Week 10 Research

Maria Shevchuk

Changes...

hopefully for the better

What I did before

```
X_train = np.array([cv2.cvtColor(image, cv2.COLOR_BGR2GRAY) for image in X_train])
X_test = np.array([cv2.cvtColor(image, cv2.COLOR_BGR2GRAY) for image in X_test])
```

```
input_shape = (X_train.shape[1], X_train.shape[2], 1)
```

It worked… So why change it?

- Run time was the same (which logically makes no sense)
- Research suggests that changing CNN architecture will greatly impact learning
  - The weights are trained for a specific input configuration
  - Removing initial layers of a CNN = destroying the hierarchy of features

What I changed it to

```
X_train_conc = np.repeat(X_train[..., np.newaxis], 3, -1)
X_test_conc = np.repeat(X_test[..., np.newaxis], 3, -1)
```

```
input_shape = (X_train.shape[1], X_train.shape[2], 3)
```

*Repeating the image 3 times on a new dimension to appear as RGB

What changed?

What I changed it to

```
X_train_conc = np.repeat(X_train[..., np.newaxis], 3, -1)
X_test_conc = np.repeat(X_test[..., np.newaxis], 3, -1)
```

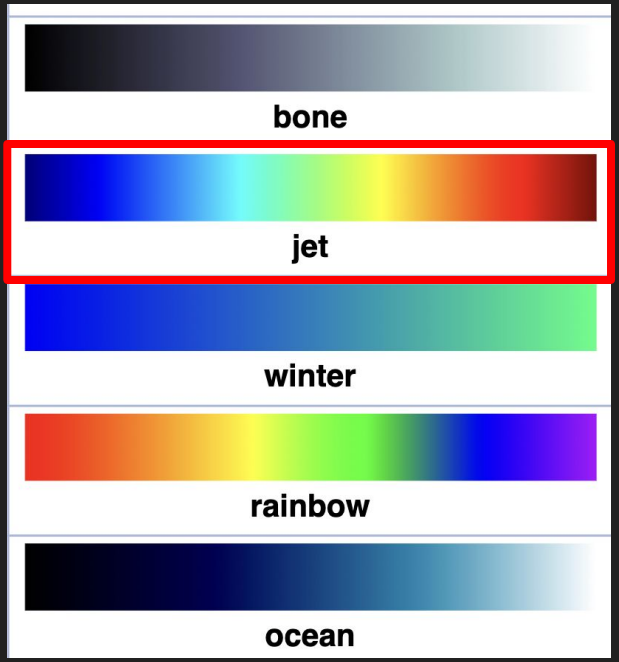
```
input_shape = (X_train.shape[1], X_train.shape[2], 3)
```

*Repeating the image 3 times on a new dimension to appear as RGB

What changed?

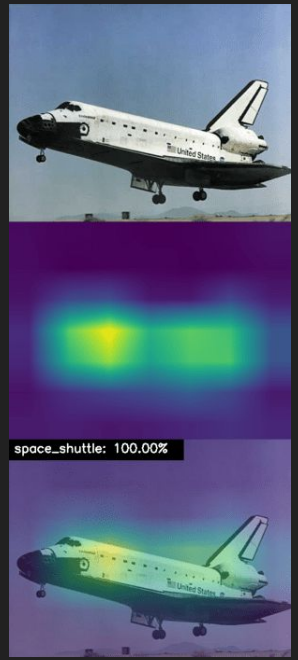
- I feel better now

Time for visualizations!

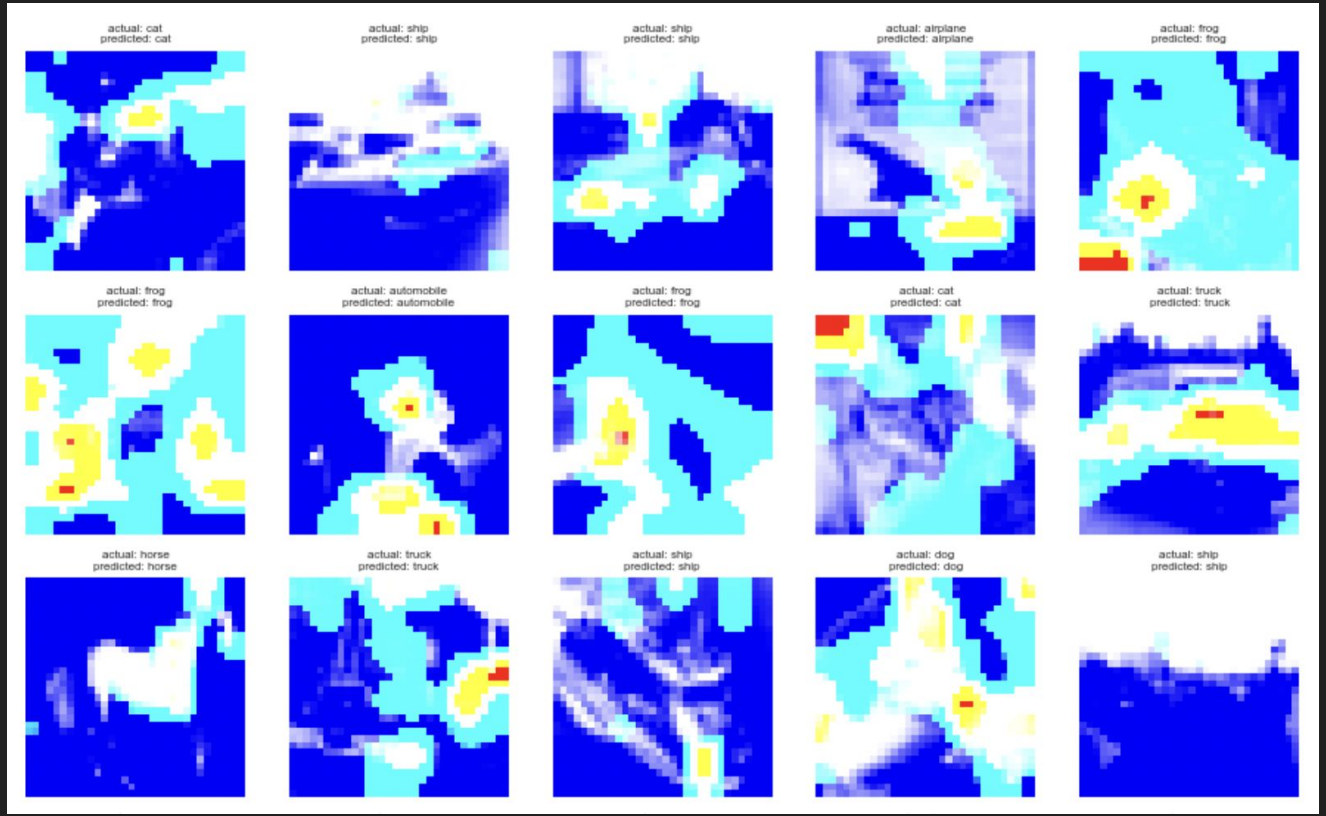


Gradient-weighted Class Activation Mapping (**Grad-CAM**)

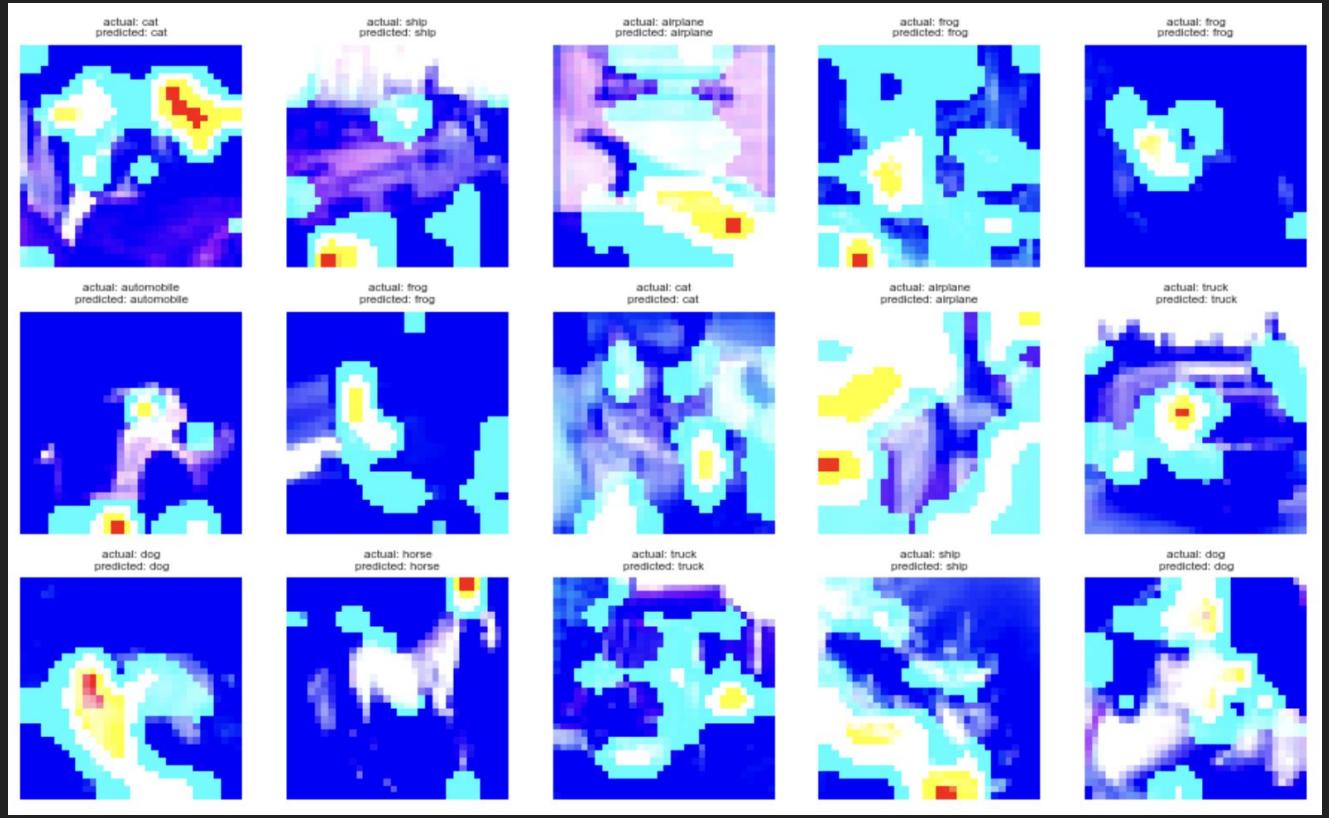
Examines the gradient information flowing into a given convolutional layer.



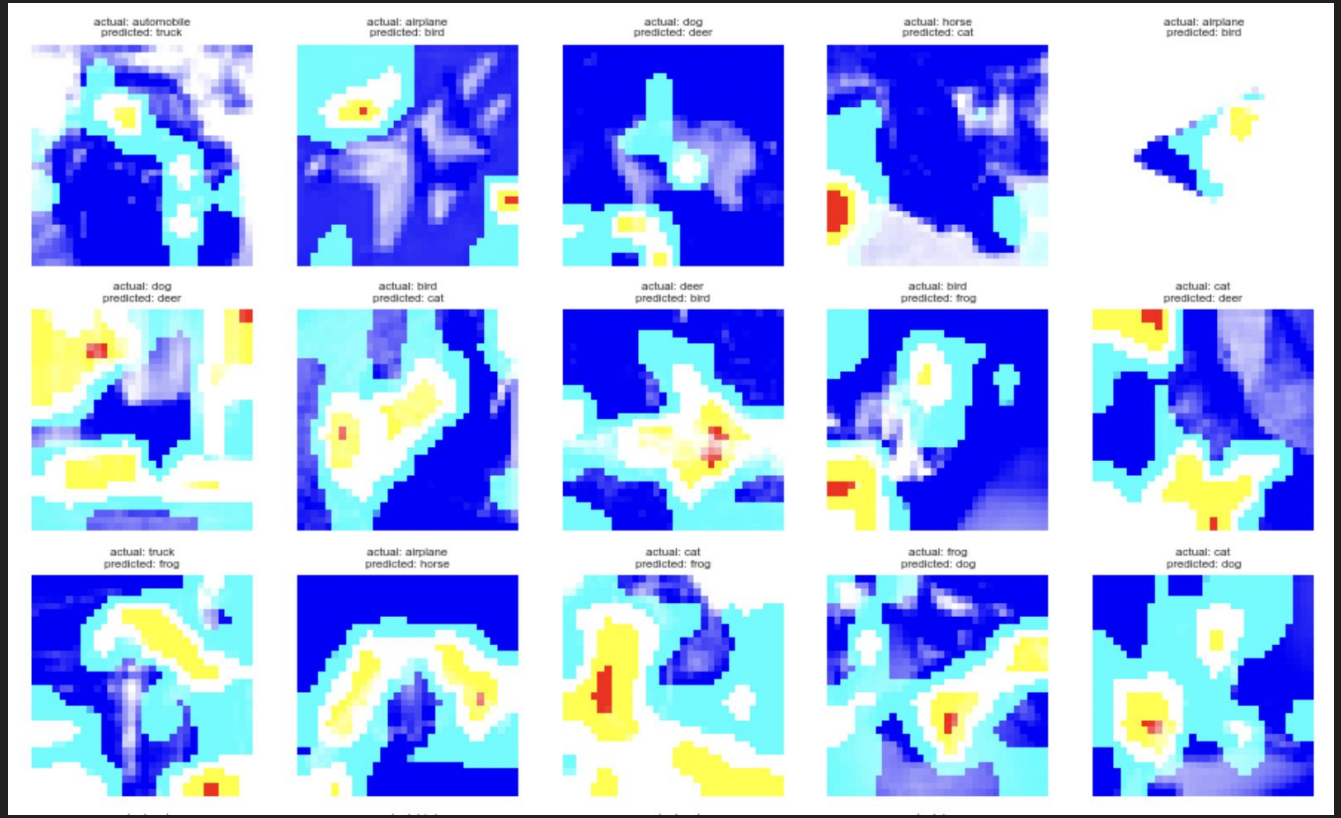
Grad-CAM visualizations | Correct Grey



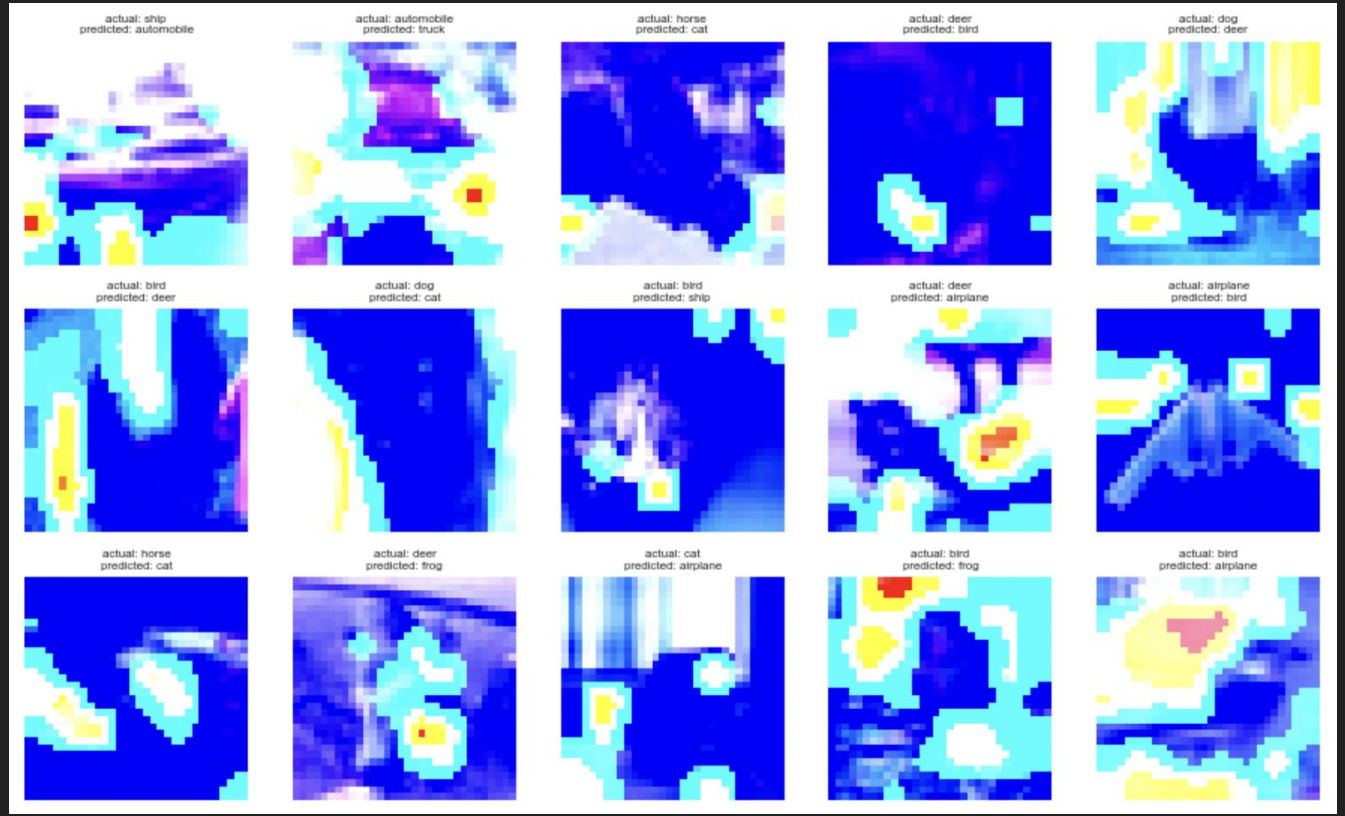
Grad-CAM visualizations | Correct RGB



Grad-CAM visualizations | Misclassified Grey



Grad-CAM visualizations | Misclassified RGB



What’s next?

- Improve visualizations
  - Original img next to gradcam
  - Try to turn down the opacity of the heatmap
- Make heatmaps at each layer of the CNN
- SHAP!!!
- Apply a high pass filter (Gaussian) - eliminate low frequencies to obtain edges
- Custom greyscale conversion (original: 0.299R + 0.587G + 0.114B)
  - How would greater weights of blue affect the results?
- GITHUB!!!