DISTRACTED DRIVING

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Outline

- Introduction (overall idea) - Ayaan
- Problem (distracted driving, causes, stats) - Khushi
- Solution (explain the proposed solution)- Raahim
- Models (data, classification models…) - Ayaan
- Results (compare accuracy scores, confusion matrices, metrics…) - Ayaan
- Conclusion (rephrasing everything important) - Ayaan
- Future work (different data….)
- Thank-you slide (thanking the audience, questions?)

Tips

- Interactive
- Make it look nice
- Add images and plots (visuals)
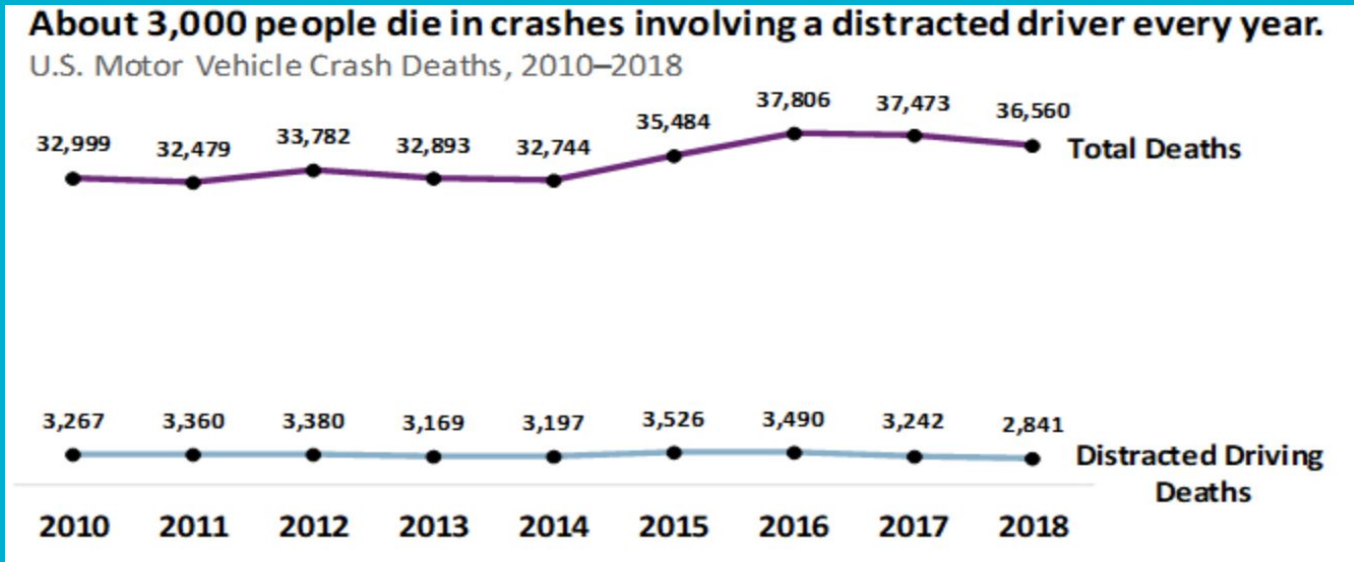- Avoid too much text
- Have fun!

OVERVIEW

- How can machine learning decide what is considered "Distracted driving"?

- How should cars respond to distracted driving?

- What kind of data would be needed to decide this?

WHAT IS DISTRACTED DRIVING AND WHY IS IT DANGEROUS?

Distracted driving refers to any and all activities that might divert the driver's attention away from the road. Some examples of this would be texting/talking to someone on the phone, eating and drinking, but even something as basic as tuning the radio is an example of distracted driving and is usually considered a traffic offense. Distracted driving is usually punished by fines, but in some cases the severity of punishments escalates to a short sentence. The way that distracted driving is treated is not unfounded, as reportedly about 15% of fatal and 14% of all reported motor crashes were caused by some type of distracted driving. Distracted Driving is dangerous because you put not only yourself, but everyone else on the road as well as in close proximity to it in danger.

PROBLEM AT HAND

Research conducted by the Centers for Disease Control and Prevention (CDC) found that every day in the U.S., at least 9 people die and more than 1060 are injured in crashes involving a distracted driver. This makes distracted driving a dangerous threat to public health.

About 3,000 people die in crashes involving a distracted driver every year.
U.S. Motor Vehicle Crash Deaths, 2010–2018

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Deaths	32,999	32,479	33,782	32,893	32,744	35,484	37,806	37,473	36,560
Distracted Driving Deaths	3,267	3,360	3,380	3,169	3,197	3,526	3,490	3,242	2,841

We included 3 types of driver distractions in our model:

- ❏ Visual – looking at something other than the road (mirror)
- ❏ Auditory – hearing something not related to driving (radio)
- ❏ Manual – taking your hands off the wheel (drinking coffee)
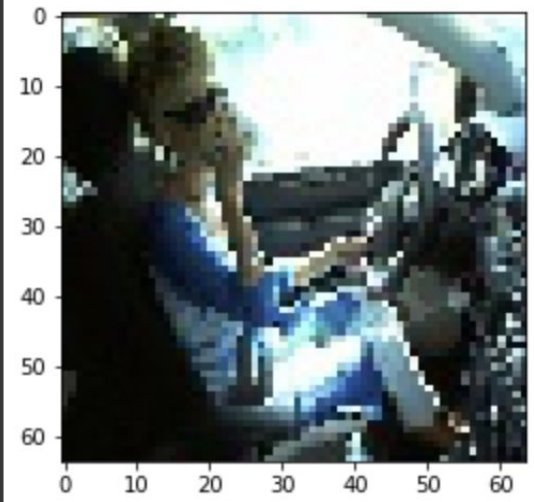

Label: ['LookingMirror']
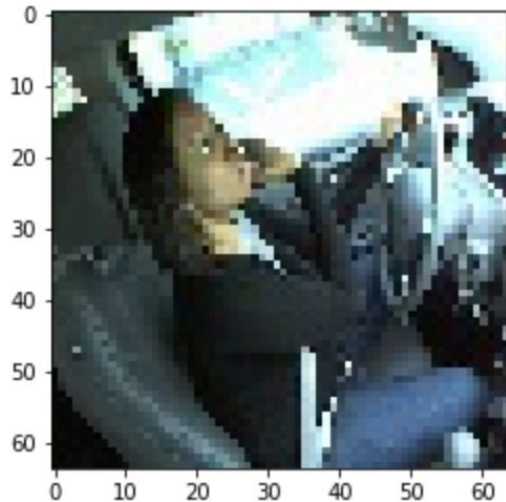
Label: ['UsingRadio']
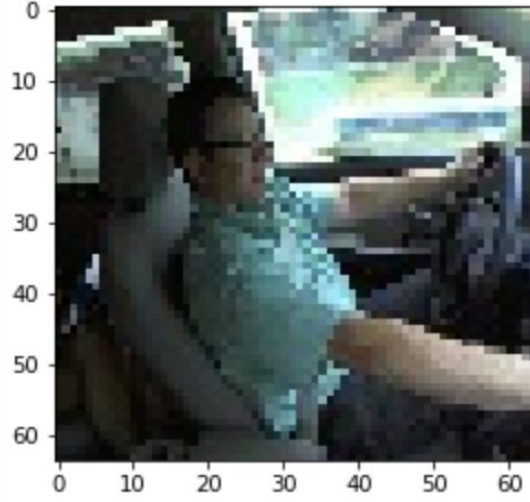
Label: ['DrinkingCoffee']

THE SOLUTION

- IT IS CLEAR THAT THE CONSEQUENCES FOR BEING DISTRACTED WHILE OPERATING A VEHICLE ARE MANY.

- IT IS REPORTED THAT WE ARE 20 TIMES MORE LIKELY TO CRASH WHILE USING A CELLPHONE THAN NOT USING IT

- WE HAVE DESIGNED A MODEL TO HELP WITH THIS GROWING PROBLEM.

- OUR MODEL LEARNS FROM A WIDE ARRAY OF IMAGES. FOR EXAMPLE: PEOPLE DRINKING COFFEE, LISTENING TO THE RADIO OR ARE ATTENTIVE

- IT IS PROGRAMMED TO IDENTIFY IF A CERTAIN DRIVER IS DISTRACTED AND GIVE THE RESULTS ACCORDINGLY

MODELS

We needed to classify different images of distracted drivers from a library in python which we downloaded.

```
1 ### YOUR CODE HERE
2 sns.countplot(x = 'class', data = metadata, hue='split' )
3 ### END CODE
```

Test Data: The actual data we use to compare predicted outputs for accuracy.
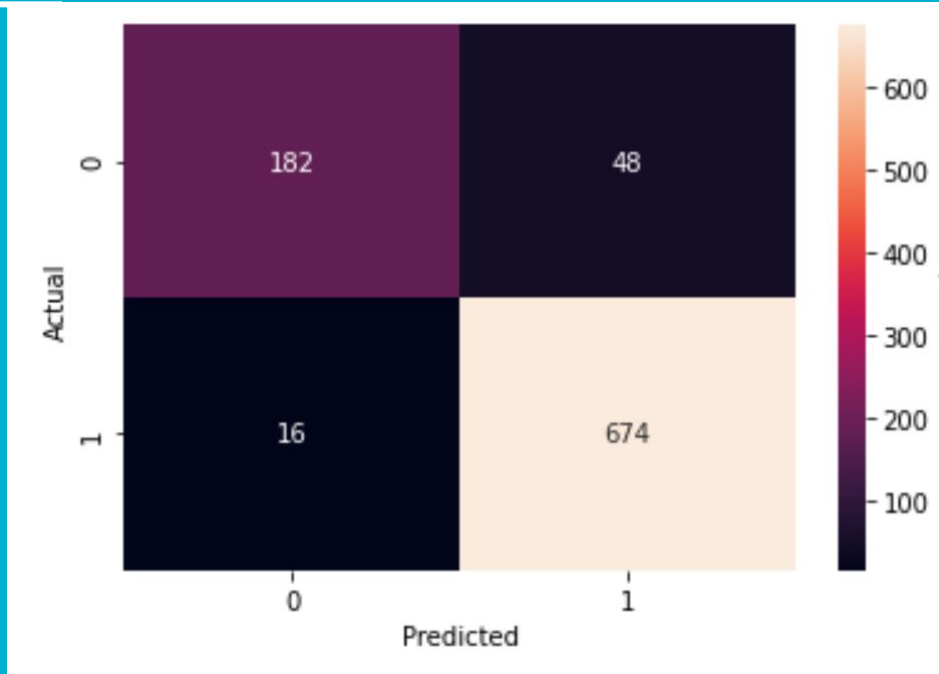Train Data: Output data gotten from running our model.
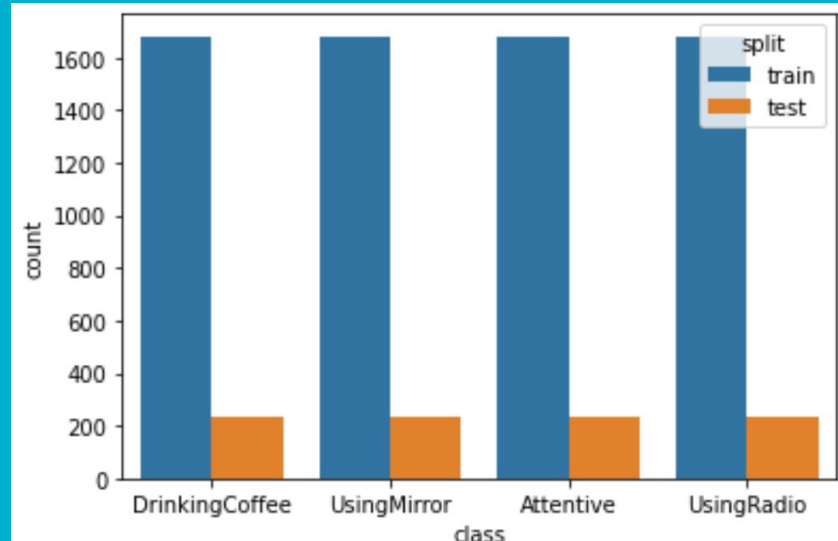
MODELS

A convolutional neural network tested parameters from the pixels to decide if the driver was distracted or not.

Label: ['DrinkingCoffee']

INPUT   CONVOLUTION + RELU   POOLING   CONVOLUTION + RELU   POOLING   FLATTEN   FULLY CONNECTED   SOFTMAX

— CAR
— TRUCK
— VAN
— BICYCLE

FEATURE LEARNING   CLASSIFICATION
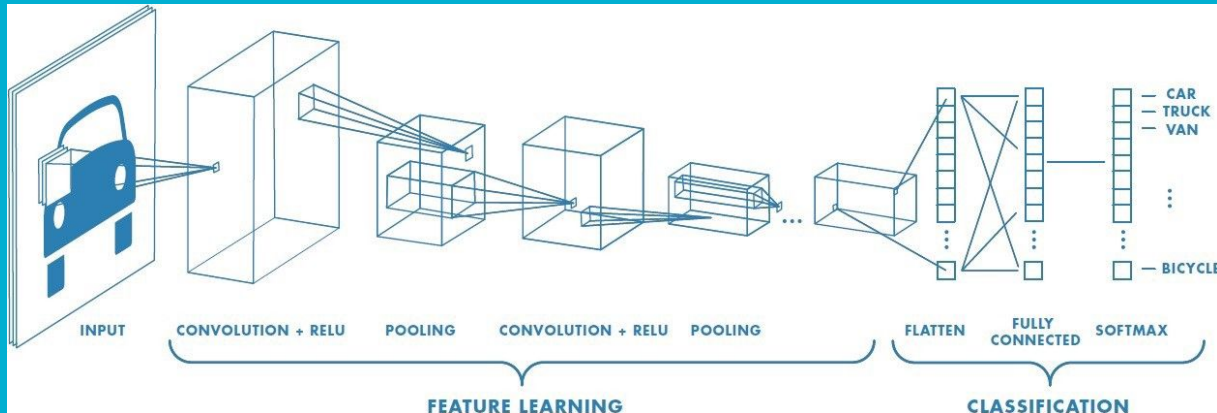
RESULTS

Top left: Model correctly detected a distracted driver

Top right: Model mistakened image for an attentive driver

Bottom left: Model mistakened image for a distracted driver

Bottom right: Model correctly detected an attentive driver

Can we use our model practically in self-driving cars? Why/why not?

CONCLUSION

- You need a large group of people and a long time to make an efficient, accurate and practical detection device, however cnn's can greatly improve the accuracy side of things.

What we hope you learnt:

- The importance of road safety and tackling distracted driving.
- How pixels are used in many detecting devices.
- A basic understanding of convolutional neural networks and how it's used.

Any questions?