	0.8620506528274146	0

Another example

Thank You!
Any Questions?