FreshIT

Team

Member 1 : Ayush Agrawal, 2017A8PS0604G, f20170604@goa.bits-pilani.ac.in

Member 2 : Mayank Harsani, 2015A7PS0010G, f20150010@goa.bits-pilani.ac.in

Motivation

Every day seeing the mess food wastage amount rise up made us think, if a small community of people produces 100 kgs of food wastage per day, How much total amount of food waste is produced globally? A 2012 report from the National Resources Defense Council (NRDC) revealed a list of statistics that show just how big the food waste problem is in America:-

- Americans throw away $165 billion of food each year.
- 40% of food is wasted in the United States every year.
- 20% of food that the average American buys is never eaten.

All of this wasted food is a huge contributor to climate change. It takes a ton of resource to produce food. On top of that, you have all of the energy it takes to keep it cold and transport it around the country. And when food decomposes, it isn't just stinky. It releases potent greenhouse gases. Basically, we're trashing our planet to grow more food that no one eats. But here's the thing : No one actually likes wasting food. It just something we haven't been paying much attention to. Of all the challenges in the world, reducing the amount of food is relatively one of the easiest.

Consumers collectively make up the largest portion of food waste. And you don't have to be an expert too understand why food is going to waste in our homes. We're all busy on the go and we buy food without thinking if we really need it. There's even been a little bit of research to show that once something goes in the refrigerator, it's actually worthless to us than before. A lot of the waste in our society happens when we come down to the choice and wanting to have the option to eat something at any time whether or not we use. We store a lot of food inside our refrigerator but that's the problem : we store our food and then forget about it. Unfortunately, many of us do it even when we don't intend to. If you are not keeping track of the expiration date of your foods, you are going to end up wasting food.

Objective

- Problem Statement :-

  “I find it difficult to keep track of the food that I have and hate to throw away expired food.”

  To prevent food wastage due to expiration, develop an application that tells you when your food is going to expire so that you can use it before it does. It should intelligently send you an alert when your food is close to expiring.

- Deliverables :-

  Android based application to prevent food wastage that lets you scan the item or the barcode and automatically figures out the name of the item, classifies it into the type of food, lets you record the shelf life of your goods and reminds you to use them before they expire. It will estimate an expiration date and to make things a lot easier and will also keep a track of the previous items you’ve scanned so that you don’t have to scan again.

Related Work

There has been significant work done on the Image Classification Subsystem of this application and some applications based on basic implementation of this idea have already been developed. Here, we are listing some of the work we found that matches our project :

- Keeping Track of Expiry Dates & Reducing Food Wastage
- Fridgely - Food Expiration Date Tracker & FreshFridge

Every project/work that we found depends on addition of food item manually or through barcode scanning but none among them scans the food item.

Hardware and Software Requirements

Development : Desktop/Laptop

- NVIDIA® GPU card with CUDA® Compute Capability 3.5 or higher enabled for Tensorflow. NVIDIA® GTX 1070 or above preferred.
- Quad core Intel Core i7 Skylake or higher
- 8Gb RAM recommended
- 16Gb of disk space
- 1280 x 800 minimum screen resolution

Tools:-

- Android Studio IDE 3.3.1
- Anaconda/Jupyter Notebook
- Git
- Flutter v1.0
- Firebase SDK v16.x.x

Android Application Requirements :

- Android 5.0 (API 21) or higher is required.

Milestones

Design GUI of the application

- Finalize a simple user friendly design for the complete application.

Allow adding products through barcode scanning

- In the first iteration, allow user to add and categorize food through barcode.

Data Cleaning

- Study and familiarize ourselves with CNN, Keras, Tensorflow and TensorFlow Lite.
- Clean, Refine and Optimize the datasets for food classification training: Fruits, Vegetables, Other Groceries.

Design a neural network for automatic identification

- Finally, training a convolutional Neural Network for classifying food images using appropriate framework.

Converting the TensorFlow model

- Freezing the graph and optimizing the model file for mobile apps.
- Export the project to TensorFlow Lite in order to achieve low latency and hardware acceleration.

Integration of Model in the mobile application

- Integration of converted .tflite model with the mobile application, which will now support adding items both through image identification as well as barcode scanning. Scanning the item will display its name, classification and estimated expiration date.

Refactoring and Testing

- Refactoring the code by following good development practices.
- Developing test suite which involves everything from Unit, Integration and End to End testing.

Documentation

- Well organized documentation for Developers as well as for the Users.

A buffer of two weeks has been kept for any unpredictable delay.

Challenge and Research needed

- How to export Tensorflow and Keras Model to ML Kit.
- How to export Tensorflow Models to Tensorflow Lite for portable devices.
- Research Papers :
    - http://vim.ustc.edu.cn/?product=vegfru
    - https://www.researchgate.net/publication/321475443_Fruit_recognition_from_images_using_deep_learning
    - http://cs231n.stanford.edu/reports/2017/pdfs/607.pdf
    - http://ijabe.org/index.php/ijabe/article/view/2690/pdf