

Introduction to Data Analytics in Marketing

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Homework 3

Recommendation System

Please submit your homework through my.nes as a PDF file. It should include your code and result. Please take time to format your homework so it is easy to read. Take care that axes on graphs should be labeled, tables should be formatted so we can understand what they mean (including units), and every result should be explained in words.

Data Description.

AllRecipes.com is a website which allows users to share, search, and save recipes. For each recipe, the site contains a brief recipe description, a list of ingredients, cooking time, cooking directions, nutrition information and reviews (see Figure 1 for an example recipe). For each user, the site displays the user's "recipe box", or recipes he has saved on the site. Our goal is to use these data to estimate these user's preferences and make predictions about what recipes they might like.

We have preprocessed the recipe descriptions of 1000 recipes to extract 1,077 ingredients and 7 cooking methods only. We then used a Lasso regression to do feature selection, to shrink this to 84 features (81 ingredients and 3 cooking methods). The resulting features are contained in the file "fe_recipe_attribute_matrix_file84". The information on which recipes a user saved are contained in the file "fe_user_recipe_matrix". This file contains a user-by-recipe matrix, which has a 1 if the user liked the recipe, and 0 otherwise.

The third file "user_recipe_matrix_train_only" is the same as the "fe_user_recipe_matrix" file, with 10% of the values changed to 2. These correspond two cells that should be used for testing the models, i.e. they should not be used for training.


1. Please predict the values in those cells using:

- A. A k-Nearest Neighbors approach, using only the user-recipe matrix (not using the recipe ingredients or cooking methods). Try both user-based and item-based approaches. Please explain in words exactly how you implemented k-NN, including similarity function, neighborhood size, and prediction function.
- B. A logit-based approach, using the recipe attributes. For this approach, please first fit a simple logit model for each individual. What is the problem? Demonstrate with a plot of estimated coefficient for at least one feature. Explain how regularization may solve this problem, and implement a regularized logit. Again, explain specifically what you did (regularization type and parameter).

2. For both the above approaches, report model performance on the following metrics: Mean Absolute Error, Root Mean Square Error, and Precision, Recall, and F1 for top-N metrics for several values of N.

allrecipes.com
search
by ingredient
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RECIPE BOX
SHOPPING LISTS
MENU PLANNER



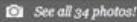
Chicken Asparagus Roll-Ups
READY IN
55 mins

★★★★★ Read Reviews (406)

Pin it 14Kx Like 6.8k Tweet 12 8+1 45

Recipe by Monica

"Very flavorful chicken and asparagus dish with almost a hollandaise-inspired flavor with a little crunch from the Panko breadcrumbs. Quick and easy to prepare, the presentation is simple yet elegant. Great served with artichokes!"



Recipe Box Shopping List Menu Email Print

Ingredients Edit and Save

Original recipe makes 4 servings Change Servings

☐ 1/2 cup mayonnaise
☐ 1/2 teaspoon salt

☐ 3 tablespoons Dijon mustard
☐ 16 spears fresh asparagus, trimmed

☐ 1 lemon, juiced and zested
☐ 4 skinless, boneless chicken breast halves

☐ 2 teaspoons dried tarragon
☐ 4 slices provolone cheese

☐ 1 teaspoon ground black pepper
☐ 1 cup panko bread crumbs

Check All Add to Shopping List

Directions

- Preheat oven to 475 degrees F (245 degrees C). Grease a baking dish. In a bowl, mix together the mayonnaise, Dijon mustard, lemon juice, lemon zest, tarragon, salt, and pepper until the mixture is well combined. Set aside.
- Cook asparagus in the microwave on High until bright green and just tender, 1 to 1 1/2 minutes. Set the asparagus spears aside. Place a chicken breast between two sheets of heavy plastic (resealable freezer bags work well) on a solid, level surface. Firmly pound the chicken breast with the smooth side of a meat mallet to a thickness of about 1/4 inch. Repeat with the rest of the chicken breasts.
- Place 1 slice of provolone on each chicken breast, and top the cheese with 4 asparagus spears per breast. Roll the chicken breasts around the asparagus and cheese, making a tidy package, and place, seam sides down, in the prepared baking dish. With a pastry brush, apply a coating of the mayonnaise mixture to each chicken breast, and sprinkle each with panko crumbs, pressing the crumbs into the chicken to make a coating.
- Bake in the preheated oven until the crumbs are browned and the chicken juices run clear, about 25 minutes.

PREP
25 mins

COOK
30 mins

READY IN
55 mins

Reviews More Reviews

Most Helpful Positive Review
★★★★★ Apr 05, 2012
I loved it!! Absolutely wonderful!! And you know I completely disagree with the person before me Who... —LoLo
See full review »

Most Helpful Critical Review
★★★★☆ Apr 18, 2011
This just did not work for us. I was worried about the tarragon, but I couldn't even taste it for all the lemon. The... —ShellyD
See full review »

544 Ratings

See other versions of this recipe!

Nutrition

Calories	530 kcal		27%	Carbohydrates	28.8 g		9%
Cholesterol	97 mg		32%	Fat	33.3 g		51%
Fiber	2.8 g		11%	Protein	36.8 g		74%
Sodium	1170 mg		47%				

* Percent Daily Values are based on a 2,000 calorie diet.

Figure 1: example recipe page.

