Predicting Halloween Candy Desirability

STAT 425: Statistical Modeling I

Matthew Klima & Gabe Price

**UNIVERSITY OF ILLINOIS**
URBANA-CHAMPAIGN

Background

- to identify the qualities that make a Halloween candy more desirable based on win percentages from a survey of over 8,000 participants
- FiveThirtyEight's survey of 269,000 candy match-ups with calculated win percentages for each candy
- key candy features such as chocolate, fruity, caramel, peanutalmondy, and nougat were considered to determine desirability

Box & Whisker Plot of Candy Win%
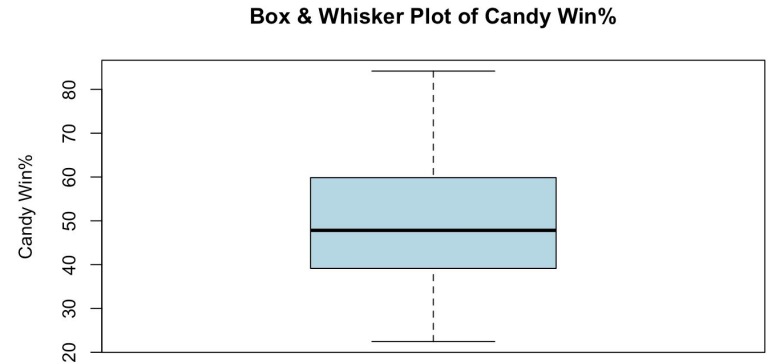
Data Overview

- we started by including all available predictor variables in the full multiple linear regression model to explain the variation in candy's win percentage

- after examining the p-values in the full model, we identified chocolate, fruity, and peanutyalmondy as the statistically significant variables ($p < 0.05$)

- the final reduced model contains only the significant predictors, which improve the model's interpretability and minimize multicollinearity

Q-Q Residuals

Theoretical Quantiles
lm(winpercent ~ chocolate + fruity + peanutyalmondy)
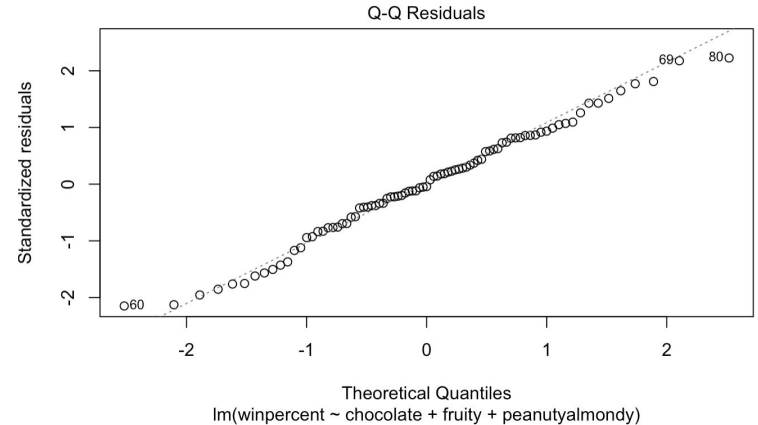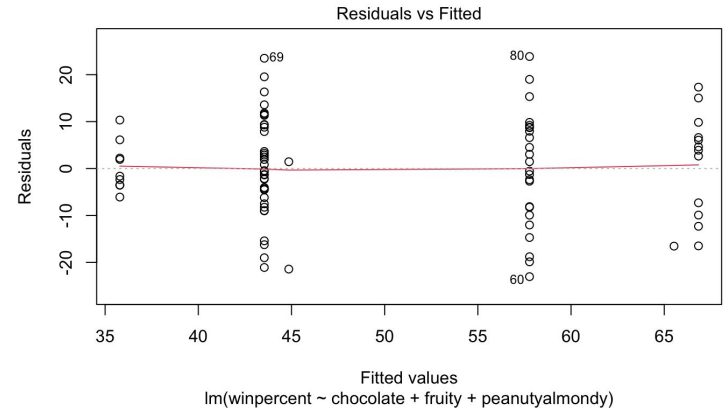
Model Predictions

- the model under-predicted the win percentages for all candies, especially for Reese's Peanut Butter Cup and Almond Joy, where actual win percentages were significantly higher

- the results suggest that additional variables or adjustments may be needed to better predict the desirability of certain candies

Candy Win %	Predicted	Actual	Residual
Almond Joy	66.84	50.35	16.49
Candy Corn	35.79	38.01	2.22
Reese's Peanut Butter Cup	66.84	84.18	17.34
Snickers	66.84	76.67	9.84

Hypothesis Test

- the null hypothesis that chocolate, fruity, and peanutyalmondy do not affect the winpercent was rejected, indicating these factors significantly impact a candy's winpercent

- p-values for chocolate, fruity, and peanutyalmondy are all below 0.05, showing strong evidence that each of these variables has a significant effect on candy desirability.

- chocolate has the strongest influence, followed by peanutyalmondy and fruity