Taste Tuner

To simplify culinary decisions and enhance cooking experiences through technology.

CIS 600: Applied Natural Language Processing
Instructor: Edmund Yu

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Introduction

Taste Tuner: a comprehensive tool designed to enhance culinary experiences using data-driven insights.

Functionalities

1. Cuisine Rating
2. Ingredient Network Analysis
3. Recipe Classification
4. Recipe Clustering
5. Recipe Difficulty Identification
6. Recipe Recommendation
7. Recipe Summarization

Data

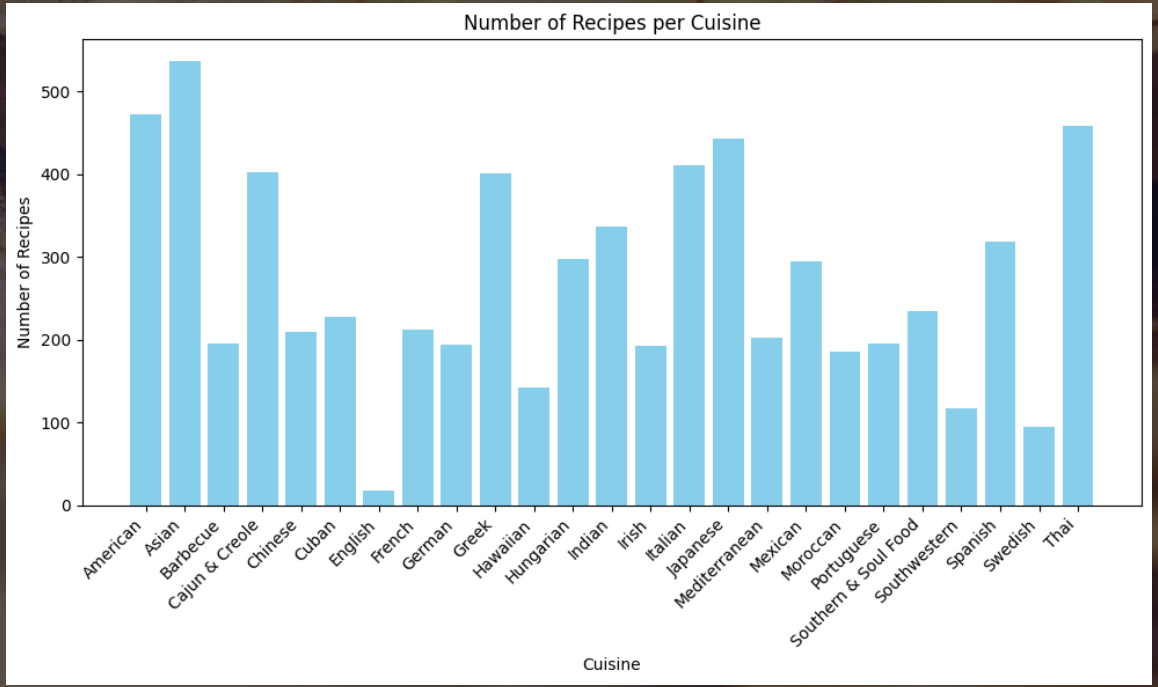
1. Ingredients.csv
2. Recipes.json
3. Yummly.pkl

Pre-processing

1. Data Cleaning
2. Normalization of Ingredients
3. NLP on Ingredients and Instructions
4. Data Integration
5. Feature Engineering

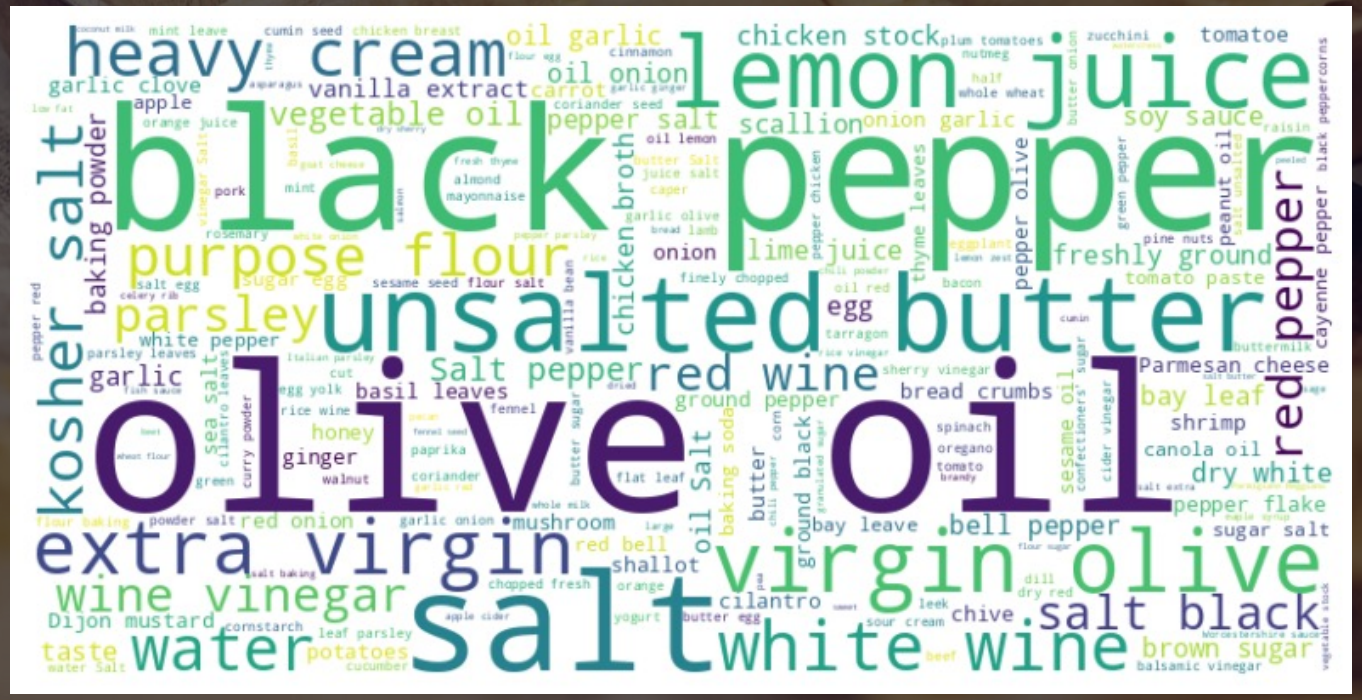
Exploratory Data Analysis

- Recipe Frequency Analysis



Exploratory Data Analysis

- Ingredient Word Cloud
  - CSV Import
  - Data Preparation
  - Word Cloud Creation
  - Visualization


heavy cream
lemon juice
black pepper
olive oil
unsalted butter
salt
extra virgin olive
virgin olive
wine vinegar
salt black
white wine
water
kosher salt
purpose flour
parsley
red wine
red pepper
chicken stock
vegetable oil
oil garlic
oil onion
garlic clove
vanilla extract
pepper salt
scallion
onion garlic
soy sauce
tomatoe
freshly ground
lime juice
Salt pepper
basil leaves
garlic
honey
ginger
bread crumbs
Parmesan cheese
bay leaf
shrimp
canola oil
dry white
pepper flake
sugar salt
bell pepper
bay leave
mushroom
red onion
shallot
cilantro
chive
brown sugar
Dijon mustard
taste
potatoes
baking powder
baking soda
oil Salt
ground black
ground pepper
sesame oil
peanut oil
cayenne pepper
black peppercorns
pepper olive
thyme leaves
chicken broth
onion
egg
tomato paste
spinach
oregano
tomato
paprika
coriander
flat leaf
walnut
green
curry powder
sea salt
cilantro leaves
butter
chopped fresh
orange
yogurt
butter egg
sour cream
leek
dill
dry red
balsamic vinegar
cornstarch
leaf parsley
cucumber
apple cider
water Salt
vegetable stock
Worcestershire sauce
pine nuts
green pepper
raisin
tarragon
sherry vinegar
rice vinegar
buttermilk
sugar
cumin
bacon
finely chopped
oil red
almond
mayonnaise
caper
butter Salt
juice salt
fresh thyme
pork
mint
rosemary
whole wheat
half
nutmeg
plum tomatoes
zucchini
butter onion
garlic olive
bread lamb
eggplant
lemon zest
salt egg
sesame seed flour salt
vanilla bean
celery rib
pepper red
pepper parsley
whole milk
garlic onion
powder salt
flour baking
salt baking
flour sugar
salt butter
salt extra
cider vinegar
confectioners'
translated sugar
chili pepper
corn
fennel
fennel seed
rice wine
egg yolk
cut
Italian parsley
parsley leaves
fish sauce
beef
cumin seed
chicken breast
mint leave
flour egg
cinnamon
coriander seed
low fat
orange juice
basil
dry sherry
goat cheese
fresh thyme
butter Salt
juice salt
caper
almond
mayonnaise
pork
mint
rosemary
whole wheat
salmon
asparagus
garlic ginger
butter onion
black peppercorns
peanut oil
green pepper

Cuisine Rating

1. Imports and Setup
2. Data Preparation
3. Analysis of Ingredients
4. Interactive Widgets Setup
5. Function to Update Outputs
6. Display and Interaction

Cuisine Rating Demo

colab.research.google.com

Cuisine Rating.ipynb

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Files

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sample_data

Yummly Clean.pkl

+ Code + Text

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```
            random_recipes_output.clear_output()
            print(f"\nCommon recipes for {cuisine} cuisine:")
            for recipe in random_recipes:
              print(recipe)


# Observe changes in the dropdown to update outputs accordingly
cuisine_dropdown.observe(on_cuisine_change, names='value')

# Display widgets
display(cuisine_dropdown, rating_output, top_ingredients_output, random_recipes_output)
```

Select Cuis... American

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Ingredient Network Analysis

- Loading the Data
- Extracting Ingredients
- Creating a Co-occurrence Matrix
- Data Structure Transformation
- Network Graph Creation
- Interactive Ingredient Analysis

Ingredient Network Analysis Demo

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Ingredient Network Analysis.ipynb

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sample_data

Recipes.json

```
    output_area.clear_output()
    with output_area:
        ingredient = change['new'].lower()
        top_ingredients = get_top_cooccurrences(ingredient, co_occurrence_df, 3)
        if isinstance(top_ingredients, str):
            print(top_ingredients)
        else:
            print("Top co-occurring ingredients with", ingredient, "are:", ', '.join(top_ingredients))

text_input.observe(on_text_submit, names='value')
display(text_input, output_area)
```

14s

Ingredient: Type an ingredient

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Recipe Classification

1. Libraries and setup
2. Model Training Functions
3. Confusion Matrix and Evaluation Metrics Plotting
4. Main Execution Block
5. User Interface for Predictions

Recipe Classification Demo

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Recipe Classification.ipynb

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Files

..
sample_data
Yummly Clean.pkl
logistic.pickle
nb.pickle
rf.pickle
svm.pickle

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```
    with prediction_output:
        prediction_output.clear_output()
        print(f"The predicted cuisine is: {predicted_cuisine}")

# Register the click event
predict_button.on_click(on_predict_button_clicked)

# Display the widgets
display(ingredients_input, model_selector, predict_button, prediction_output)
```

Ingredients: Enter ingredients separated by commas

Model: logistic

Predict Cuisine

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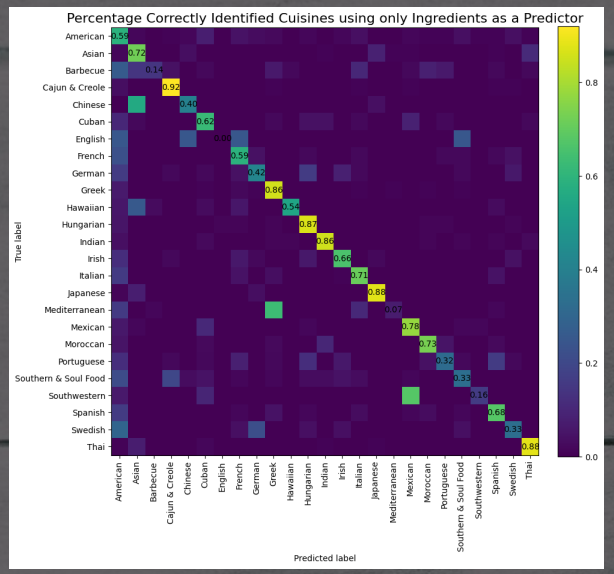
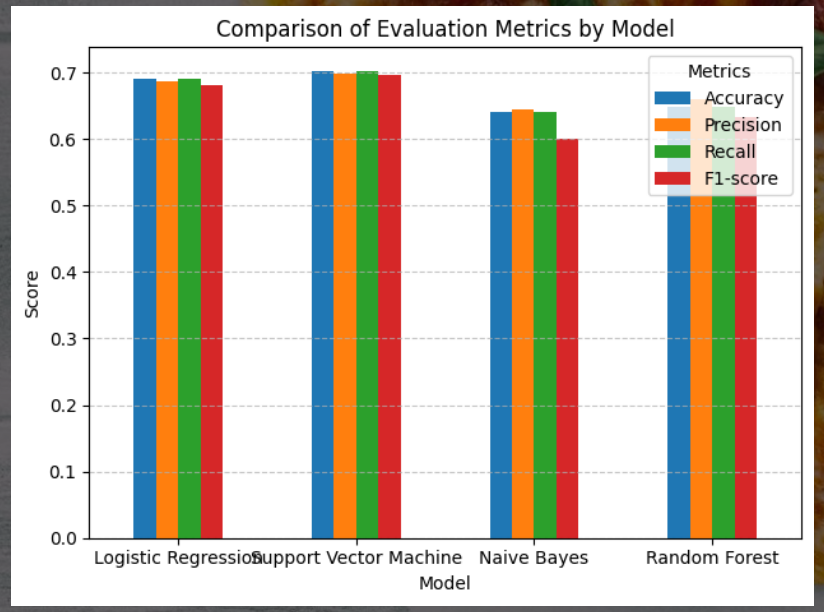
Recipe Classification Results



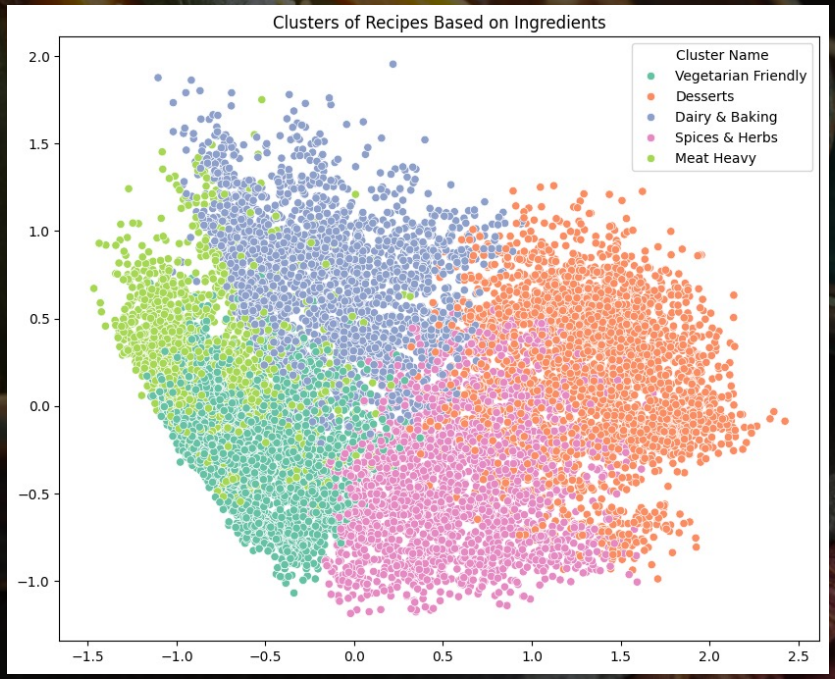

```
Logistic Regression Test Accuracy: 0.690041249263406
Support Vector Machine Test Accuracy: 0.7030053034767236
Naive Bayes Test Accuracy: 0.6399528579846788
Random Forest Test Accuracy: 0.6487919858573954
Results:
                    Model  Accuracy  Precision    Recall  F1-score
0     Logistic Regression  0.690041   0.686901  0.690041  0.680784
1  Support Vector Machine  0.703005   0.699102  0.703005  0.696460
2             Naive Bayes  0.639953   0.644973  0.639953  0.599737
3           Random Forest  0.648792   0.660983  0.648792  0.632503
```



Recipe Clustering

1. Libraries and Data Loading
2. Data Preparation
3. Clustering
4. Interactive Exploration

Recipe Clustering



Recipe Clustering Demo

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IngredientBased Recipe Clustering.ipynb

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sample_data

Recipes.json

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```
        selected_recipes = df[df['Cluster'] == cluster_id]
        print(f"Recipes in the {cluster_readable_names[cluster_id]} cluster:")
        for index in selected_recipes.index:
            print(recipe_names[index])  # Displaying recipe names instead of indices

cluster_selector.observe(display_cluster_info, names='value')
display(cluster_selector, output_area)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/cluster/_kmeans.py:870: FutureWarning: The default value of `n_init` wil
  warnings.warn(
```

Cluster: Dairy & Baking

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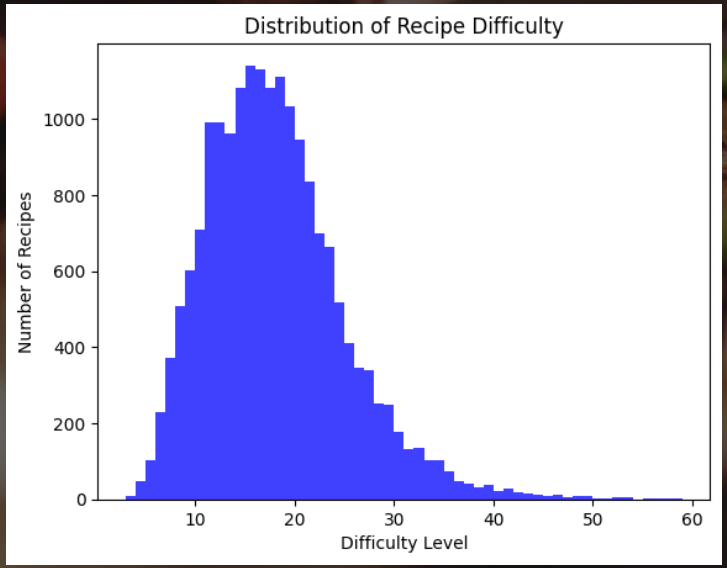
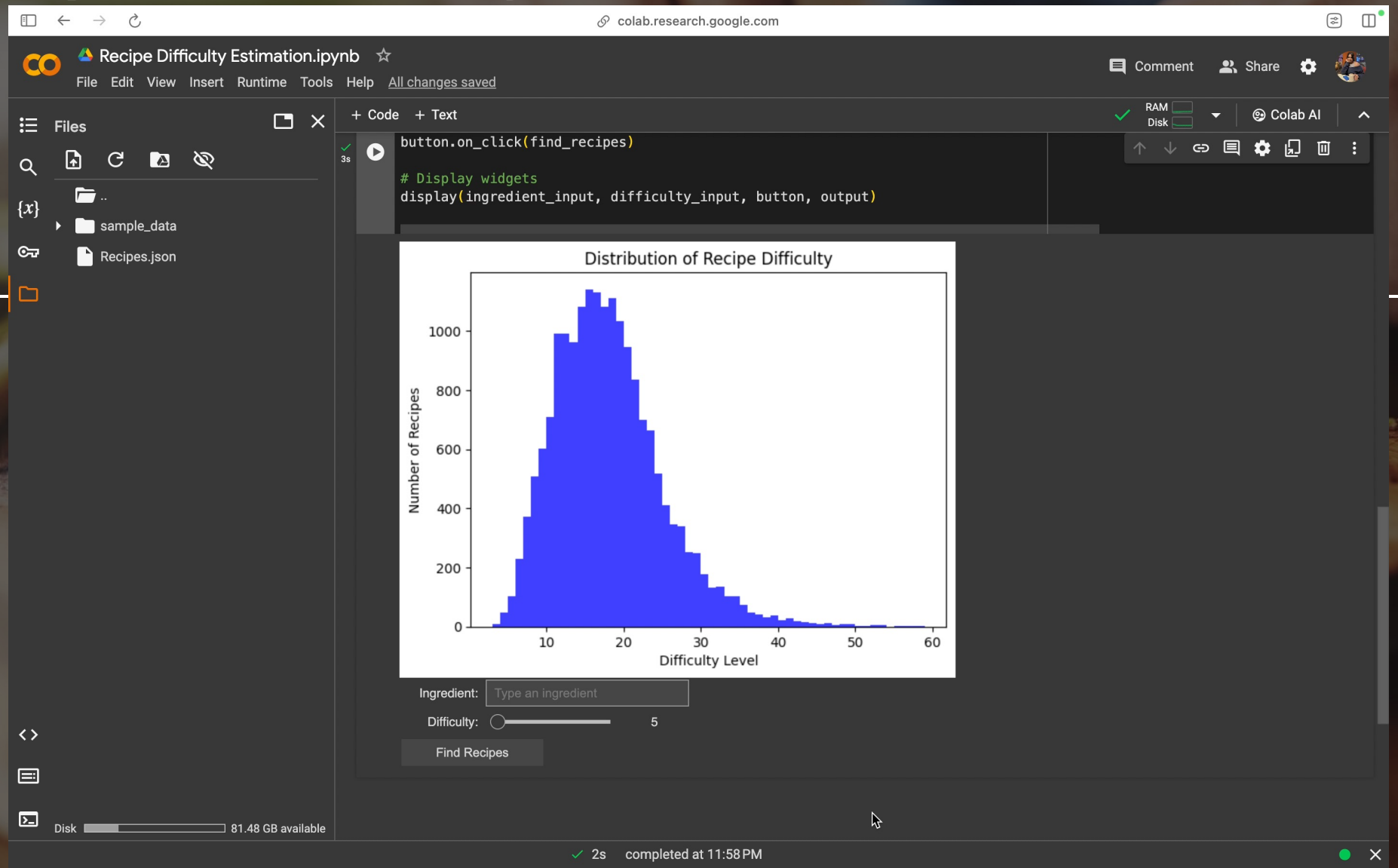
Recipe Difficulty

1. Data Loading and Preparation
2. Difficulty Calculation
3. Visualization
4. Interactive Features for Recipe Search

Recipe Difficulty



Recipe Difficulty Demo



Recipe Recommendation

1. Data Loading
2. Data Preparation
3. User Interface for Ingredient Input
4. Recipe Filtering and Detailed Display
5. Interactivity and Output

Recipe Recommendation Demo

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Recipe Recommendation.ipynb

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Files

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Recipes.json

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```
                print(f"Step {step['step']}: {step['direction']}")
            print("\n")

# Linking widgets
ingredient_input.on_submit(search_recipes_by_ingredient)
recipe_list.observe(show_recipe_details, names='value')

# Display widgets
display(ingredient_input, recipe_output, recipe_list, detailed_recipe_output)
```

Ingredients: Type ingredients, separated by co

Recipes:

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Recipe Summarization

1. Data Loading
2. User Interface Components
3. Data Summarization Functions
4. Event Handling and Display

Recipe Summarization Demo

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RecipeSummarizer.ipynb

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sample_data

Recipes.json

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```
        summary_output.clear_output()
        print(f"Recipe: {recipe['name']}\n")
        print(f"Key Ingredients: {main_ingredients}\n")
        print(f"Summary of Directions: {brief_description}\n")

# Observing changes in the dropdown to update the summary
recipe_selector.observe(display_recipe_summary, names='index')

# Display the widgets
display(recipe_selector, summary_output)
```

Select Reci... Crispy Cheese Twists

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Conclusion

Application

1. Personalized Cooking Experience
2. Culinary Education
3. Nutritional Planning
4. Food Service Industry Optimization
5. Content Creation for Food Bloggers and Chefs