Machine Learning - Mini-Project 4

In this Mini-Project, we will build and share machine learning models using Google's 'Teachable Machine.'

Learning Goals:

- Explore and build a meaningful Machine Learning Tool from a user perspective.
- Identify and demonstrate aspects of a meaningful machine learning project. ● Share and test your model with others in the class.
- Document your own process of learning to use the tool.
- Review and try out models from the class.

The Project:

Begin by visiting the project website https://teachablemachine.withgoogle.com/

And watch the intro video https://www.youtube.com/watch?v=T2qQGqZxkD0&t=3s

For this project you will make and share your own meaningful/non-trivial Why meaningful? It should not be a trivial model. It should have a purpose or clear goal - something more than "Does this person have a hand on their head?"

Example
Watch the Pottery demo videos

Pottery Demo.mov

Pottery ML demo.mov

And a current example of how this is currently being used in archaeology.
https://www.sciencedaily.com/releases/2021/05/210517144704.htm

Submit in Gradescope.

1. Use the Teachable machine website and picture from the web (or your own) to make a simple “Is this a dog or a human?” model just using images from the web. On this page (fill page) Describe your process of learning how to use the site/tool. How did you choose images? Tricky? Fun? Worked? Include the link to your model.

The process I began with to use the tool, is I searched for dog images on Google. I picked 10 images from Google of dogs with a lot of fur, images where the dog has all four legs on the ground, dogs smiling, dogs that have distinctly shaped heads (compared to human heads), and dogs that have a lot of hair all over their ears as well as whiskers. I also picked 10 images from Google of humans of different races, humans standing tall on two feet, close up shots of humans (face and shoulders), skinny and heafy humans, humans with a lot of jewelry/accessories on, and smiling humans. When I got on the website, I clicked the *Get Started* button, clicked on *Image Project*, chose *Standard image model*, placed the dog images in the first class and the human images in the second class, clicked on *Train Model*, and exported my model. This process was fun and it worked because when I turn on my webcam, it identifies me as class two which is all of the humans.

https://teachablemachine.withgoogle.com/models/ncZFopkr7/

2. Decide on your own model to create and how you improved it. What makes your model non-trivial? Why did you choose it? It can be any of the three types from the site - Image, Audio, or Movement. Two page narrative here and on pages 3/4. You may include thumbnails of images.

For my model, I chose to give the teachable machine images of a virtual car compared to a real car. I have a passion for video games and I love how realistic the digital realm can be presented in relation to the real world. I am constantly inspired by gaming companies having the same digital concepts of the real world so I wanted to know if the teachable machine would know the difference between virtual cars and real cars. For the virtual cars, I chose to use the cars that I play with on GTA and Rocket League as well as other players' cars. For the real cars, I chose to use images of exclusive cars from Google images. My first class is for virtual cars and my second class is for cars in the real world.

Virtual Cars

Real Cars

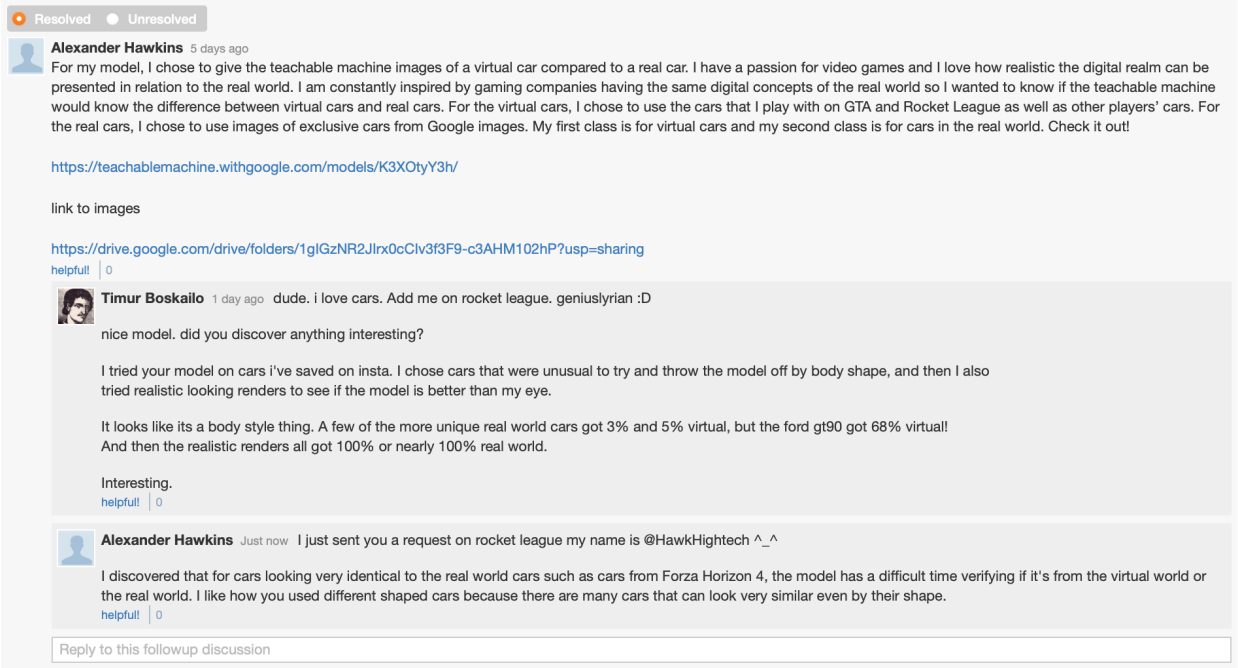
3. Put the link to your model here on page 4:

https://teachablemachine.withgoogle.com/models/K3XOtyY3h/

Add the link to a shareable Google folder containing your training images/files.

https://drive.google.com/drive/folders/1gIGzNR2JIrx0cCIv3f3F9-c3AHM102hP?usp=sharing

Post a link to your model on Piazza and ask your classmates to try it out. Include a screenshot of your post and responses here on this page.

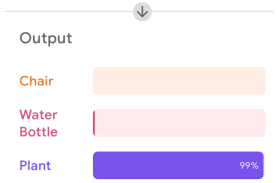


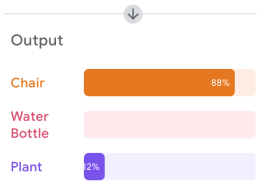
4. Go to Piazza and try out 3 of the models from your classmates. On the following pages, give a one page review of each (on pages 6/7/8 (may include thumbnails):

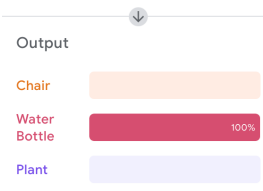
- Is the model non-trivial?
- What did you use to test it?
- How well does it work?
- Why is it a meaningful model?
- Does it do something that is hard for a human to do?
- What images did you use to test the other's models?

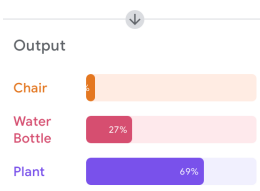
4A Model Review One:

I reviewed George Khoury's model which rendered the images between a water bottle, chair and plants. To test their model, I chose to insert an image of Japanese bamboo commonly named *Gold Dust Dracaena* as well as Dracaena Sanderiana. For the Gold Dust Dracaena, the model created the output of 0% chair and water bottle, and 100% plant. For the Dracaena Sanderiana, the model created the output of 0% chair, 1% water bottle, and 99% plant. When I inserted an image of a Louis Vuitton table set with flowers on the table, the model created the output of 0% water bottle, 12% plant, and 88% chair (there are more chairs than plants in the photo). When I inserted an image of beach water bottles, the model created the output of 0% chair and plant, and 100% water bottle. I also placed an image of lions in the model and got 4% chair, 27% water bottle and 69% plant. This model works well with models that are related to a chair, water bottle or plant but anything else, it isn't sure what the image is. This could be a meaningful model for home decor. I wouldn't place a plant where a chair would be placed or a water bottle inside of a plant bowl. This model is non-trivial only for the related subjects but trivial for random images such as a car or clothes. This is not hard for a human to tell the difference between a chair, water bottle or plant as well as other random images.



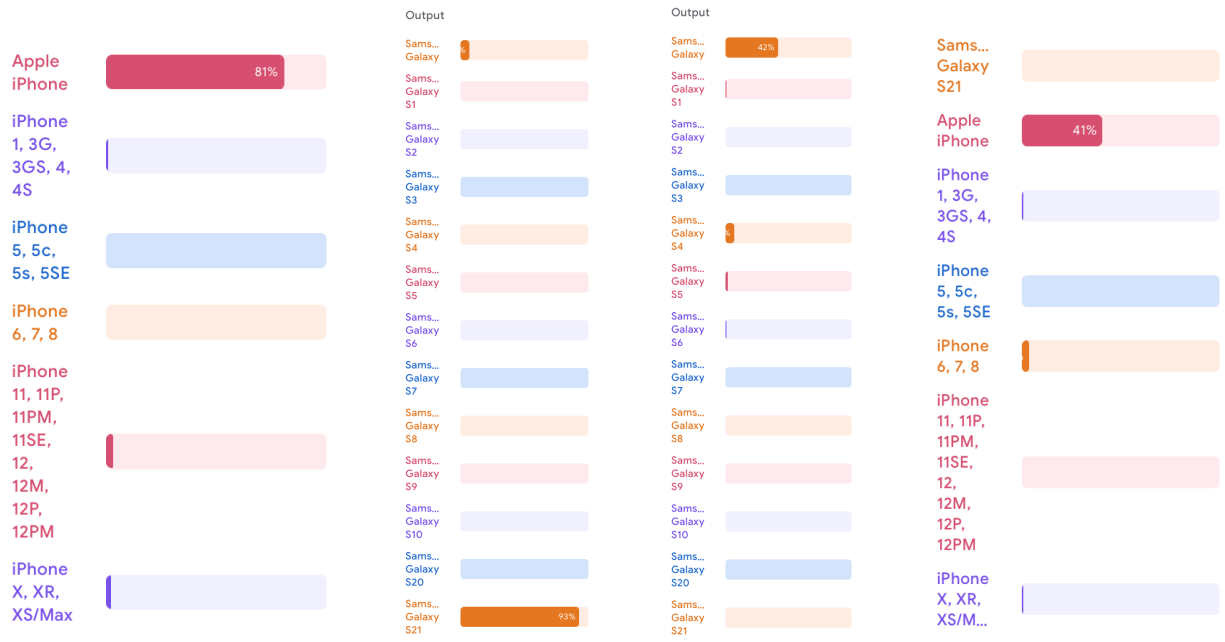






Model Review Two:

I reviewed Edward Kim's model which renders images pertaining to Samsung Galaxy phones and iPhones in order to reduce electronic waste. To begin, I attempted to render an image of an iPhone X without showing the Apple logo and according to the model, I got the result of 81% apple iPhone, 11% Samsung Galaxy and the other percentages were from other iPhone nodes. I also attempted to render an image of a Samsung Galaxy S21 and I got the results of 93% Samsung Galaxy S21 and 7% Samsung Galaxy. I was curious what category a Blackberry Phone would be in, so I rendered an image of a Blackberry and got the results of 42% Samsung Galaxy and 41% Apple iPhone (the other results varied between both phones). The model is very accurate with images pertaining to Samsung Galaxies and iPhones, but is unsure with any other types of phones which makes sense because the classes only support the images specific for the class. This is a very meaningful model because electronic waste is important in 1st world countries and it's valuable to know which devices other people can use, what can be recycled, what wired/batteries can still be used in today's technologies, etc. This model would be difficult for humans that don't know much about the types of Samsungs and iPhones there are. This model is very specific for which phone is being rendered and has many nodes.



Model Review Three:

For a while, I've been looking for a new bike to buy/order online. I chose to try out Reid Pritchard's model which takes an image and verifies if the bike is a road bike, mountain bike or cruiser bike. I attempted to render an image of a mountain bike that I've been wanting to buy. For the results, I received 100% pure mountain bike from the model. For my next image, I wanted to render an image of a road bike and got the results of 100% road bike. I also attempted to render an image of a cruiser bike and got the results of 9% road bike, 1% mountain bike and 90% cruiser bike. Lastly, I chose to render an image of a GTA bike and got the results of 82% road bike and 18% cruiser bike. I enjoyed this model because it gave me more insight on which bike is considered a road bike, mountain bike and cruiser bike.