

Project Proposal: Cat/Dog Image Classification using a Convolutional Neural Network Model

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With the rise of many ubiquitous image-capturing systems, the classification of the vast amount of unstructured image data is extremely relevant. For my Junior Independent Study Thesis, I would like to use machine learning to develop a model for classifying images into specific labels with Convolutional Neural Networks(CNN). The specific image classification model I will be working with is for classifying images into either the Cat or Dog Label.

Image Classification is under the greater field of computer vision and is the process of identifying and grouping images according to specific labels. Image Classification is particularly useful in the medical research field, autonomous vehicle industry, object identification in traffic management systems and many more computer vision applicable industries. For example, in the autonomous vehicle industry, using captured imagery from sensory input devices, cars are able to detect pedestrians and traffic signs and classify them into their appropriate categories. Deep learning techniques as opposed to traditional image processing is preferred, because of its greater accuracy and speed.

My project will consist of two components. There will be the user interface that accepts images of cats and dogs from users. I plan to build a web application user interface using React. The Graphical User Interface(GUI) will be divided into two areas. The first will allow user input and the second area will be for displaying the classification of the image. I plan for the output to be a simple large text output that describes the correct label.

The other portion of the project is the back end, which will consist of the CNN model for the dataset. I hope to use the Keras API in Python and specifically the CIFAR-10(Canadian Institute For Advanced Research) dataset for my model. The model should be able to correctly label and locate the animal in the image with the use of a bounding box. The primary goal is for the CNN model to have at least 80 percent validation. Finally, after input is accepted, the model should be able to correctly identify and give the right label. The result is then passed to the GUI so that the user can view the result. In the hand-drawn diagram attached to this abstract, the user input-processing-output flow of my proposed project is displayed for a better understanding of the User Interface and Modelling merge.

I plan to use a variety of textbooks, journals and tutorials to aid in the development of this project[1][2] [3][4]. As a stretch goal, I hope to be able to extend the amount of subcategories of labels, for example, classifying images based on a specific cat or dog breed. My overall goal is to have a well-trained model that can classify images into either of the two labels.

References

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