

What makes a good muffin?

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CS 229 Project

Banana Muffins II Recipe - Allrecipes.com



[allrecipes.com/recipe/.../banana-muffins-ii/](https://www.allrecipes.com/recipe/.../banana-muffins-ii/) ▾ Allrecipes.com ▾
★★★★★ Rating: 4.8 - 2,379 reviews - 35 min - 187 cal
These delicious **banana muffins** are easy for kids to make.

Banana Muffins Recipe : Food Network Kitchen : Food ...



www.foodnetwork.com/.../banana-muffins-re... ▾ Food Network ▾
★★★★★ Rating: 3.8 - 77 reviews - 45 min
Preheat the oven to 425 degrees F. Lightly brush a 12-muffin tin with butter and set aside. Whisk the flour, baking soda, brown sugar, and cinnamon together in a medium bowl; set aside. Whisk the **banana**, oil, milk, eggs, salt, and vanilla in a large measuring cup with a spout or ...

Easy Banana Muffins Recipe - Food.com

www.food.com/recipe/easy-banana-muffins-8603 ▾ Food.com ▾
Make and share this Easy Banana Muffins recipe from Food.com.



Motivation and project aims

The problem: finding a good recipe is hard

- is the best rated recipe really the most delicious?
- what if I want to use soy milk instead?
- well, I don't have any buttermilk...
- how should I split three eggs in half?!

Project aim: develop algorithm to suggest optimal muffin recipe


- predict recipe success based on ingredients
- allow for substitutions
- suggest scaling relationships

Data collection and feature refinement

Moist Chocolate Muffins

★★★★★ 187

Made 274 times



Ingredients

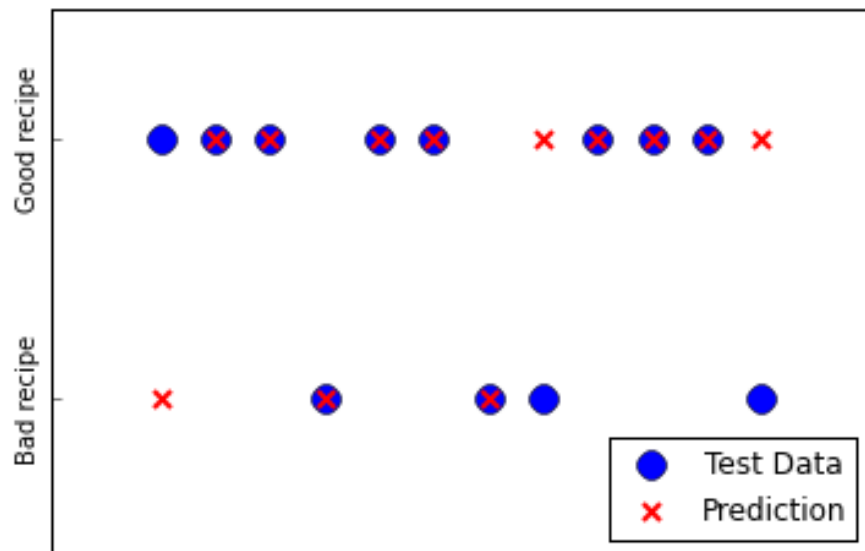
- + 2 cups all-purpose flour
- + 1 cup white sugar
- + 3/4 cup chocolate chips
- + 1/2 cup unsweetened cocoa powder
- + 1 teaspoon baking soda
- + 1 teaspoon vanilla extract
- + 1 egg
- + 1 cup plain yogurt
- + 1/2 cup milk
- + 1/2 cup vegetable oil
- + 1/4 cup chocolate chips

```
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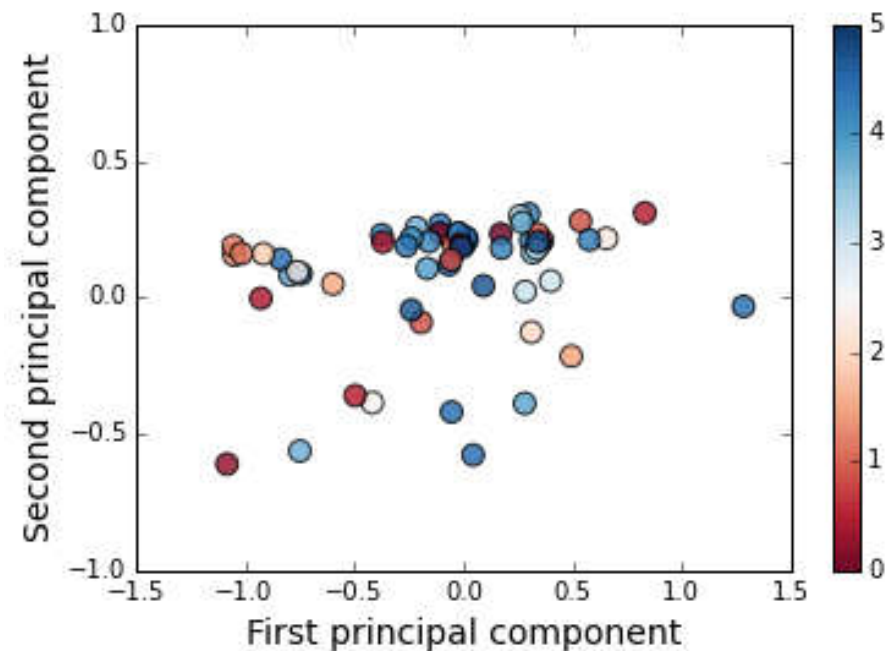
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ingredients = {id: 1684,  
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unit: `cup`,  
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Predicting success of banana muffins

Logistic regression
successfully predicts
recipe outcome

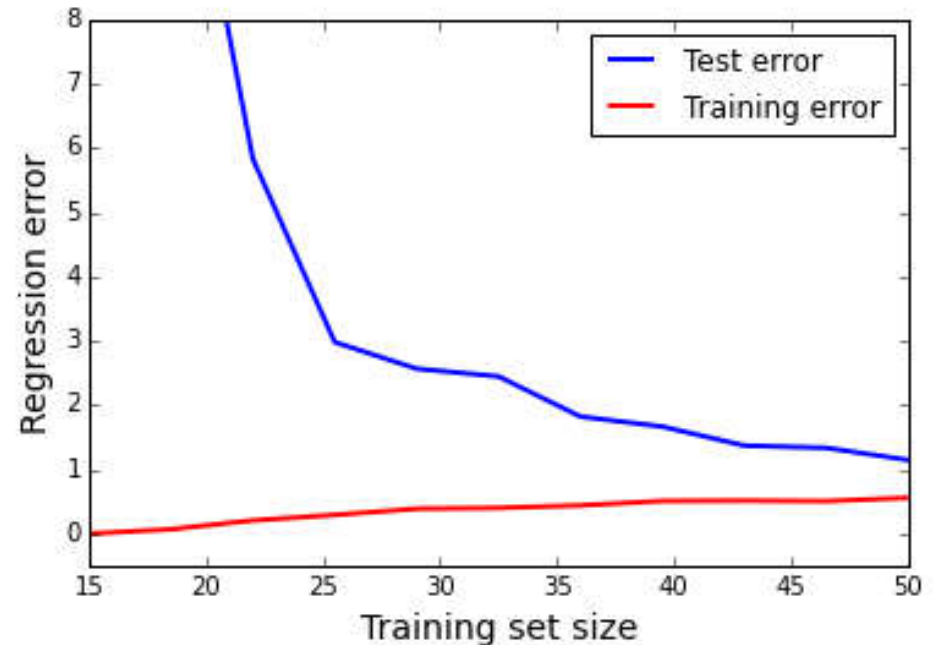
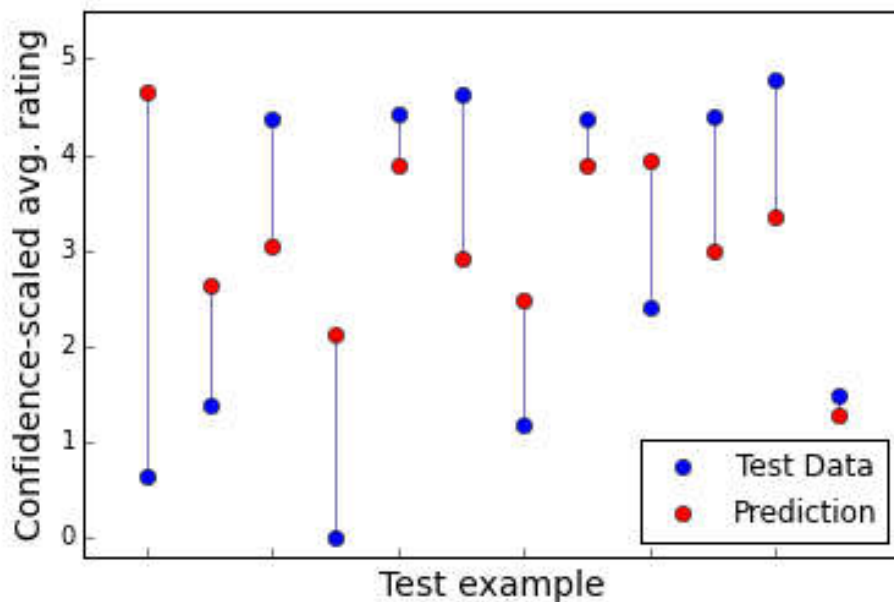


PCA analysis suggests
some data structure



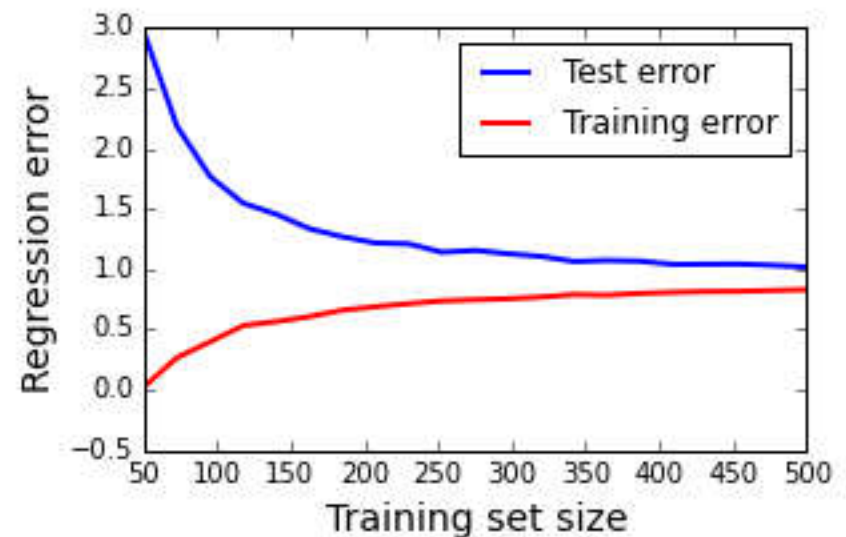
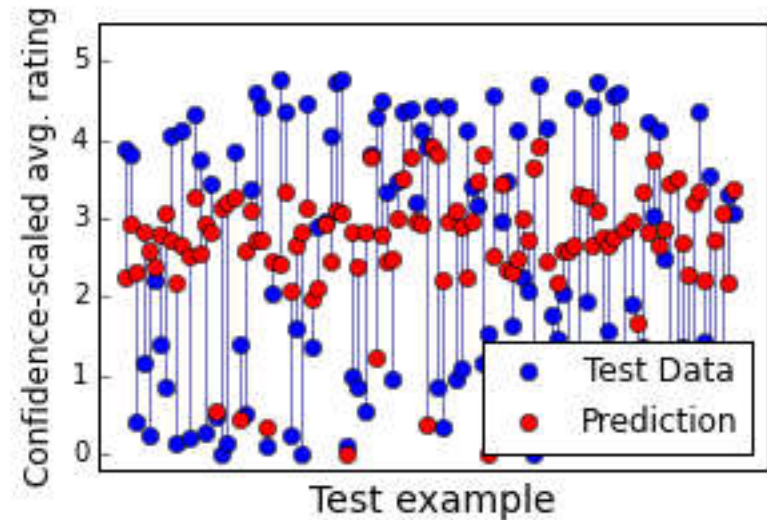
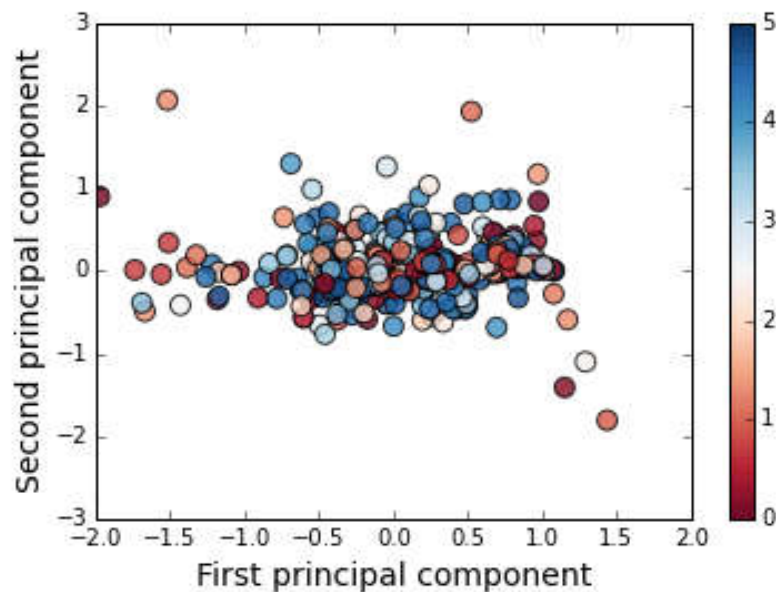
Regression model of muffin success

Regression model would allow for optimizing ingredients to maximize recipe success



Predicting success of any muffin

Data on all muffins displays complex structure. Linear regression is not reliable in predicting recipe success. Model suffers from high bias and high variance



Advanced models and conclusions

SVM Classification with Gaussian kernel does not reliably predict recipe outcome

		Predicted:	
		Bad	Good
Actual:	Bad	22	42
	Good	6	38

N = 108

Conclusions

- Logistic regression successfully predicts banana muffin recipe success
- Generalizing the model to a wider variety of muffin recipes presents a challenge, which may be solved by collecting more data
- Successful development of this software will remove guesswork from cooking to deliver robust results