UDACITY

PROJECT SPECIFICATION

Dog Breed Classifier

Files Submitted

CRITERIA	MEETS SPECIFICATIONS
Submission Files	The submission includes all required, complete notebook files.

Step 1: Detect Humans

CRITERIA	MEETS SPECIFICATIONS
Question 1: Assess the Human Face Detector	The submission returns the percentage of the first 100 images in the dog and human face datasets that include a detected, human face.

Step 2: Detect Dogs

CRITERIA	MEETS SPECIFICATIONS

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Implement a Dog Detector	Use a pre-trained VGG16 Net to find the predicted class for a given image. Use this to complete a `dog_detector` function below that returns True if a dog is detected in an image (and False if not).
Question 2: Assess the Dog Detector	The submission returns the percentage of the first 100 images in the dog and human face datasets that include a detected dog.

Step 3: Create a CNN to Classify Dog Breeds (from Scratch)

CRITERIA	MEETS SPECIFICATIONS
Specify DataLoaders for the Dog Dataset	Write three separate data loaders for the training, validation, and test datasets of dog images. These images should be pre-processed to be of the correct size.
Question 3: Describe your chosen procedure for preprocessing the data.	Answer describes how the images were pre-processed and/or augmented.
Model Architecture	The submission specifies a CNN architecture.

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Question 4: Outline the steps you took to get to your final CNN architecture and your reasoning at each step.	Answer describes the reasoning behind the selection of layer types.
Train the Model	Choose appropriate loss and optimization functions for this classification task. Train the model for a number of epochs and save the "best" result.
Test the Model	The trained model attains at least 10% accuracy on the test set.

Step 4: Create a CNN Using Transfer Learning

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Model Architecture	The submission specifies a model architecture that uses part of a pre-trained model.
Question 5: Model Architecture	The submission details why the chosen architecture is suitable for this classification task.

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Train and Validate the Model	Train your model for a number of epochs and save the result wth the lowest validation loss.
Test the Model	Accuracy on the test set is 60% or greater.
Predict Dog Breed with the Model	The submission includes a function that takes a file path to an image as input and returns the dog breed that is predicted by the CNN.

Step 5: Write Your Algorithm

CRITERIA	MEETS SPECIFICATIONS
Write your Algorithm	The submission uses the CNN from the previous step to detect dog breed. The submission has different output for each detected image type (dog, human, other) and provides either predicted actual (or resembling) dog breed.

Step 6: Test Your Algorithm

CRITERIA	MEETS SPECIFICATIONS

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Test Your Algorithm on Sample Images!	The submission tests at least 6 images, including at least two human and two dog images.
Question 6: Weaknesses and Improvements	Submission provides at least three possible points of improvement for the classification algorithm.

Suggestions to Make Your Project Stand Out!

(Presented in no particular order ...)

(1) AUGMENT THE TRAINING DATA

Augmenting the training and/or validation set might help improve model performance.

(2) TURN YOUR ALGORITHM INTO A WEB APP

Turn your code into a web app using Flask!

(3) OVERLAY DOG EARS ON DETECTED HUMAN HEADS

Overlay a Snapchat-like filter with dog ears on detected human heads. You can determine where to place the ears through the use of the OpenCV face detector, which returns a bounding box for the face. If you would also like to overlay a dog nose filter, some nice tutorials for facial keypoints detection exist here.

(4) ADD FUNCTIONALITY FOR DOG MUTTS

Currently, if a dog appears 51% German Shephard and 49% poodle, only the German Shephard breed is returned. The algorithm is currently guaranteed to fail for every mixed breed dog. Of course, if a dog is predicted as 99.5% Labrador, it is still worthwhile to round this to 100% and return a single breed; so, you will have to find a nice balance.

(5) EXPERIMENT WITH MULTIPLE DOG/HUMAN DETECTORS

Perform a systematic evaluation of various methods for detecting humans and dogs in images. Provide improved methodology for the `face_detector` and `dog_detector` functions.