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CART 451
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1. Please provide a description of the initial data set you brought to class. What were the objects, how many ... and why you chose those specific objects. Provide an image of the distinct object.

I decided to use a Yeezy foam sandal and a Nike water bottle as my two main objects. I intentionally chose 2 objects with a similar bright red color and a similar rubber/plastic-like material. The foam runner is vermillion and is shaped like a croc from an alien planet with more advanced technology than us. The bottle is a regular Nike sports water bottle with a black cap and designs on it.


I was curious if the differences in form, shape, and intricacies would be enough for the machine to identify and classify them as 2 distinct objects. I actively took pictures from certan distances and angles that would emphasize the similarity of the 2 objects, and actively took pictures that would emphasize their distinctions. I modified some of the

objects, such as taking the cap of the bottle, in certain pictures to see how that would affect how the machine would identify the object.

Most of the ‘other’ or ‘noise’ objects I used were random objects from around my apartment, but I still made sure to use some bright red objects to see if that would later interfere with the classification.

2. What was the purpose of the task you were asked to do in class?

This exercise was a simple implementation of the concepts we discussed in the workshop about machine learning, specifically the process of classification; a supervised machine learning. By training a machine with images we took beforehand, we were able to implement a clear and concise example of it. We were given an idea of the step-by-step process required to initialize and run machine learning, with a lot of its complexities hidden through using a website that facilitated the process.

I believe that we were not given a clear idea of what we were going to do, or how exactly we should take the pictures beforehand in order to gain experience with the inherently faulty nature of machine learning and classification. Understanding the process of machine learning is not as simple and straightforward as figuring out how to create a website or design a game. It involves interacting with a separate entity that reacts according to our (the designer's) input instead of simply reacting based on it.

3. Describe in a series of steps what you did to complete the initial task in class

We first assembled three folders of images. Two based on our objects and choice, and another of various objects to serve the purpose of acting as ‘noise’. Using edge impulse, a platform that simplifies and facilitates the process of machine and transfer learning, we created an ‘impulse’ where we trained a model to make classifications from the three folders of images we had assembled.

Once the model acquired the data, we instructed it to use 80 percent of our object's images to train it, thus allowing it to interpret how we see/classify our objects based on the tag we provided with them. The other 20 percent of the images were used to test the model where its ability to classify the images was tested.

How the machine interpreted the images was presented to us on a data-visualizing graph that represented each image as hoverable points on it. The axis represented abstract metrics related to how features of the image. This formed clusters of points based on each image.

Once the unrecognizable/ more questionable images were removed from the model, we were returned with a training output table that returned the training's accuracy, loss, and confusion matrix. The confusion matrix represented the accuracy at which the model was able to attach the relevant tag to the image.

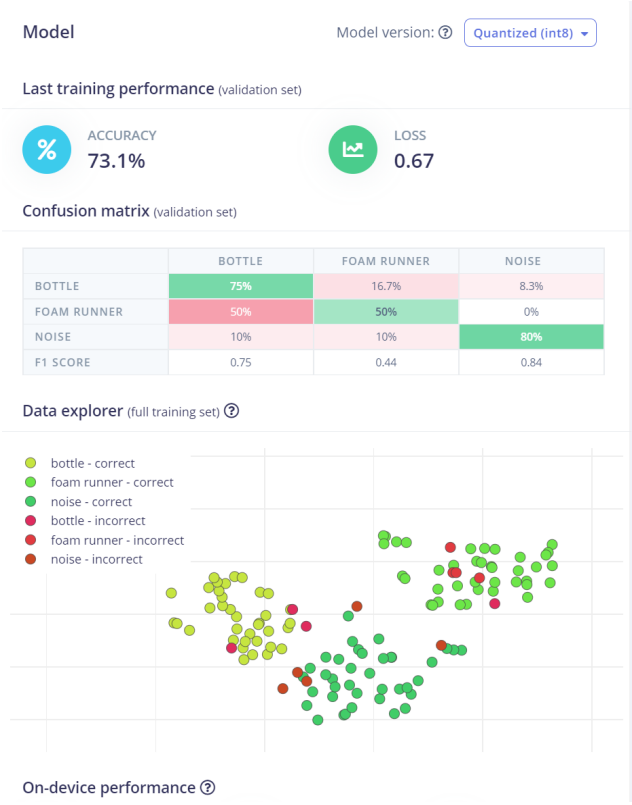
4. How well did your dataset do in terms of Accuracy, Precision and Recall?

In terms of accuracy, my dataset underperformed compared to my peers, but still managed a respectable 73.1 training accuracy 76.92% testing accuracy.

My model was relatively accurate, especially with the foam runner. At almost every angle and distance I would hold the phone runner in front of the camera, it would recognize it as a foam runner. I imagine that the way the model is trained is heavily revolved around the form and shape of the objects, with the esoteric and unique form of the foam runner super easy to recognize, even when the model was shown a separate picture of it from my phone. It was surprisingly accurate with noise objects too. Even with the small sample set, it was able to recognize items such as my wallet flawlessly. There were not many instances where I saw the ‘uncertain tag’ regularly.

The model’s precision left a lot to be desired with how it behaved with my bottle. More than half the time, the model would recognize my bottle as being a foam runner. This was not too surprising with how similar the objects I chose are.

5. Take screen grabs of the graphs available through the Feature Explorer for both the training and test/ live classification sets. Discuss the graphs in detail.

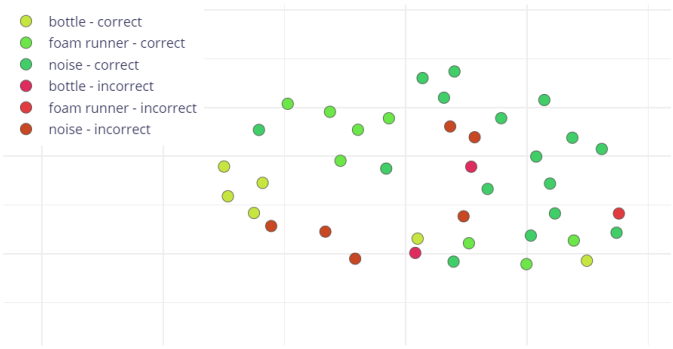


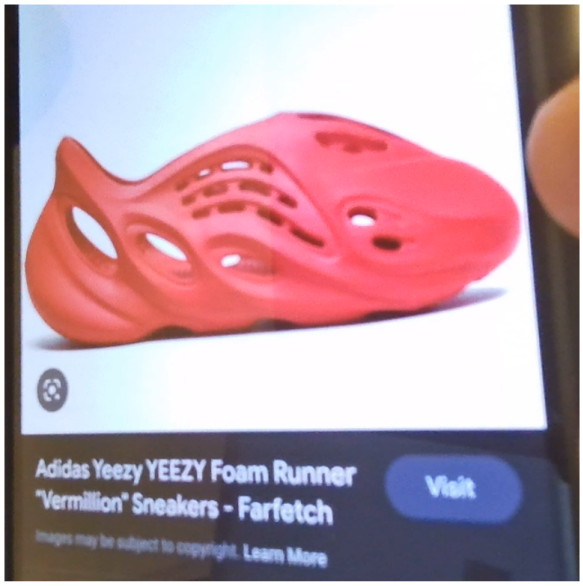
Model testing results

ACCURACY
76.92%

	BOTTLE	FOAM RUNNER	NOISE	UNCERTAIN
BOTTLE	75%	12.5%	0%	12.5%
FOAM RUNNER	0%	88.9%	0%	11.1%
NOISE	0%	9.1%	72.7%	18.2%
F1 SCORE	0.86	0.80	0.84	

Feature explorer





Inferencing...

foam runner

Inferencing...

foam runner

Inferencing...

noise

Inferencing...

noise

6. Provide brief postulations for how you think you could get your model to perform better. What does better mean?