Applying Deep Learning to Recognize Food

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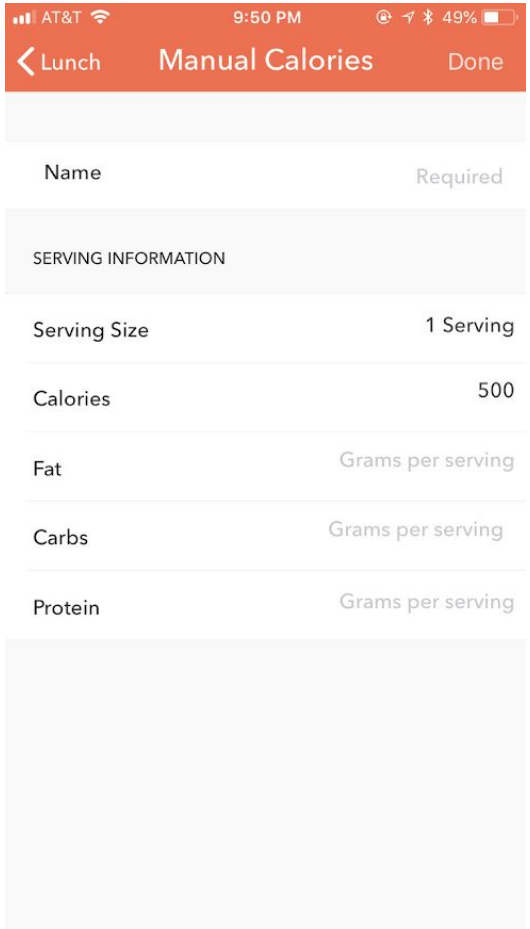
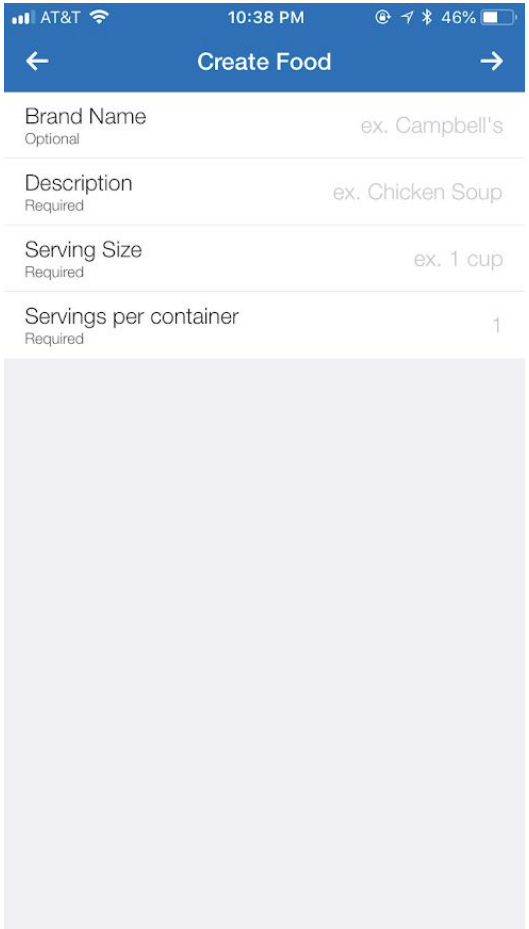
Problems in Food Consumption

We produce an excessive amount of food waste. It's estimated that around **40% of food produced is wasted** in the United States.

We also don't eat healthy enough. Almost **40% of Americans are obese**. Furthermore, we **consume 2-3 times more sugar than recommended** on average.





There have been phone applications to help with healthy eating, but they **require users to enter data manually**.

There's a **disconnect between the food and our phones**, making it difficult for technology to play a direct role in food consumption.

Image recognition

Providing a more **convenient interface** between food and technology can help **encourage more people to make positive lifestyle changes**.

We can apply **deep learning** to create a model that can **recognize food in images**, helping bridge the disconnect between food and software.

Collecting Data

eggs: 900x523

cheddar_cheese: 700x700

bay_leaf: 1280x1280

cabbage: 3456x2592

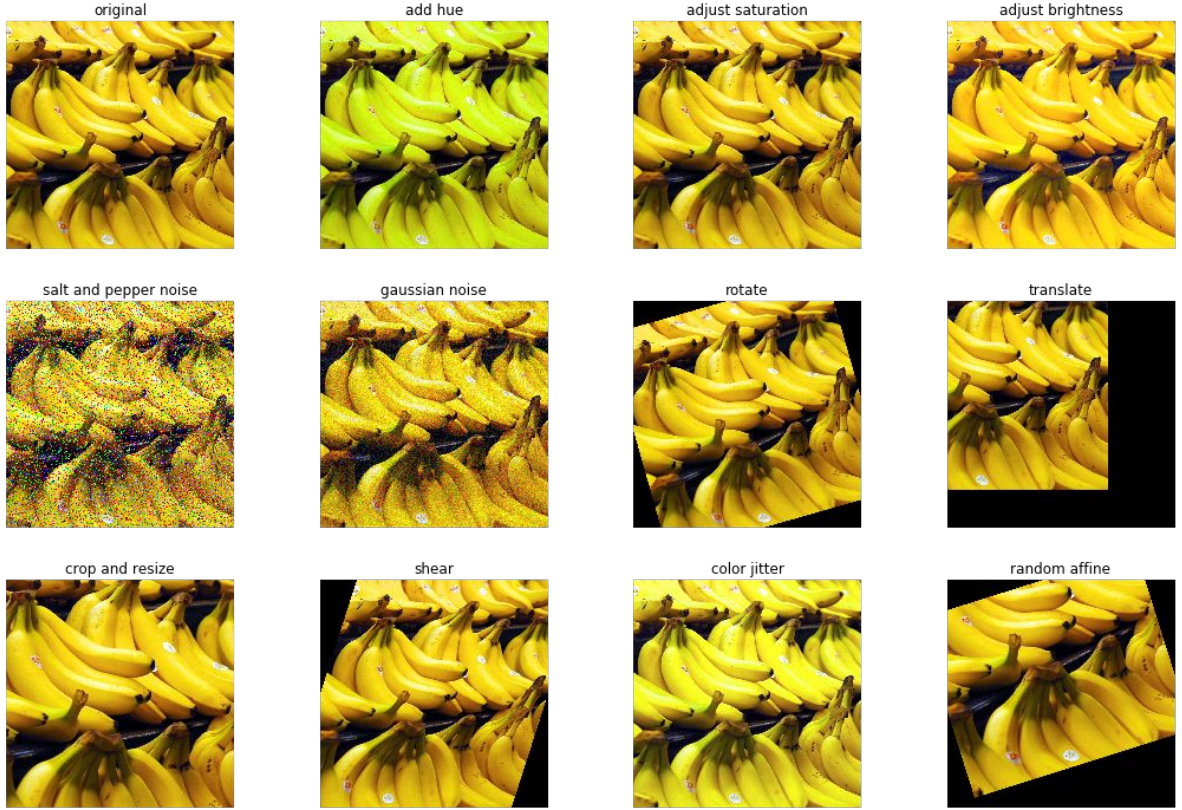
asparagus: 264x250

bell_pepper: 612x404

tilapia: 640x640

chickpeas: 355x355

Data Augmentation



Model Architecture

This is a pretrained model that recognizes objects.

It makes predictions for objects like such as cars, and people.

ResNet 50

We remove the last layer of the ResNet model and train our own layer instead.

We can train the layer that makes predictions to predict food items instead.

Prediction Layer

Prediction: Banana (99%)

We trained the model on

52 food items

with around 20 images for each class.

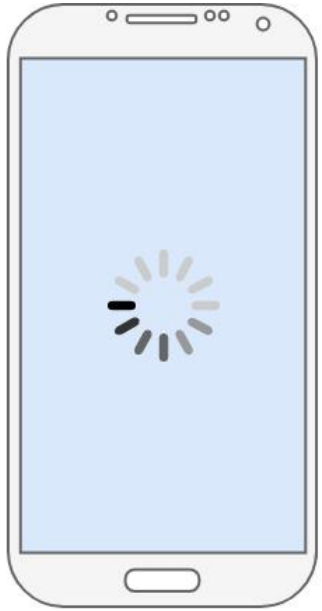
The model scored

92.56%

accuracy on test images.

Application: Recipe Suggestion

Take an image of some ingredients.



Application identifies items in image.

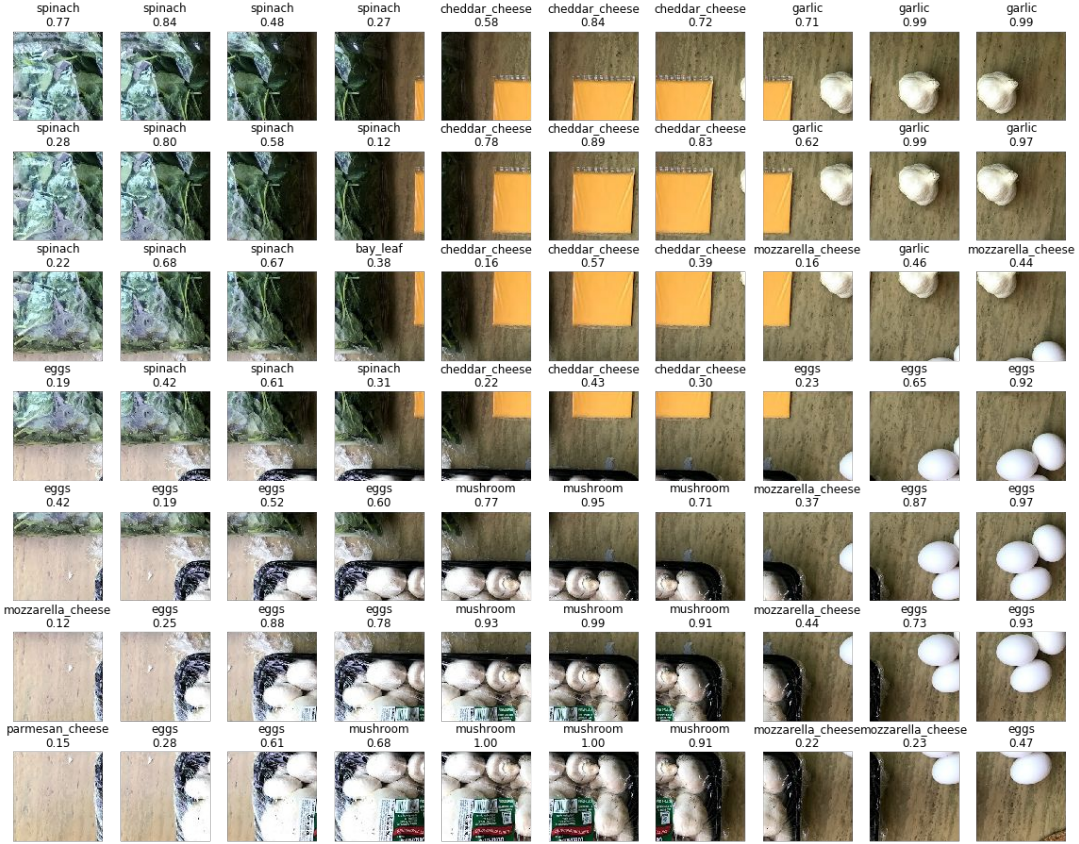
Application returns recipes that use the ingredients in the image.

Multiple Objects

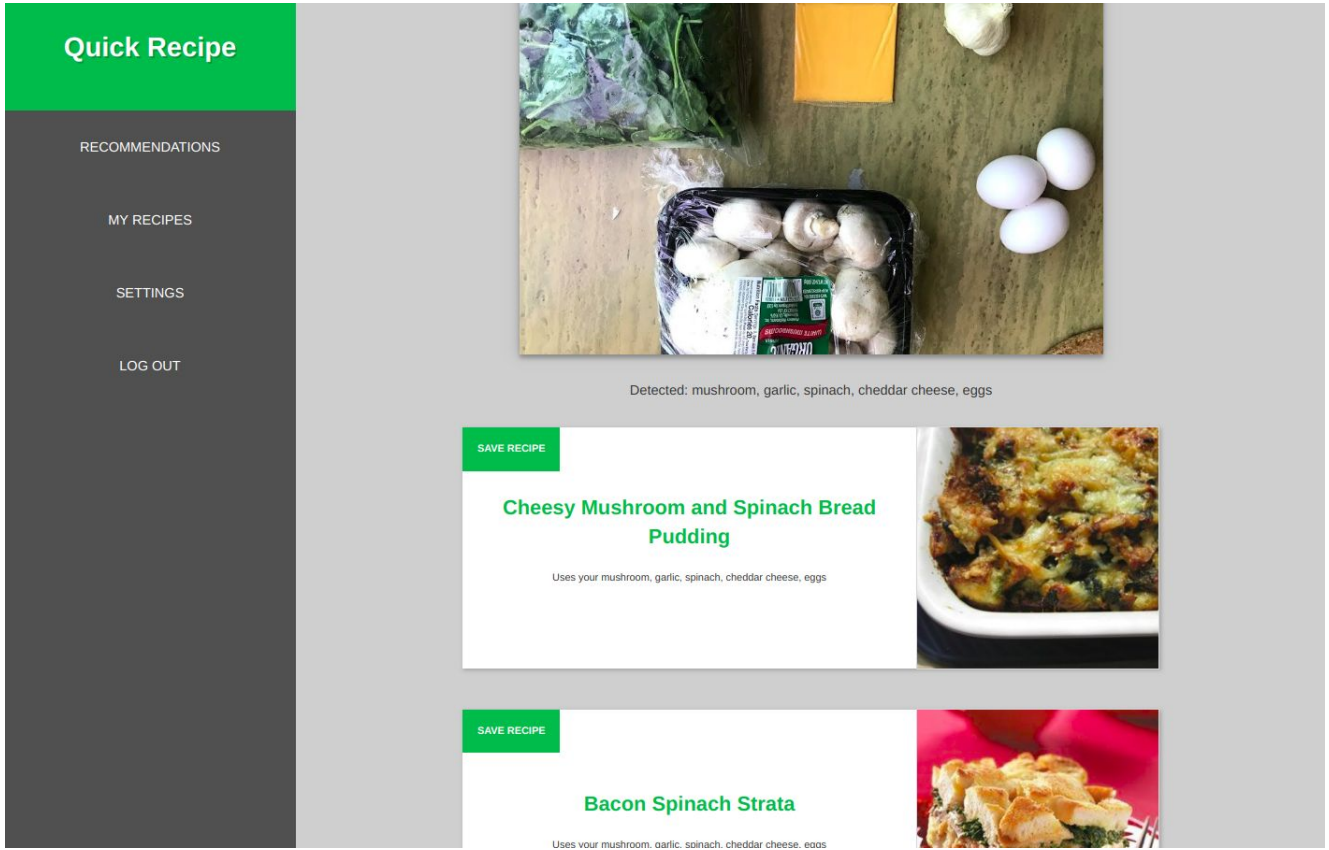
We've trained a model that recognizes food items.

To use it in our application, we need it to detect **multiple objects in a single image**.

Sliding Window



Implementation as a Web Application



This recipe suggester has potential commercial value, but can help us **reduce food waste at home**.

Instead of letting good produce spoil, we have an easy way to find recipes to put it to use.