

Descriptive

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What is Descriptive?

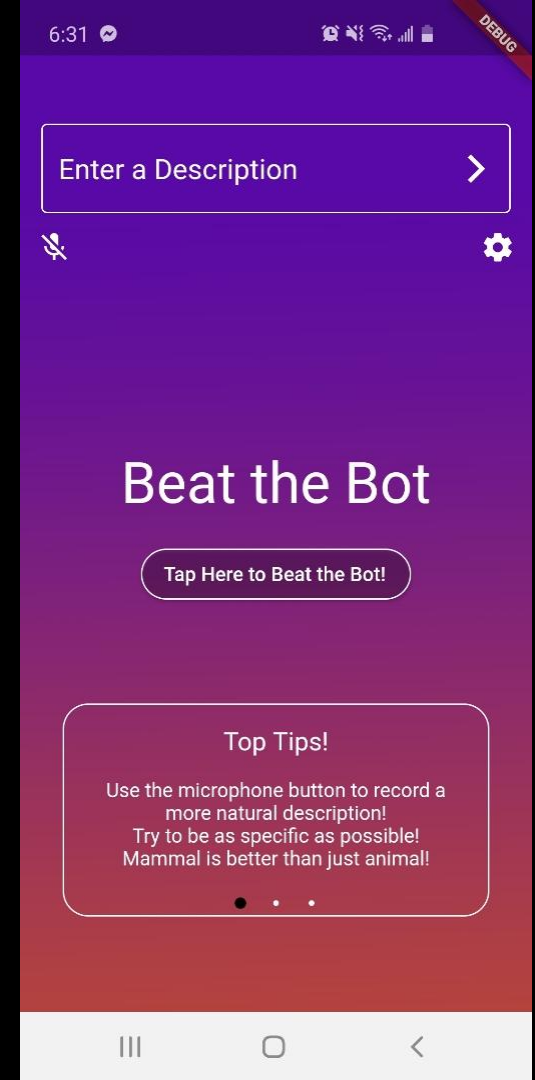
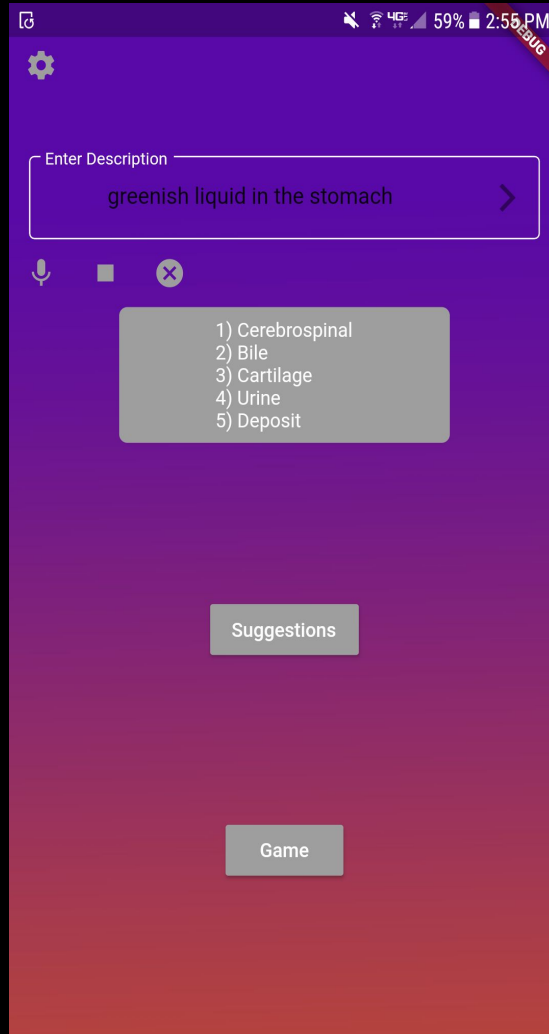
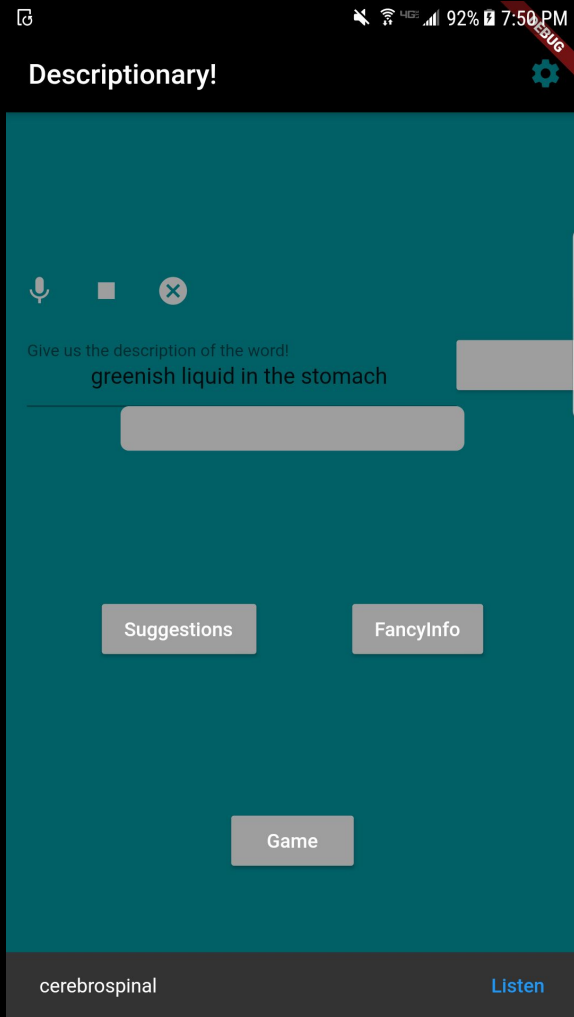
- Learning Languages
- No complex rules
- Leverage machine learning
- Multilingual potential
- Crossplatform opportunity

Initial Start - Foundation

- Michael/Gregory on back-end, Alex/Nick work on front-end
- Define functions of the app
- Draw up a couple designs (mostly layout)
- Decide what UI framework to use

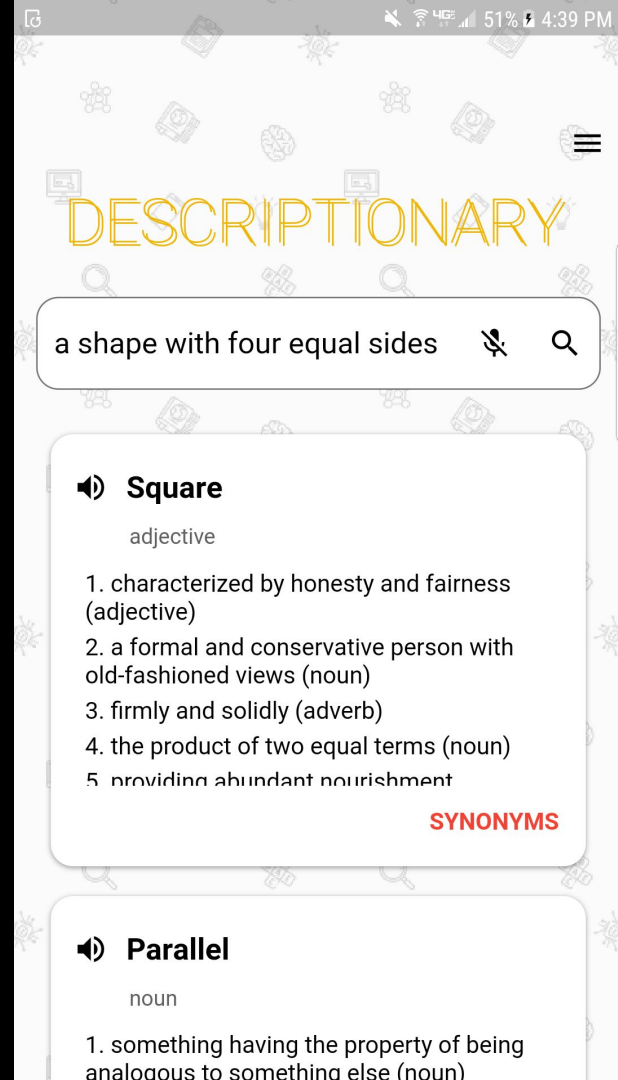
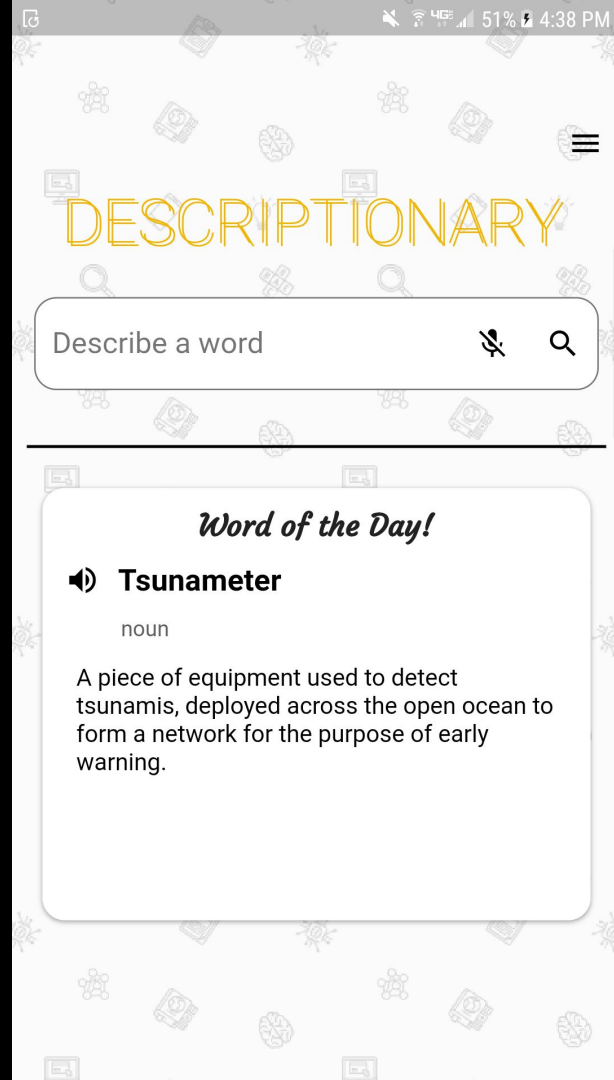
Flutter & Dart

- Flutter: Cross-Platform UI SDK - released in 2017 by Google
 - Everything is a “Widget” (Think of it like building structures with legos)
 - Easy to learn
- Dart language - released in 2011 by Google
 - Object oriented, garbage collected
 - Syntax similar to Java
- Deep Integration within Android Studio
 - Similarities to Android's SDK




Building a Responsive App

- Flutter allows one codebase, allowing great optimization
- Scalability is key
- Using third party services hampers speed, leading to lots of time spent on managing it
- Lightweight impact on the device
 - Work smart not hard



DESCRIPTIONARY


A yellow object in the sky

 **Sun**

noun

1. first day of the week; observed as a day of rest and worship by most Christians (noun)
2. expose one's body to the sun (verb)
3. expose to the rays of the sun or affect by exposure to the sun (verb)
4. the rays of the sun (noun)
5. any star around which a planetary system revolves


SYNONYMS

 **Shadows**

noun

1. a spy employed to follow someone and report their movements (noun)
2. an indication that something has been present (noun)
3. something existing in perception only (noun)
4. cast a shadow over (verb)
5. make appear small by comparison (verb)
6. an unilluminated area (noun)


SYNONYMS

 **Eye**

noun


1. the organ of sight (noun)
2. look at (verb)
3. an area that is approximately central within some larger region (noun)
4. a small hole or loop (as in a needle) (noun)
5. attention to what is seen (noun)
6. good discernment (either visually or as if visually)

SYNONYMS

 **Earth**


noun

1. the 3rd planet from the sun; the planet we live on (noun)

 **Stars**

verb

1. mark with an asterisk (verb)

 **Horizon**

noun

1. the great circle on the celestial sphere whose plane passes through the possible horizon and the center of

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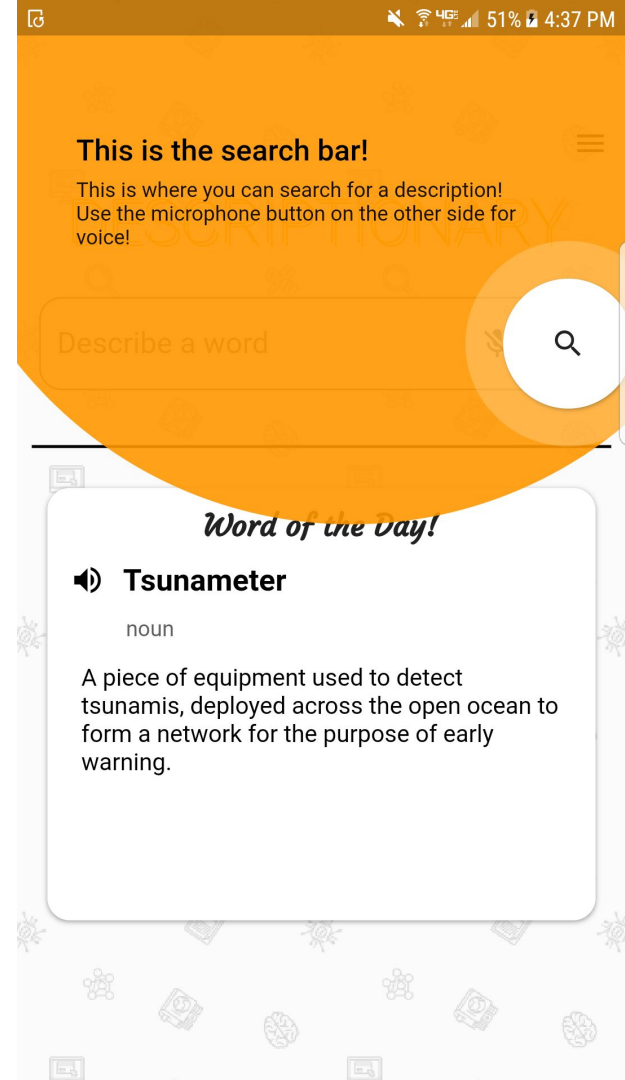
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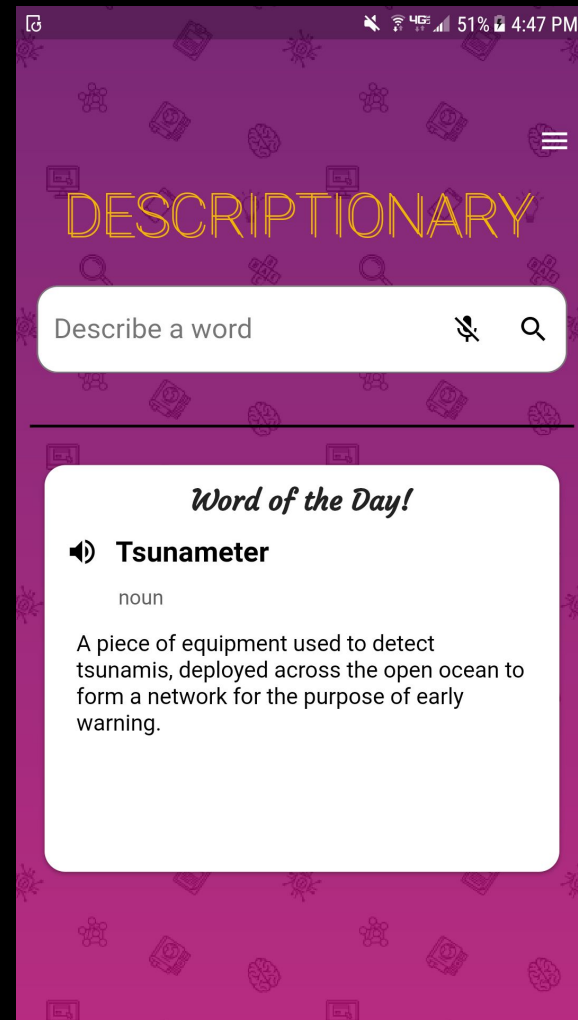
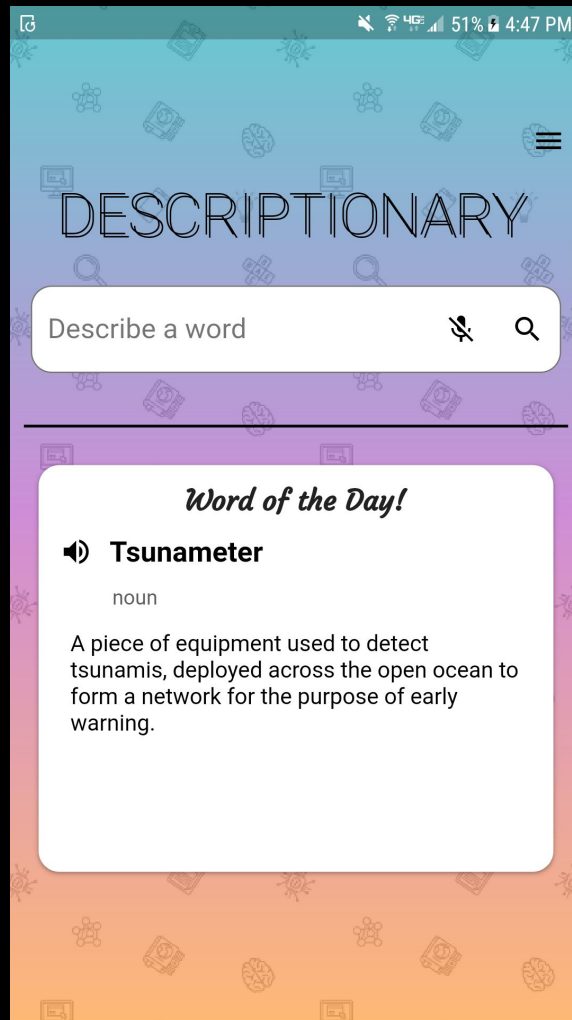
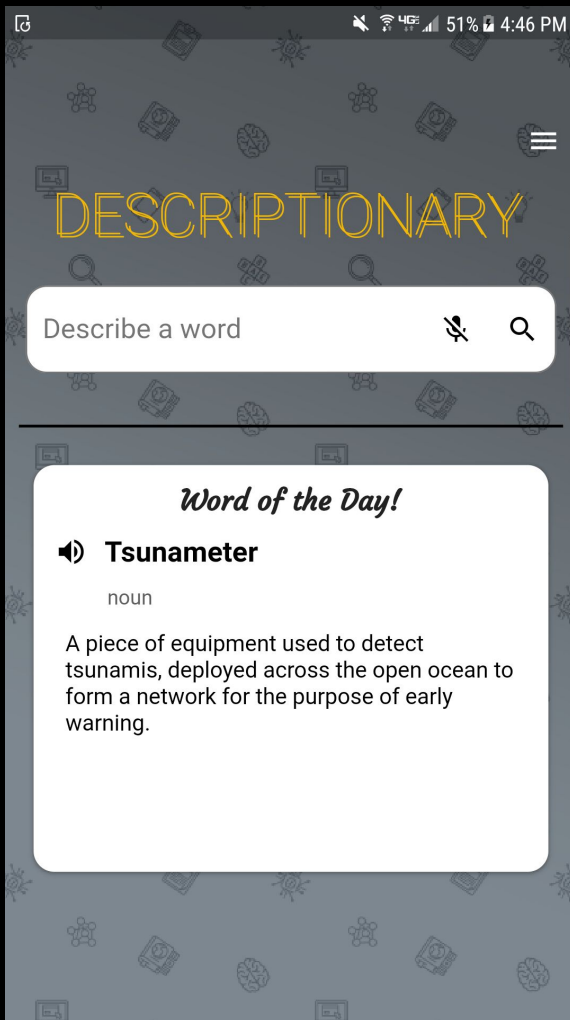
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Tutorial

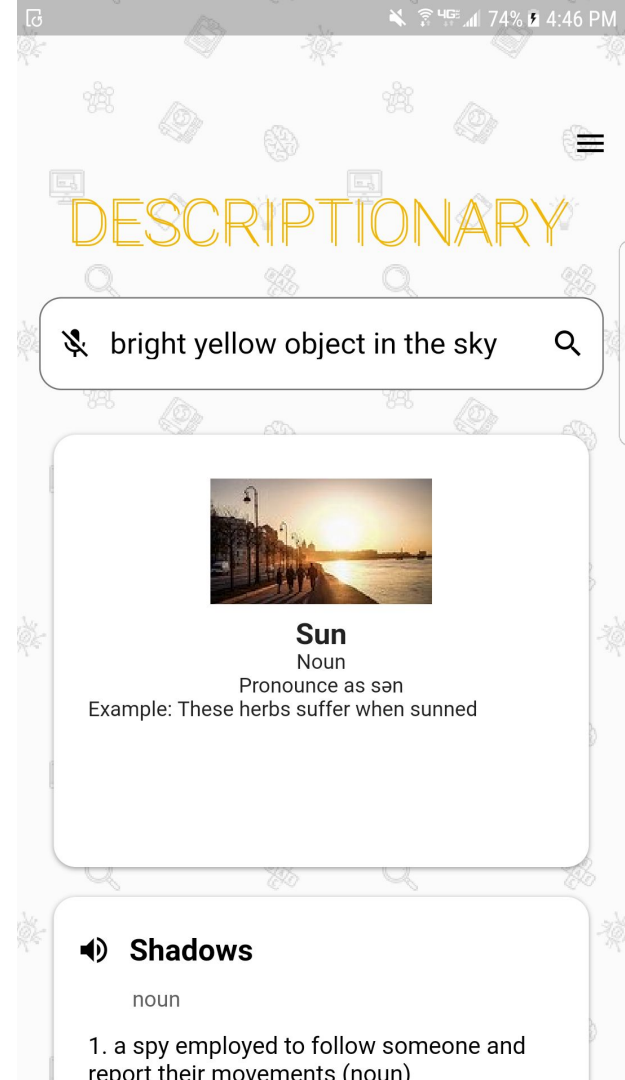
- Never let a user get confused
- Shown on the first launch of Descriptionary
- Highlights and explains every single element to using the app
- Includes advice we've found for getting the best possible results
- Uses a pre-existing library we modified ourselves





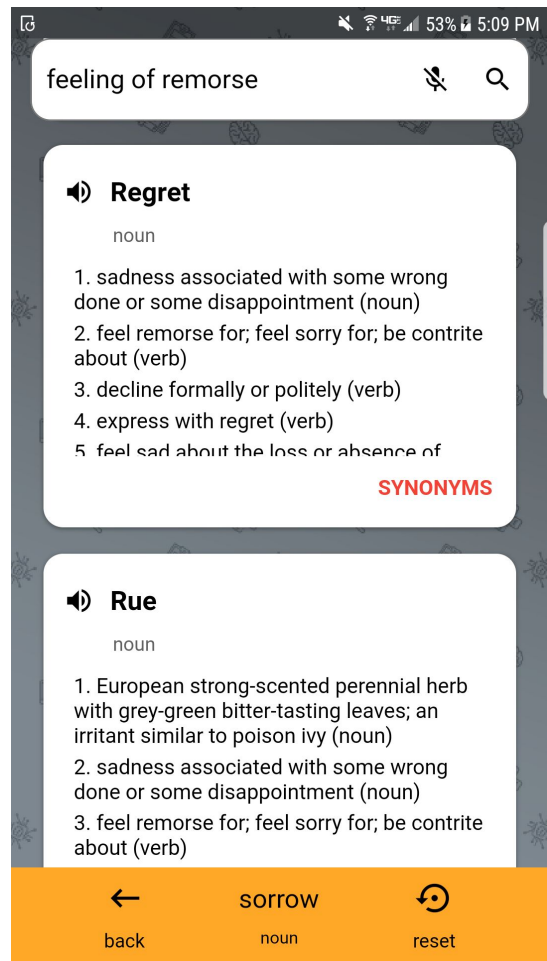
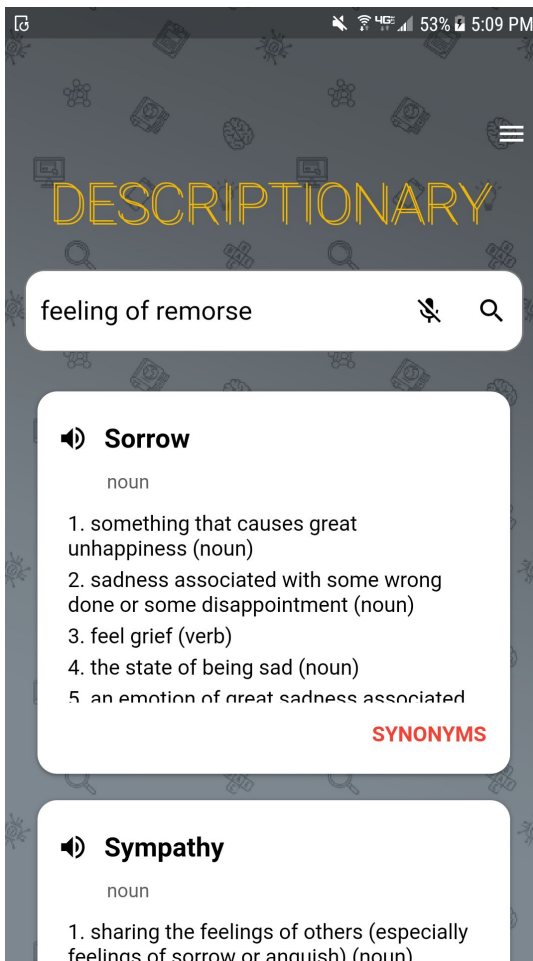
WordCard Details

- Shows information about the results so that a user can learn more from it
- Part of Speech
- Written pronunciation guide
- Example of the word in use
- An image of the word



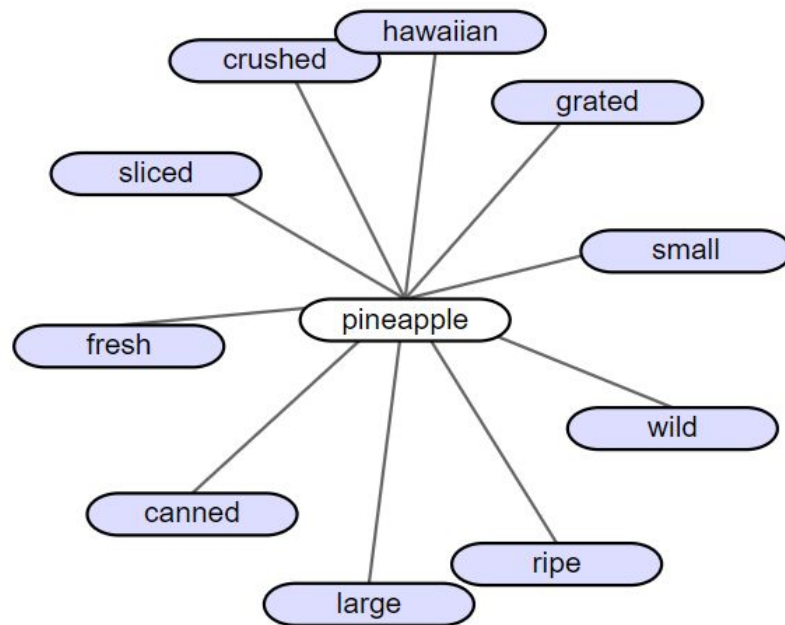
Traversable Word Network

- User may not immediately find a word they are searching for.
- User can pick a word they think is closest to what they want and traverse through related words
- In other words, there will be a synonym button next to each word.



WordGraph/WordNet Implementation

- Initially we wanted to have a visual representation of the related words
- Limited pre-existing libraries in flutter made this difficult.
- All synonyms are read from a file to reduce API calls.



Temporary Backend

- We built a server in Google Cloud for tests before a final backend was ready
 - Compute Instance
- Followed RESTful design
 - An always accessible service returning easy to read/manipulate data
- We switched to a different type of Google Cloud service that better fit us afterwards, which Greg handled from then on

Final Backend

- Google Cloud App Engine
- Serverless, horizontal/vertical scaling
- Process api calls
- Host model

Machine Learning

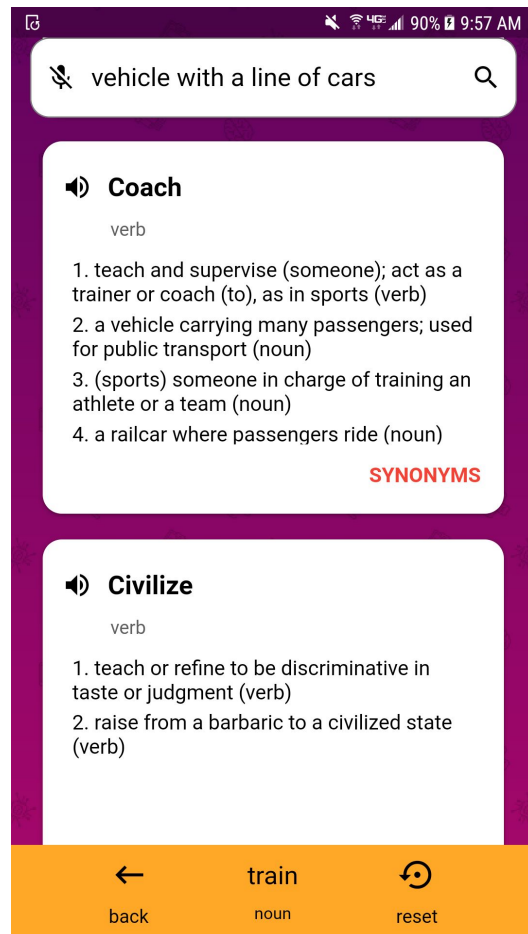
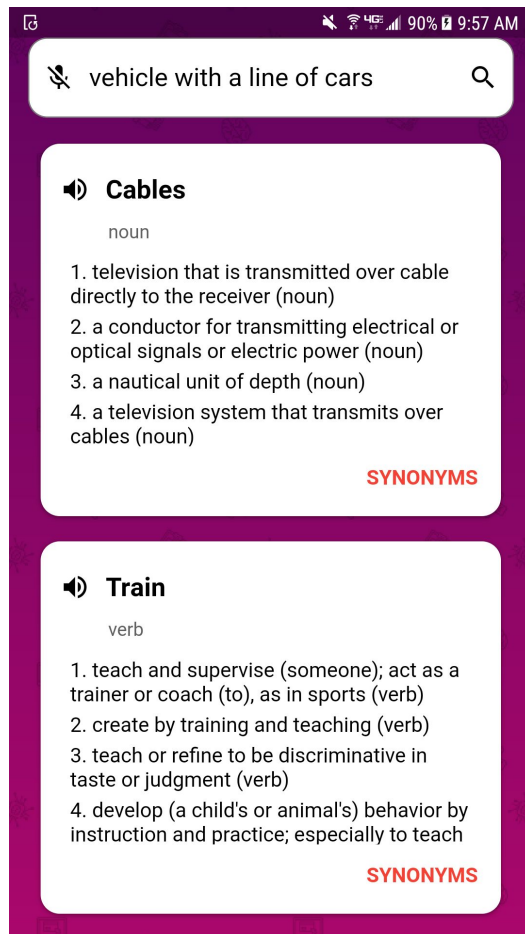
- Finds rules for us
- Good at specific tasks
- Potentially limitless capability
- Reliance on data

Data, Data, and More Data

- No good ML without good data
- Definition utilization
- High class size
- Lack of domain specificity
- Lack of data

Machine Learning Continued

- Initial model
- Issue comparing new models
- ML Pipeline development
- Preprocessing -> Vectorizing -> Training -> Evaluating
- Better results
- Memory issues
- POC = 90% in the top 50



Shortcomings and Lessons

- Losing our plan with a designer outside of our team
- Feature creep and focus
- Flutter web can't support some of the same features as mobile yet
- Adapting to long term changes
- Flutter has some weird bugs with layering that haven't been fixed

Machine Learning Shortcomings

- POC earlier (duh)
- Reduce high class size via semantic familial grouping
- Different transfer models
- Non neural network approaches (Naive Bayes, support vector machines, etc.)
- Not enough time

Demo/Questions