Recipe Recommender Assignment EDA

By:

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Problem Statement:

Design a recommender system to recommend recipes to users based on their choice and the current recipe they are looking at for food.com by Extracting features from data.

The recommendation engine is a way to increase the website's user engagement. If a user is shown relevant recipes, they are more likely to spend more time on site reading about recipes. Higher user engagement will likely result in more business opportunities like collaborations, promotions, etc.

The performance of a recommendation engine will significantly impact the revenue your recipe site can generate.

BUSINESS OBJECTIVE:

- This recipe is to analyze user interactions with recipes in order to understand user preferences and identify patterns that can be used to improve the recipe recommendations for users.

  This can be accomplished by analyzing factors such as review time since submission, preparation time, number of steps, and number of ingredients, and determining which factors are most strongly correlated with high ratings.

  The resulting insights can be used to inform the development of a more effective recipe recommendation algorithm, which can help to increase user engagement and satisfaction with the recipe website or application.

  Additionally, this analysis can be used to identify potential areas for improvement in the recipe content and presentation, such as reducing the number of steps or ingredients in a recipe. The overall goal is to improve user experience and increase customer retention and acquisition.

- from pyspark.sql import SparkSession
- from pyspark.sql import SparkSession
- spark = SparkSession.builder.appName("Basics").getOrCreate()
- from pyspark.sql import functions as F
- Import for typecasting columnsfrom pyspark.sql.types import IntegerType,BooleanType,DateType,FloatType,StringType
- from pyspark.sql.types import ArrayType

- This code imports various functions and types from the PySpark library, which is used for working with data in the Apache Spark framework.
- we can use these types and functions in our code to manipulate and analyze data stored in Spark DataFrames
- We have included some test cases given below. We have complete the tasks .

Solution Methodology

Data cleaning and data manipulations.

- Solution to All Tasks
- Read the data
- List of nutrition columns
- Extract individual features from the nutrition column.
- Use string operations to remove the square brackets from the nutrition column
- Split the nutrition column into seven individual columns and cast the new columns to float values.
- Nutrition column split into multiple
- We have included some test cases given below. You can use them to check if you have completed the task correctly.

DATA MANIPULATION

- Standardize the nutrition values
- By converting the nutrition values from absolute to relative terms, we ensure that portion size is not a factor in the analysis.
- All nutrition columns standardized to per 100 caloriesWe have included some test cases given below. You can use them to check if you have completed the task correctly
- Complete the code in the following cell
- Convert the tags column from a string to an array of strings
- Join Recipe Data to Review Data and Read the second data file
- Create time-based features
- Save the data we have created so far in a parquet file. ('s3a://upgradfoodrecsysdir/interaction_level_df_processed.parquet')

- has a header row and that the data types for all columns should be inferred automatically. The file is located at "s3a://raw-recipes-clean-
  1. ('s3://recipe-assignment/data/interaction_level_df_processed.parquet’)
  2. ('s3://recipe-assignment/data/interaction_level_df_postEDA.parquet’)
  3. ('s3://recipe-assignment/data/interaction_level_df_ModelReady.parquet')

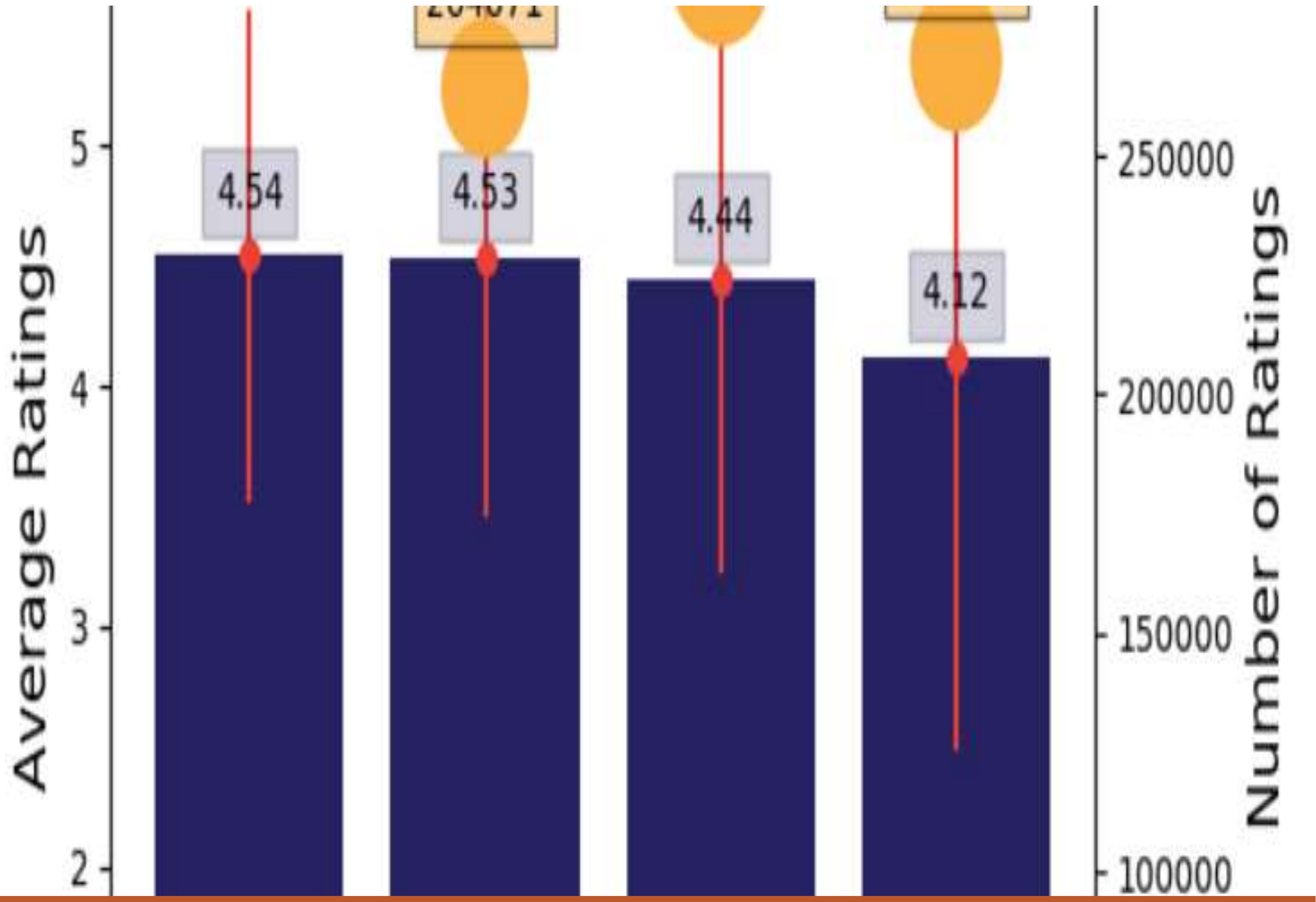
- Such values and Null values are treated as Not Declared and used for further analysis
- Numerical Missing values have been dropped
- Outlier Treatment of TotalVisits and Page Views Per Visit.
- Observed that major part of null values in "Page Views Per Visit", "TotalVisits" are Converted. So, imputing
- median values of them to null values.

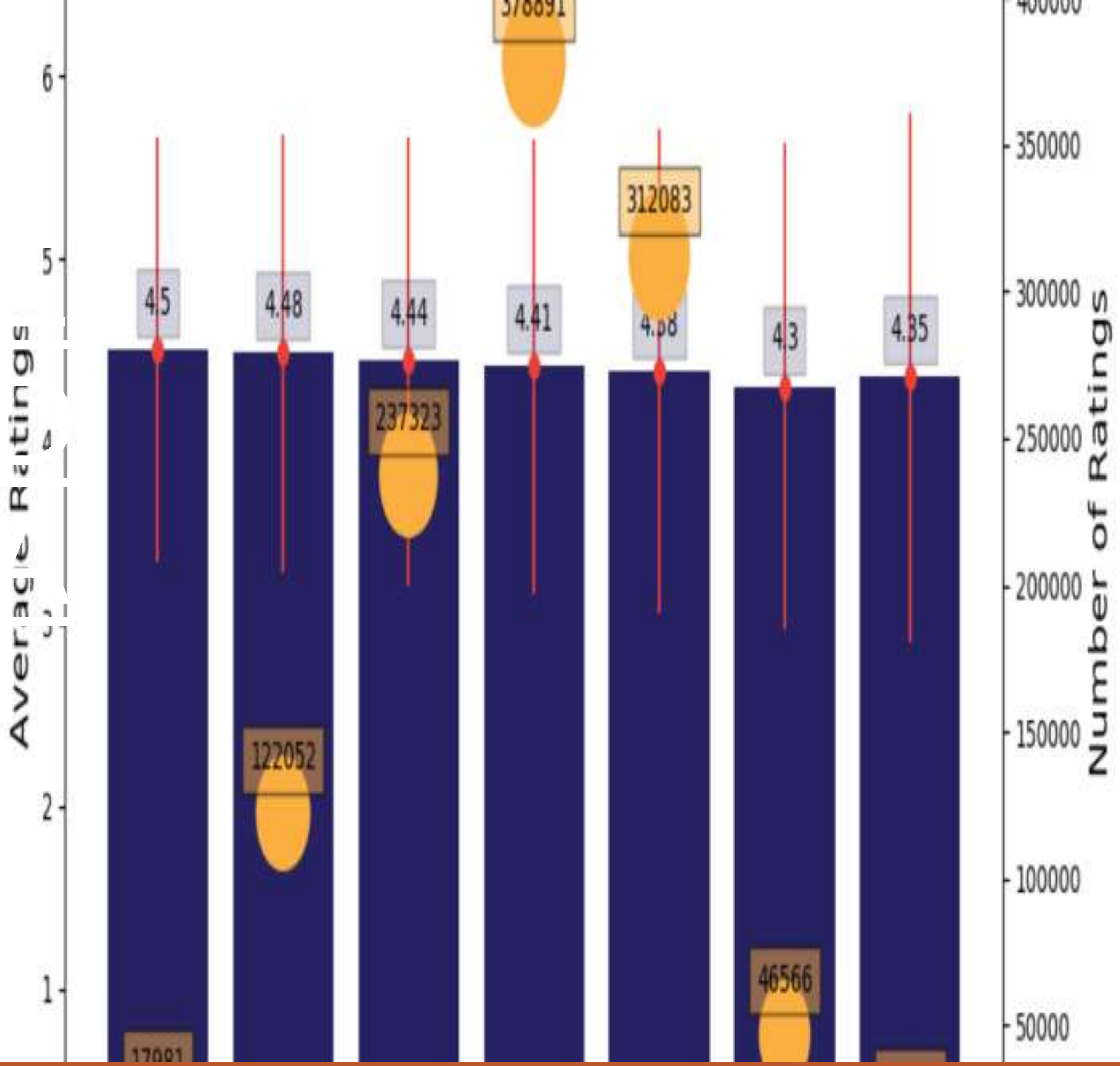
EDA

Years since submissionon review date

[Review Time Since Submission]

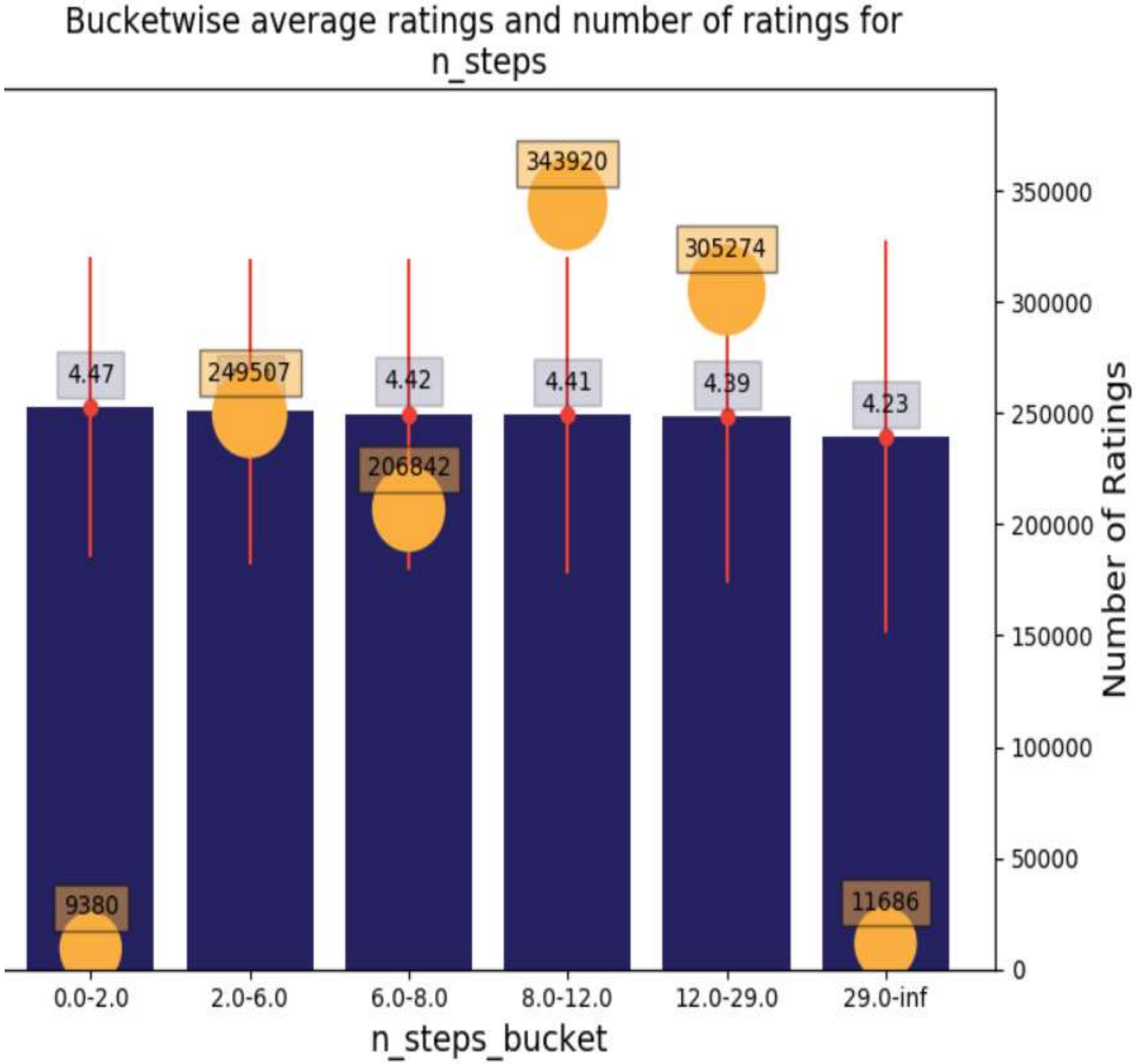
- Recipes more than 6 years old are rated low





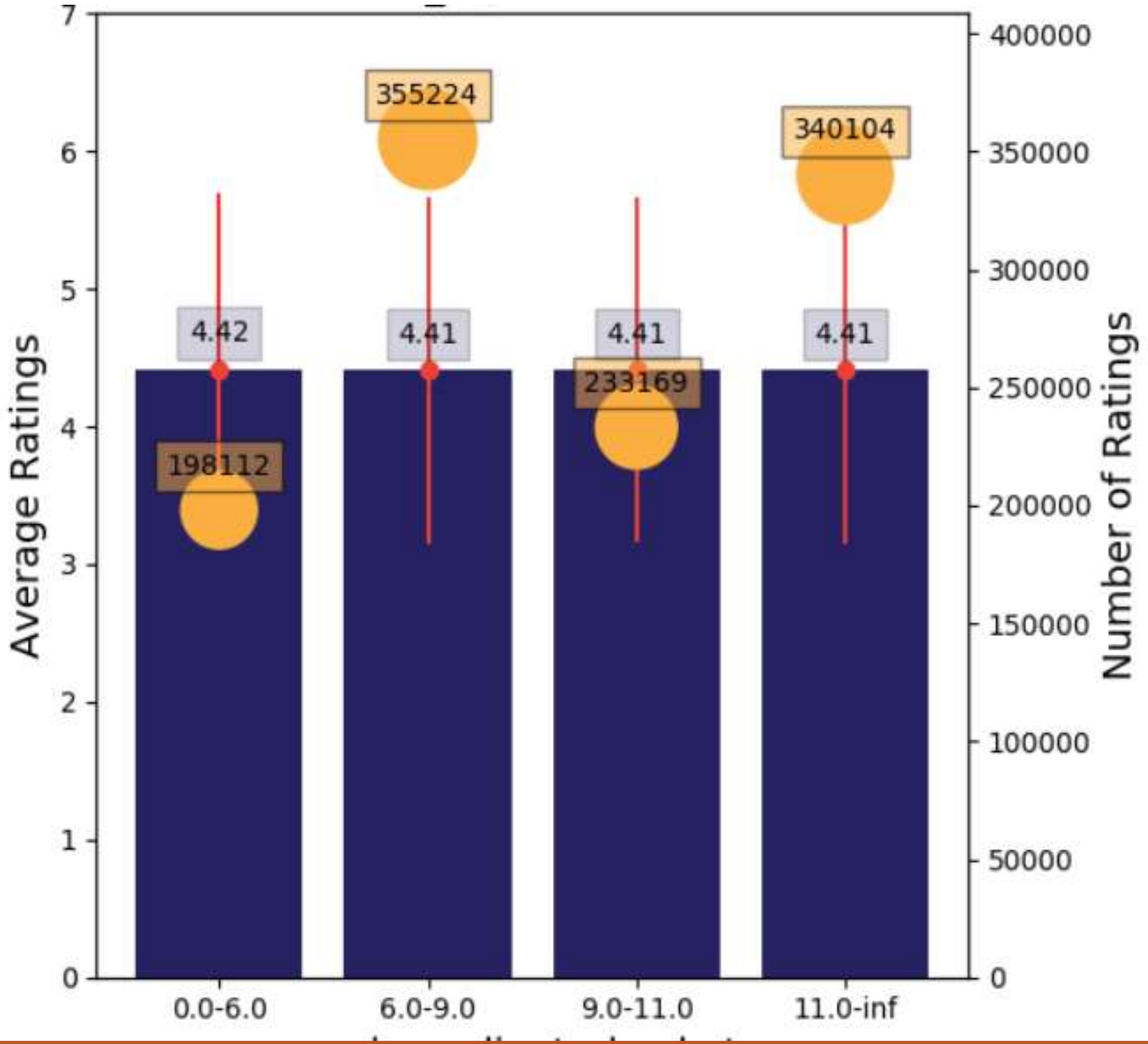
Preparation time

- ➢ Somewhat relevant
- ➢ Low prep time is preferred



Number of steps

- Clearly relevant
- Recipes with less than 2 steps are rated high
- Recipes with more than 29 steps are rated very low



Number of ingredients

- ➢ Not relevant

EDA

Nutrition columns

- calories - Calories per serving seems irrelevant
- fat (per 100 cal) - Calories per serving seems irrelevant
- sugar (per 100 cal) - Calories per serving seems irrelevant
- sodium (per 100 cal) - Calories per serving seems irrelevant
- protein (per 100 cal) - Calories per serving seems irrelevant
- sat. fat (per 100 cal) - Calories per serving seems irrelevant
- carbs (per 100 cal) - Calories per serving seems irrelevant

EDA

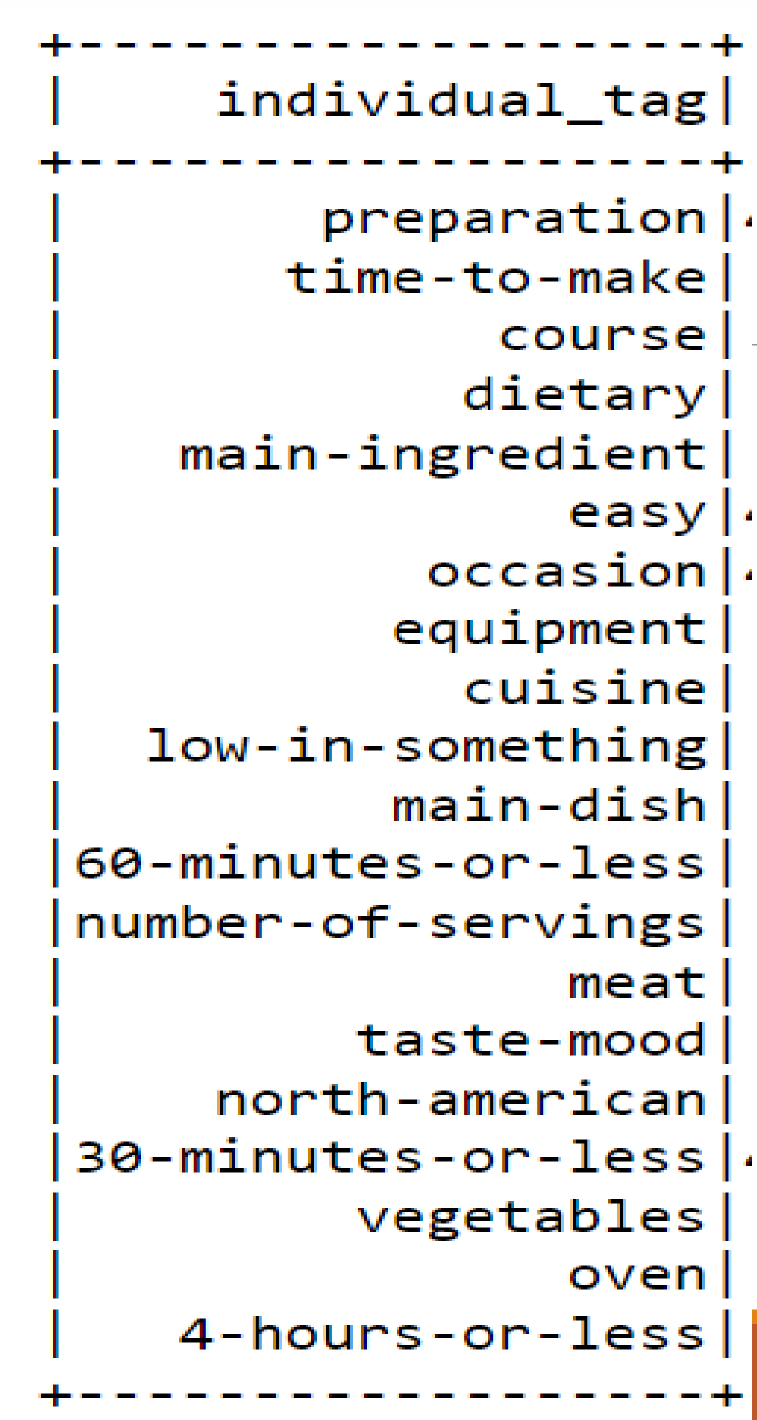
More Features:

High ratings = 5 rating

- User avgrage years between review and submission high ratings
- User avgrage Preparation time recipes reviewed high ratings
- User avgrage number of steps recipes reviewed high ratings
- User avgrage number of ingredients recipes reviewed high ratings

EDA

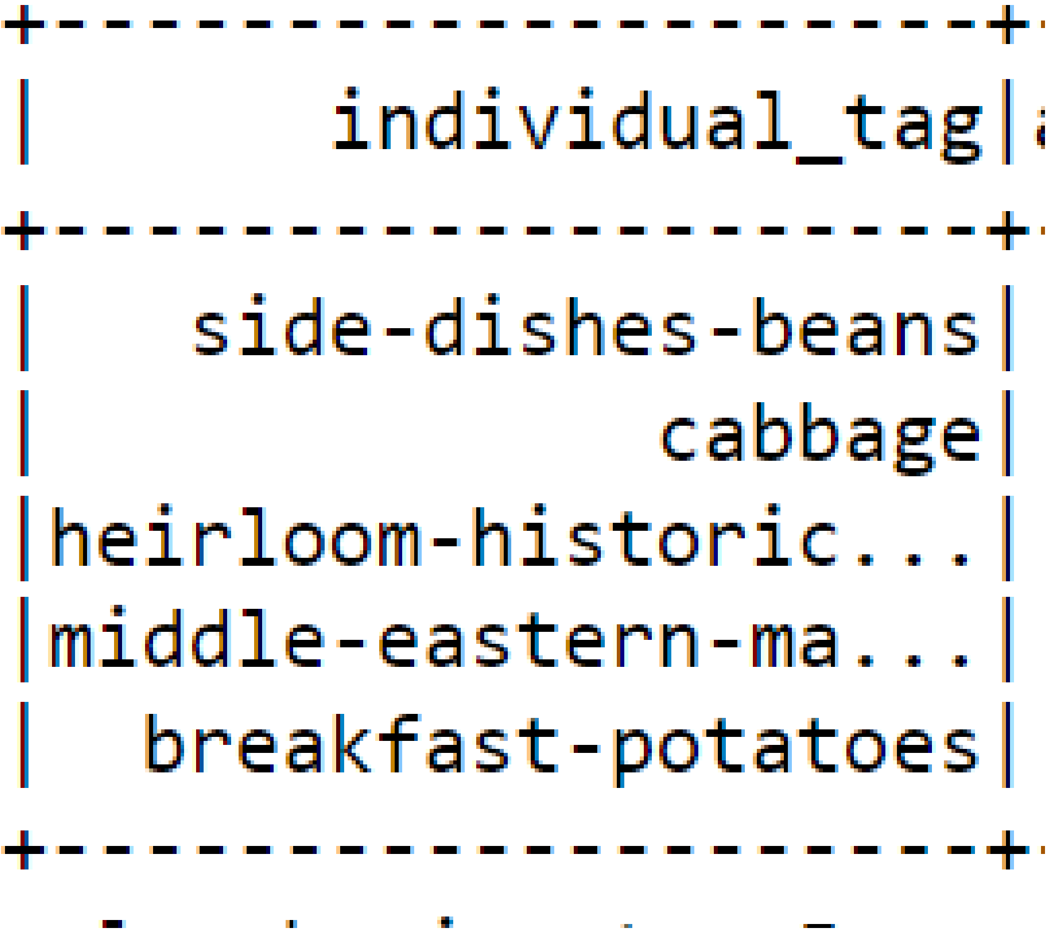
Top numbers most rated tags



```
+------------------+
|      individual_tag|
+------------------+
|       preparation|
|      time-to-make|
|            course|
|           dietary|
|   main-ingredient|
|              easy|
|          occasion|
|         equipment|
|           cuisine|
|  low-in-something|
|         main-dish|
|60-minutes-or-less|
|number-of-servings|
|              meat|
|        taste-mood|
|    north-american|
|30-minutes-or-less|
|        vegetables|
|              oven|
|   4-hours-or-less|
+------------------+
```

EDA

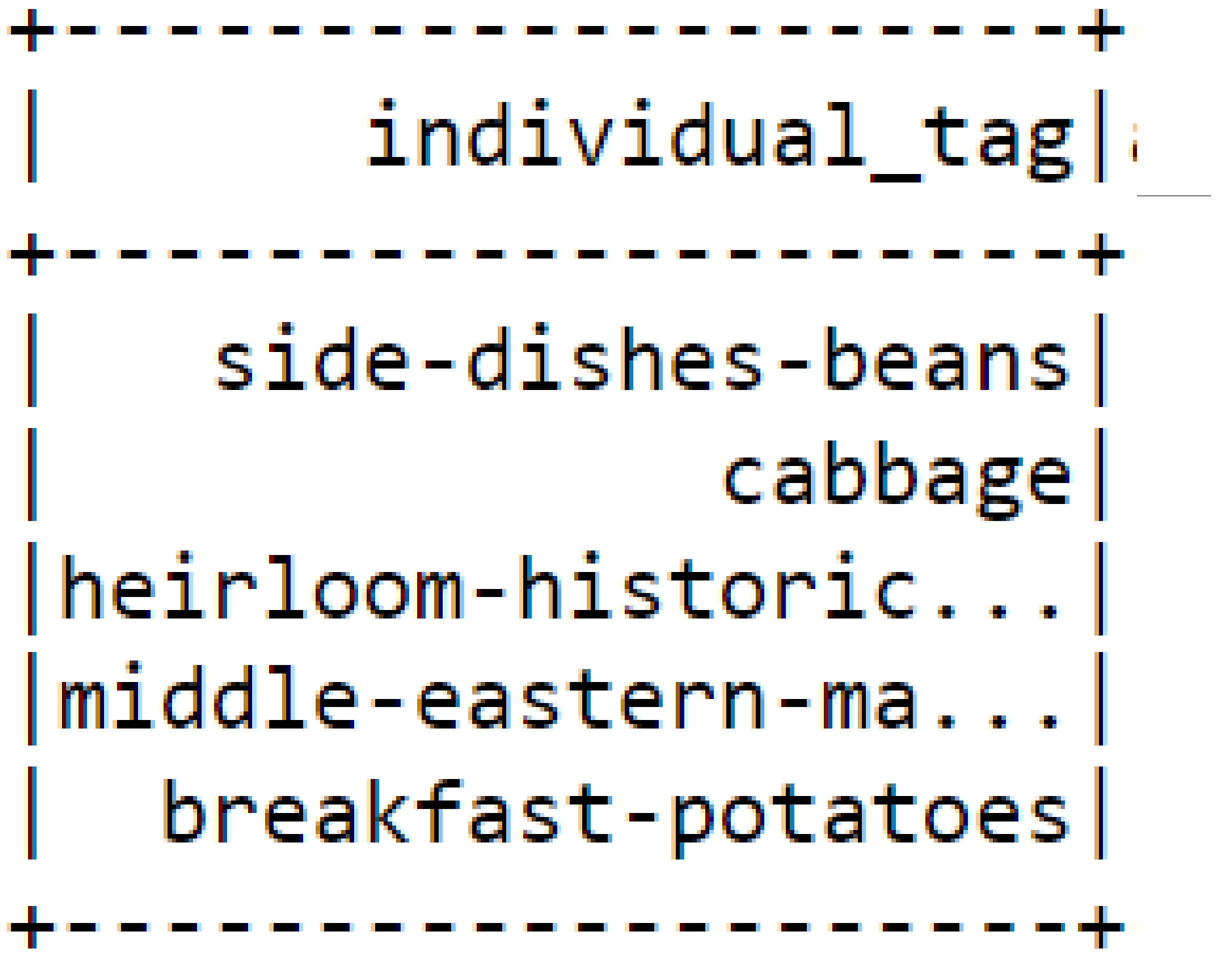
Bottom number least rated tags



```
+--------------------+
|      individual_tag|
+--------------------+
|   side-dishes-beans|
|             cabbage|
|heirloom-historic...|
|middle-eastern-ma...|
|  breakfast-potatoes|
+--------------------+
```

EDA

Top number rated tags



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|      individual_tag|
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|   side-dishes-beans|
|             cabbage|
|heirloom-historic...|
|middle-eastern-ma...|
|  breakfast-potatoes|
+--------------------+
```

Conclusion and Recommendations:

In this analysis of recipe data shows that the review time since submission and the number of steps, preparation time and number of ingredients are important factors in determining the rating of a recipe.

Recipes that are reviewed by users after a long time from the submission date, have less number of steps, less preparation time and less number of ingredients tend to have high ratings of 5.

In contrast, the number of ingredients in a recipe is not found to be relevant to the rating. Similarly, the nutrition columns such as calories, fat, sugar, sodium, protein, and fat. and per serving are not found to be relevant in determining the rating of a recipe.

The findings of this analysis can be used to inform decisions about recipe development and presentation to users in order to meet their preferences.