

Hitachi Team CFP 1 Handout

Overview

(Problem) Older adults start to get forgetful. In terms of food safety and health, it's important to help them keep track of food expiration dates and remind them when some food goes bad.

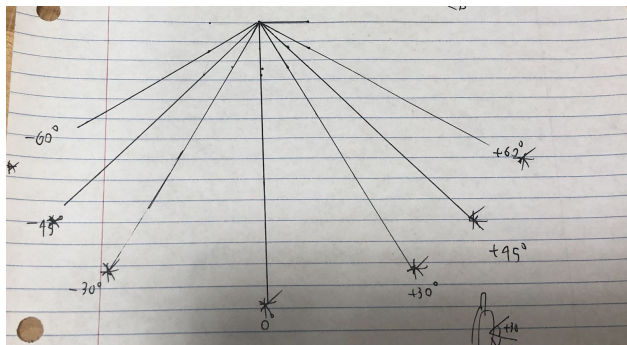
(Need) We want to implement an AI component in our design that can record expiration dates of various items.

(Goal for this CFP) In our first CFP, we decided to use a camera-based text scanner to identify and record the expiration dates on a variety of packaged foods and drinks. To examine the feasibility of the technology, we tested how accurate the text scanner results are when scanning at different angles.

Question: How accurate is character recognition at various angles?

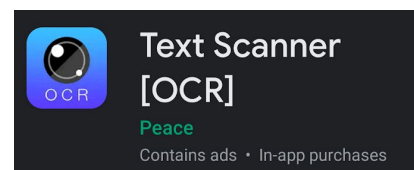
Test Setup

We scanned the item at angles ranging from -60 to +60 degrees (at +/-60, +/- 45, +/-30, and 0 degrees). The axis of rotation was varied based on the item geometry and most likely orientation.



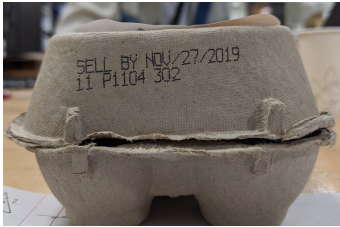
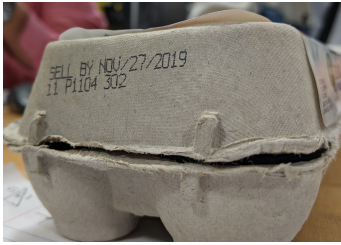
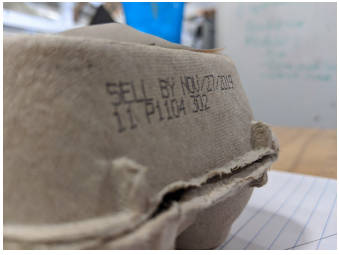
App

As the technology of text scanning is a rather mature, we tried to use an already-existing app Text Scanner [OCR] to get the expiration date off from the items.



Results

1. Example: The egg carton was placed with the bottom flat on a table, and pictures were taken with axis of rotation normal to the table. For illustrative purposes, example are attached.

		
<div>← Scan result</div> <div>SELL. BY NOU/27/2019 11 Pi104 302</div> <div>0 Degrees: SUCCESS</div>	<div>← Scan result</div> <div>SELL BY NOU/27/2019 11 P1104 302</div> <div>+30 Degrees: SUCCESS</div>	<div>← Scan result</div> <div>SELL BY NOW2/0% 11 Pi104 302</div> <div>-60 Degrees: FAILURE</div>

Item	Description	-60°	-45°	-30°	0°	30°	45°	60°
Egg Carton	Upright, rotate around axis normal to table	✗	✓	✓	✓	✓	✓	✗
Hershey's	Upright, rotate around axis normal to table	✓	✓	✓	✓	✓	✓	✓
Kombucha	Rolled on its side	✗	✗	✗	✗	✗	✗	✗
Fanta	Rolled on its side	✗	✗	✓	✓	✓	✗	✗
Arizona Tea	Upright, rotate around axis normal to table	✗	✗	✗	✗	✗	✗	✗
Hershey 2	Camera aimed at above and below text	✗	✓	✓	✓	✓	✓	✗

Outcomes & Insights

- In the case of the Kombucha can, the expiration date was printed unevenly (though still readable by humans) resulting in mistaken readings.
- The Arizona Tea had the expiration date in dark text on a clear container with dark tea, making it difficult to read.
- The Hershey's expiration date was easy to detect since it was black text on a white background.
- We learned that it would be very difficult to incorporate cameras inside the fridge to get the expiration dates as the items will be oriented randomly and the expiration dates might be blocked. Furthermore, it would require a great amount of cameras which is not ideal. Therefore, we thought it is more feasible to scan the expiration date using a single camera when putting the item into the fridge.