act_report

September 25, 2023

0.1 Report: act_report

This short article descibes key insights and results obtained from a new neural network architecture used for image classification of twitter data. For this, we used a convolutional neural network (CNN) which was trained on more than 2000 images of dogs and the metric used for evaluation was the accuracy metric.

The highlights of the perormance of the neural network as well as some shortcomings of our analysis are shown in the following:

1. The neural network predicts around 74 % of the images as dog images which is quite a good accuracy under the assumption that all images refer to dogs. But as some images do not refer to actual dogs, also the neural networks actual accuracy might be higher than we might expect from the data we have access to.
2. The second and third predictions (p2 and p3) predict a very similar amount of dog images, i.e. at first glance it seems like most of the time all three predictions coincide.
3. In around 147 cases the neural network would not have predicted a dog according to p1 but according to p2, whereas in the case of p1 and p2 not predicting a dog, the number of times p3 predicts reduces to 62. These cases could possible be interpreted as cases where the uncertainty in the predictions is large.
4. In more than 15 % (308) of the predictions the neural network seems to be rather "certain" that there is no dog in the image.
5. Dogs in the floofer stage seem to be easiest to predict from what we can conclude with our data. They are predicted as dogs with 100 % accuracy. The pupper stage does on the other hand seem the most difficult to predict since they are only in 70 % of the cases identified as dogs (cmp. Fig. 1). Apart from the pupper stage, the remaining dog stages were predicted more often accurately than the predictions over the entire dataset. However, a very important weakness of this analysis is that only about 15 % of the data of our dataset have such a categorization and, hence, analyzing only the "verified" dogs (verified in terms of having assigned a dog stage) also implies working with a very small sample of our already rather small population.

Improving the shortcomings of the analysis and improving the network's predictive capabilities will be subject to future work.

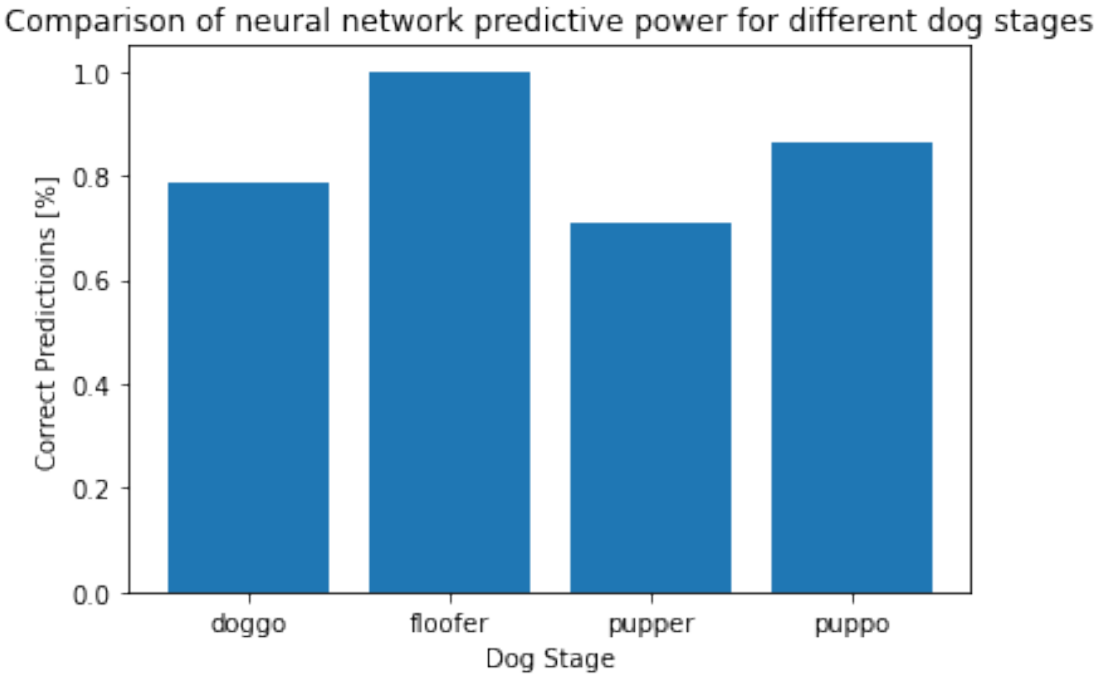
[4]:
```
import matplotlib.pyplot as plt

accuracy, dog_stages = ([0.78378378, 1.,         0.70935961, 0.86363636],
```

```
                        ['doggo', 'floofer', 'pupper', 'puppo'])

plt.bar(dog_stages, accuracy);
plt.xlabel('Dog Stage')
plt.ylabel('Correct Predictioins [%]')
plt.title('Comparison of neural network predictive power for different dog␣
 ↪stages')
```

[4]: `Text(0.5, 1.0, 'Comparison of neural network predictive power for different dog stages')`



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