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Household Animals Classification Using Deep Learning

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CS230: Deep Learning

Abstract

- Using deep learning to study household animals' demeanor and body language, we can find out if they are sick or not and provide necessary help in time.
- In order to achieve this goal, we need to start with animal species classification.
- Develop and train the VGG models.
- Visualize the model outputs of the VGG models.

Motivation

- Recently, animal detection for wildlife has been an area of great interest among biologists. Since there are many species, manually identifying them can be a daunting task.
- A deep learning algorithm that classifies animals based on their images can help monitor them more efficiently.
- A further possible application of this technology can be used to identify household animals' behaviors. Then provide necessary help and treatment in time.
- All these challenges necessitate an efficient algorithm for classification.

Evaluation Sequence

My project starts from developing and training VGG models and then apply the visualization technique to gain insight of the models:

- Develop VGG-6 model from scratch
- Apply transfer leanring to train VGG-16 model
- Visualize images from each convolution layers filters
- Visualize heatmaps of class activations

Model Introduction

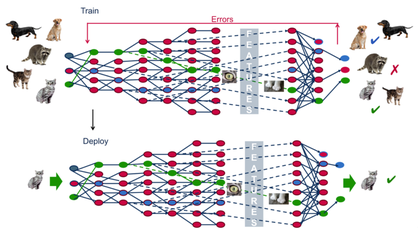

Figure 1: Animal Classification

Figure 2: Dogs vs Cats from Kaggle

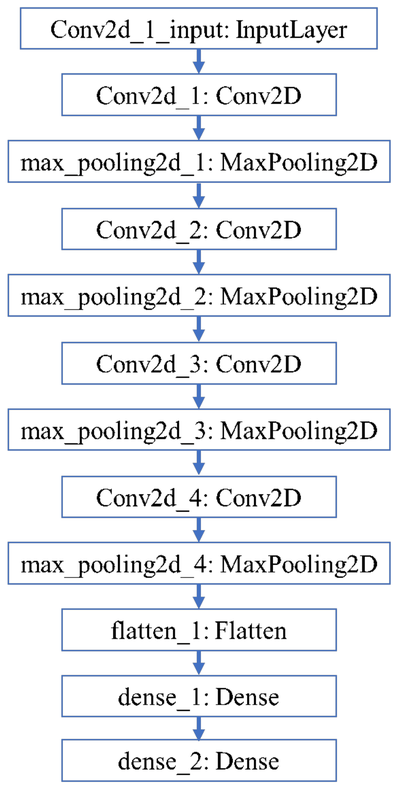

Figure 3: VGG-6 model

Testing Result

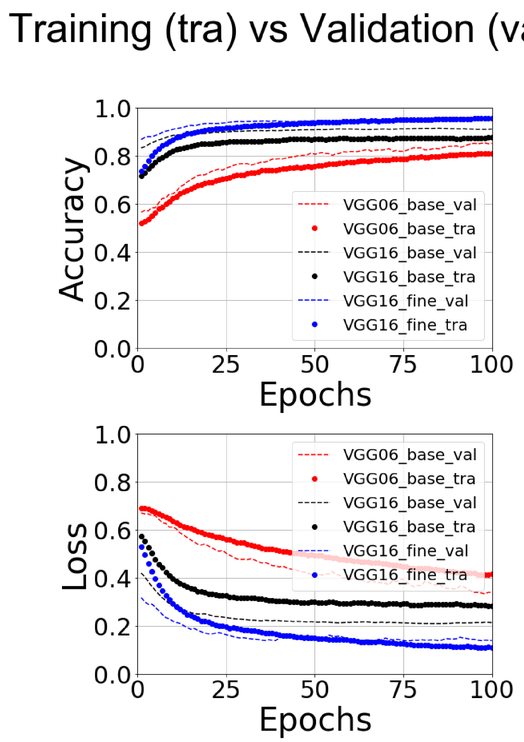

Figure 4: Accuracy and Loss

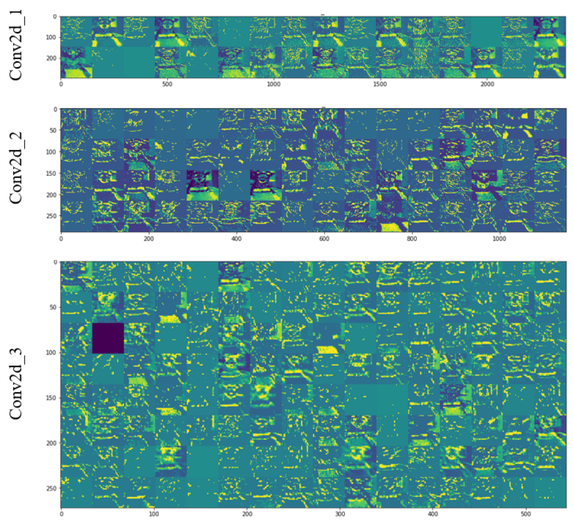

Figure 5: Visualizing Intermediate Layer Activations

Testing Result

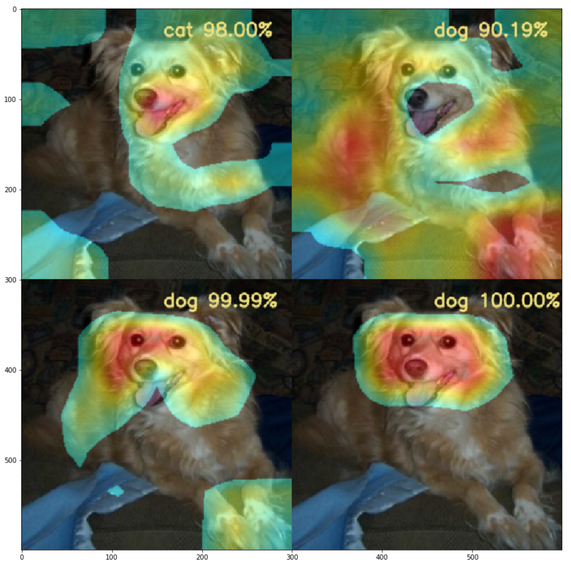

Figure 6: Visualizing Heatmaps (demo)

Conclusion

- I trained the VGG models and got over 95% accuracy.
- Demonstrated two ways of visualization the model outputs

Future Work

- Will keep collecting datasets for a month or a year in order to find the correlation between illnesses and animal behavior. Through the deep learning model, I will be able to predict the probability of a symptom for every animal picture or video.
- Moreover, different types of models can be employed to see, which one fits the needs the most. The project shouldn't be limited to VGG models.