Can Changes in Eye Appearance be Used to Predict High Blood Pressure?
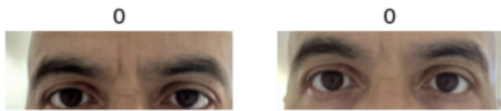
Q1: Question and Problem

- hypertension can display morphological symptoms like changes in eye appearance from hemorrhaging blood vessels
- **Can high blood pressure be predicted by a change in eye appearance?**

An image of the test subject's eye with high blood pressure. There is a noticeable bloodshot appearance.

Q3: Findings

- 87.5 - 91.7% accuracy (validation set in training)
- > 60% accuracy on 8 images

```
['1'], TensorBase([False,  True]), TensorBase([0.0155, 0.9851]))
```
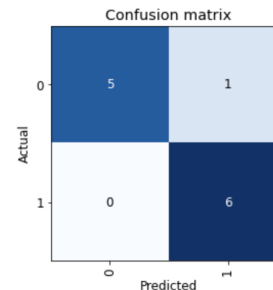

Confusion matrix

Above: Sample output code from the test set after being fed in 1 high BP image.
Left: Confusion matrix for training set. Each batch of the training data was 12 images. ~91.7% accuracy

Q2: Framework

- collection of blood pressure and eye images for 4 weeks
- photos taken at fixed angle, all cropped to the same dimensions
- images merged with BP readings in a dataframe
- thresholding: blood pressure readings >= 130 are high (1), <130 are low (0)
- Fast.ai library used to create visual classification model, 67 images of training data used

example of merged data & images, 0 indicates low BP assignment

Q4: Interpretation and Conclusions

- appears to be correlation between eye condition and raised blood pressure
- capable of detecting a change in blood pressure state from features related to eye appearance
- current risk of overfitting the training data due to fewer training examples and limited data augmentation
- further research includes collecting more images w/higher quality

(all images have been collected from my study and not published)

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