# Computational Tools to Improve Healthy and Pleasurable Eating in Young Children

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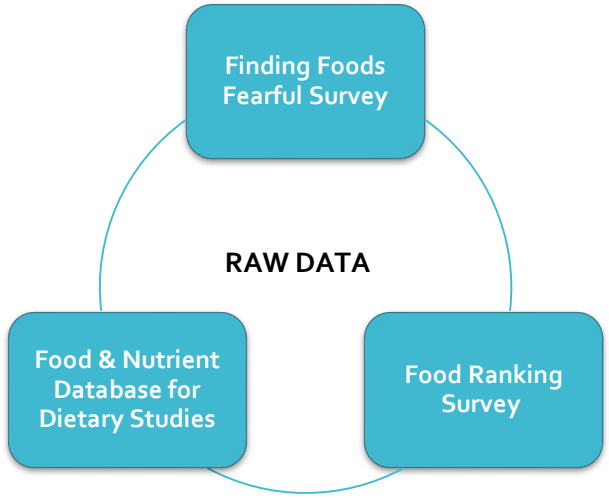
## Introduction

Avoidant Restrictive Food Intake Disorder (ARFID), colloquially understood as "extreme picky eating," is an eating disorder characterized by highly selective eating habits, disturbed feeding patterns, or both. Because ARFID is such a new and broad diagnosis, not much is understood about its diverse manifestations or the most effective methods of diagnosis and treatment.




**Screening**

- Identify most predictive variables of ARFID
- Explore both clinical and food related variables
- Streamline existing **screening tool**

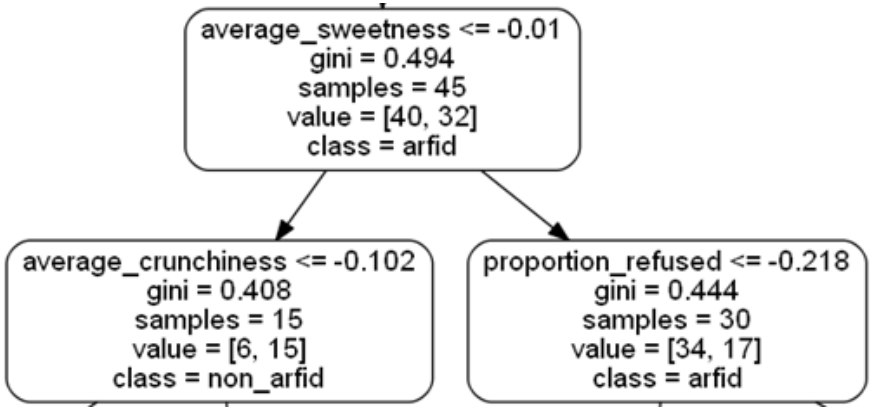
**Treatment**

- Create **food recommendation system**
- Incorporate data on sensory qualities, willingness to try, and nutrition for each food
- Project foods into two-dimensional space

# ARFID Screening

## Random Forest

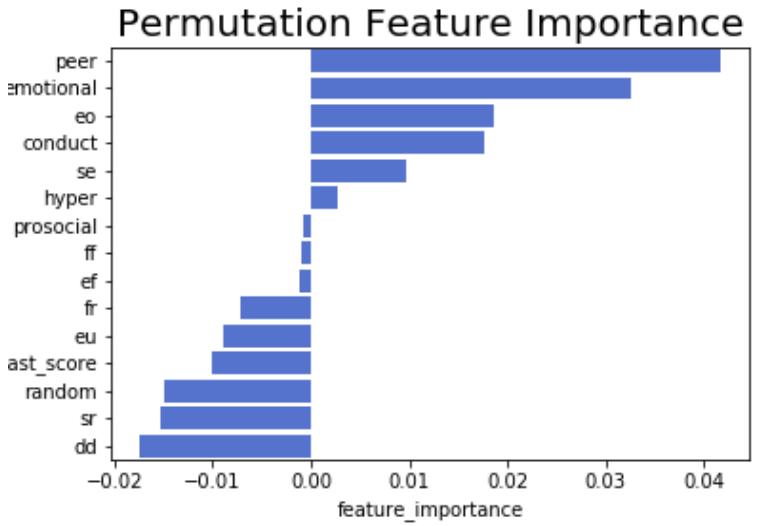
- Goal: Identify the best variable predictors of ARFID
  - Clinical and behavioral subscales (CAST, CEBQ, PFQ, SDQ)
  - Various food preferences

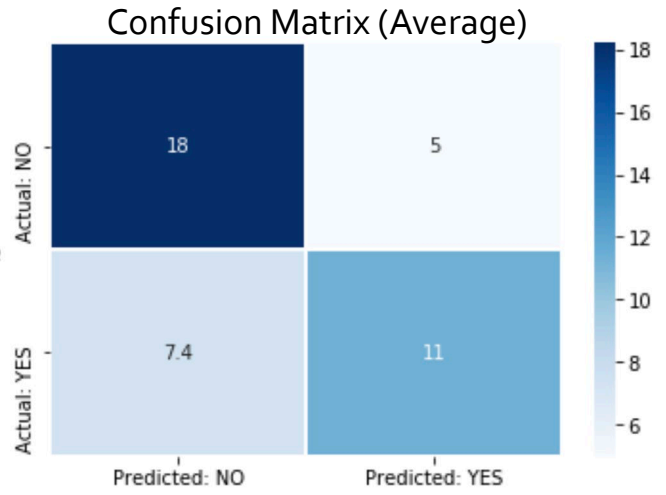



## Future Work

- Create faster and more streamlined screening process for ARFID doctor consultation
- Improve accuracy

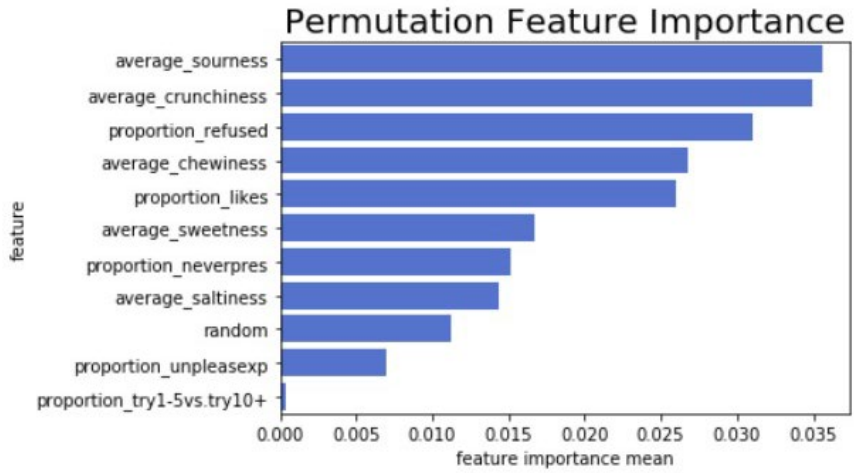
## Clinical and Behavioral Scales, model accuracy = 70%

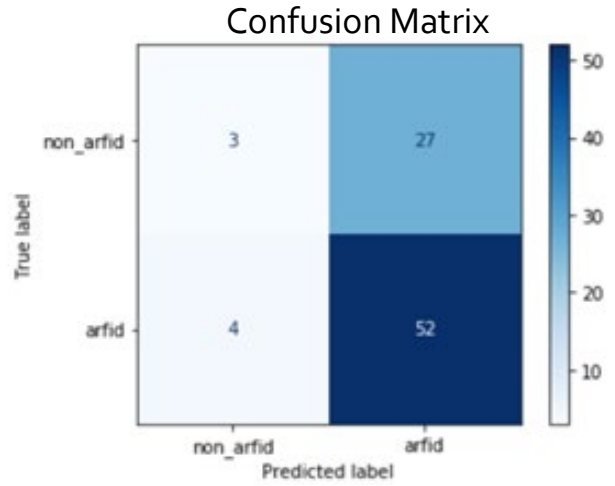



Recall = 0.688, precision = 0.698 , f1 = 0.688

## Food Preferences, model accuracy = 64%



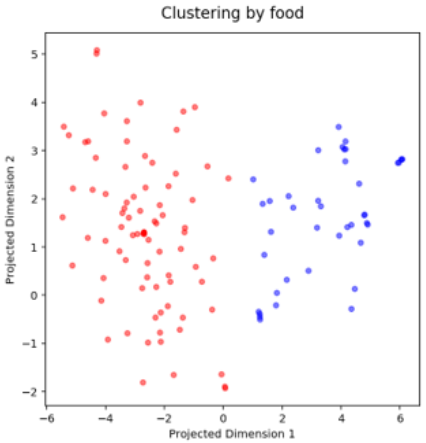

Macro-Average: Recall = 0.51, precision = 0.54, f1 = 0.47

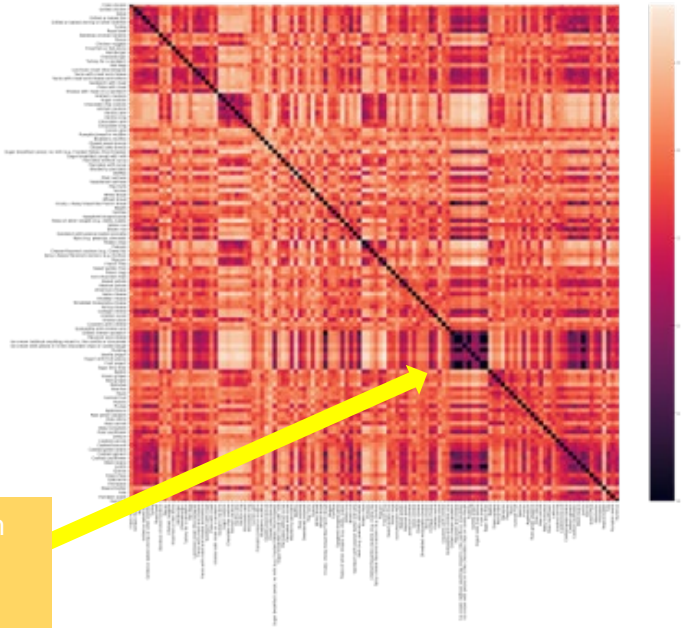
# ARFID Treatment

**<u>Goal:</u> Recommend new foods to children based on "similar picky children" eat.**

## Recommendation system

- Categorizing Methods
  - perception, human behavior, nutrition
- Clustering
  - Dimension reduction: PCA, t-SNE
  - Clustering methods: K-means, GMM, SOM
- Heat Map
  - Distance between food based on experience of trying

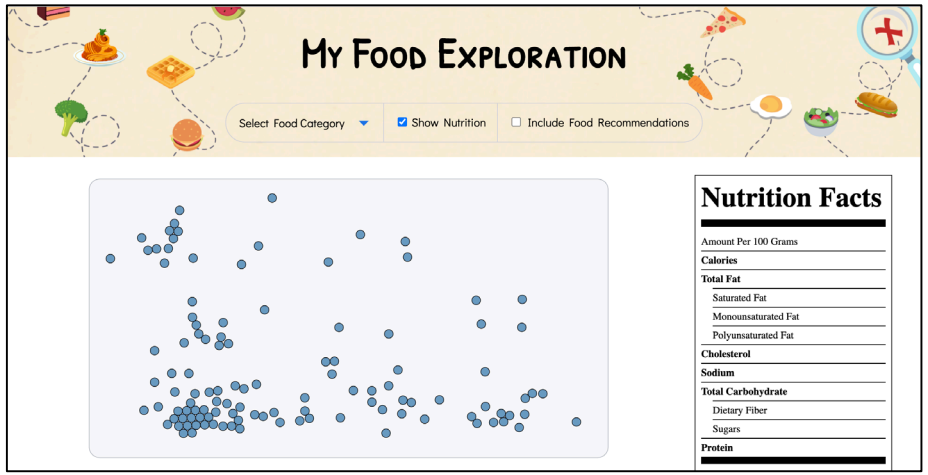


Ice cream
Pudding
Yogurt
Eggs

## Food Exploration Tool

- Each point on the scatterplot represents a food
  - Positioned based on picky eaters' ratings of how sweet, sour, salty, chewy, and crunchy the food is
- Highlight points by category
- Options to display nutrition information and/or show food recommendations

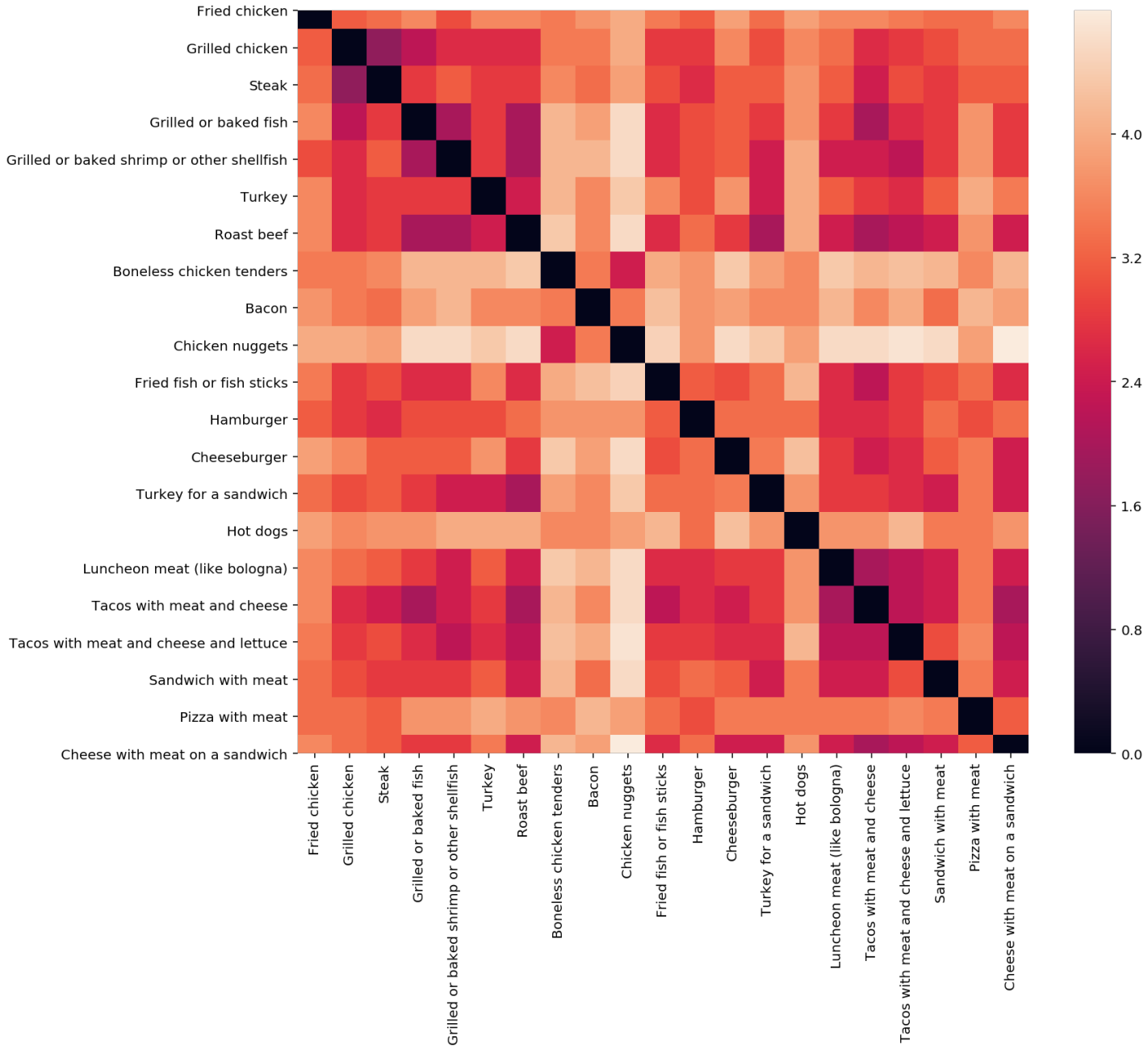



Link: http://my-food-exploration.s3-website-us-west-1.amazonaws.com/

## Future Work

- Create a mobile application for more convenient use of the food exploration system

# Appendix: Heat Map for meat



| | variable | description |
|---|---|---|
| 0 | average_sweetness | average level of sweetness for\nall foods that the participant likes |
| 1 | average_crunchiness | average level of crunchiness for all foods that the participant likes |
| 2 | average_chewiness | average level of chewiness for all foods that the participant likes |
| 3 | average_sourness | average level of sourness for all foods that the participant likes |
| 4 | average_saltiness | average level of saltiness of all foods that the participant likes |
| 5 | proportion_likes | proportion of foods in the survey that the participant likes |
| 6 | proportion_unpleasexp | proportion of foods in the survey that the participant recorded having an unpleasant eating experience with |
| 7 | proportion_refused | proportion of foods in the survey that the participant has refused to eat |
| 8 | proportion_neverpres | proportion of foods in the dataset that the participant has never been presented with to try eating |
| 9 | proportion_try1-5vs.try10+ | ratio of the number of foods from the survey that the participant has tried eating between 1 to 5 times over the number of foods from the survey that the participant has tried eating more than 10 times |

# Food Preference Variable Index