



# Visualizing and Understanding CNN



Team 49



# Motivation

---

- 01 Convolutional Networks (Convnets)
- 02 There is a little insight into their internal working

# ConvNets

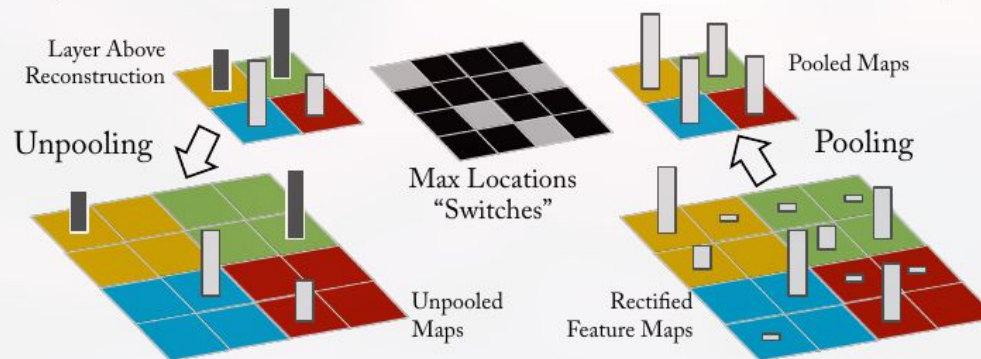
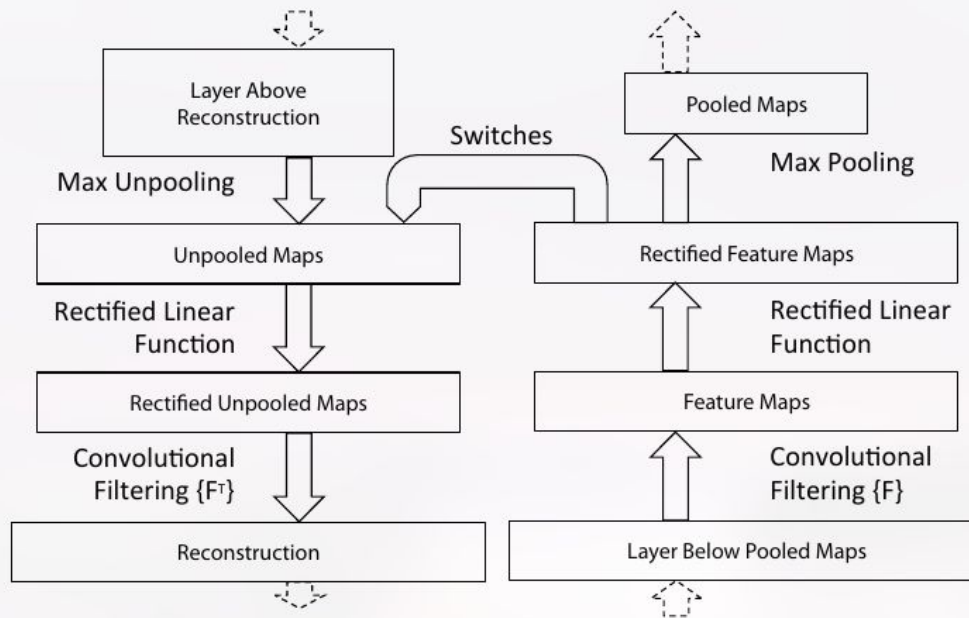
---

Convolutional Neural Network (CNNs) is a Deep Learning algorithm which can take in an input image, and assign importance to various objects in the images. It achieves this by applying a kernel operating on the image. A filter is used to do this, which is multiplied by the image matrix repeatedly by shifting it. This brings out the more important parts of an image by giving them more importance.

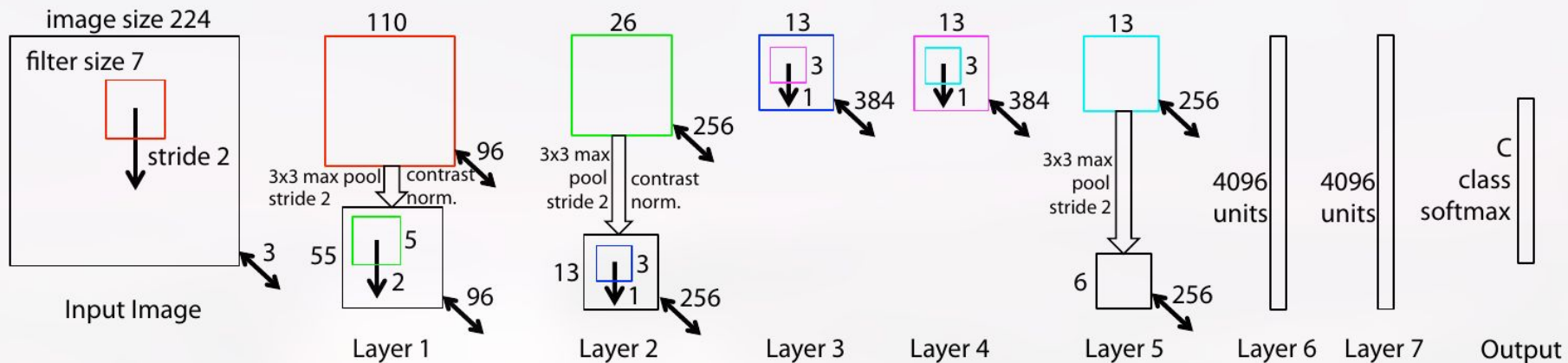
# Approach

---

- 01 Map activations back into pixel space
- 02 Uses a Deconvnet to achieve reconstruction

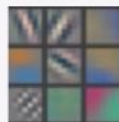


# Architecture

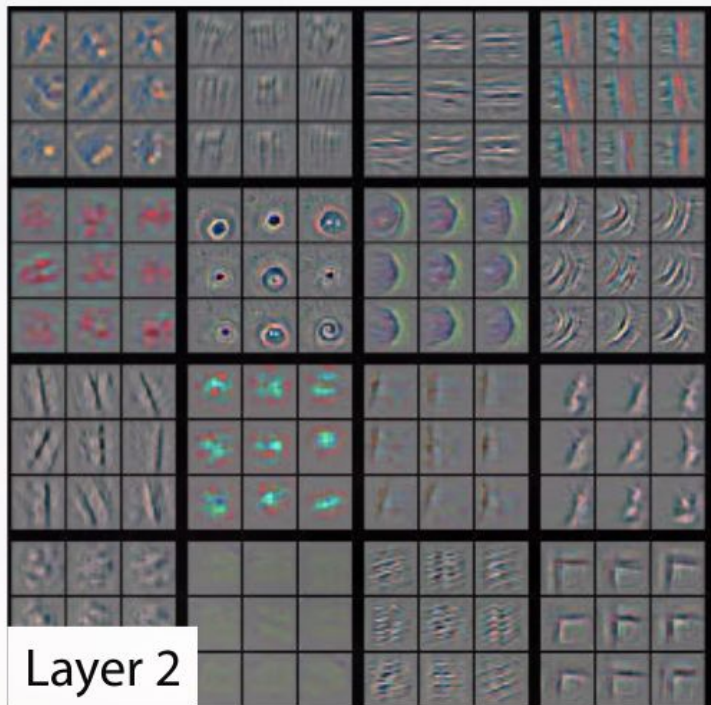


# Feature Visualizations

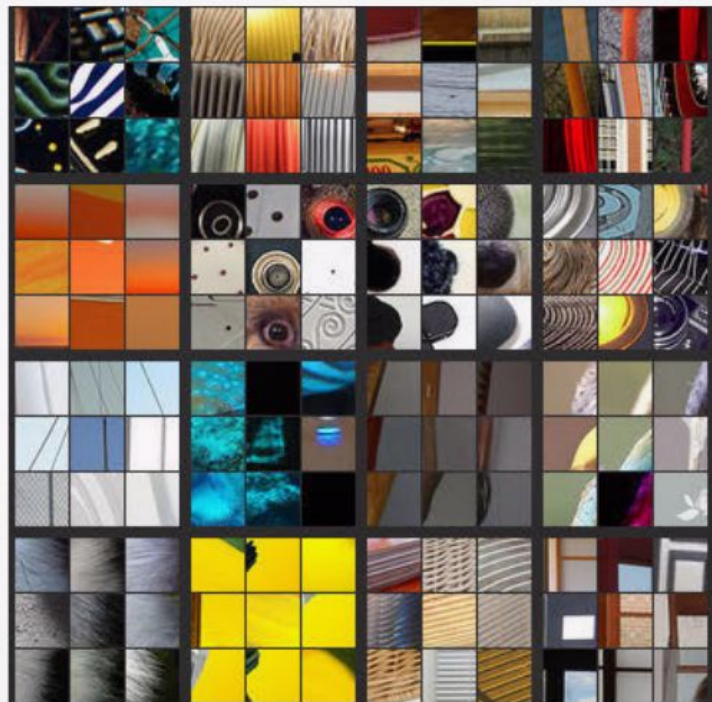
---



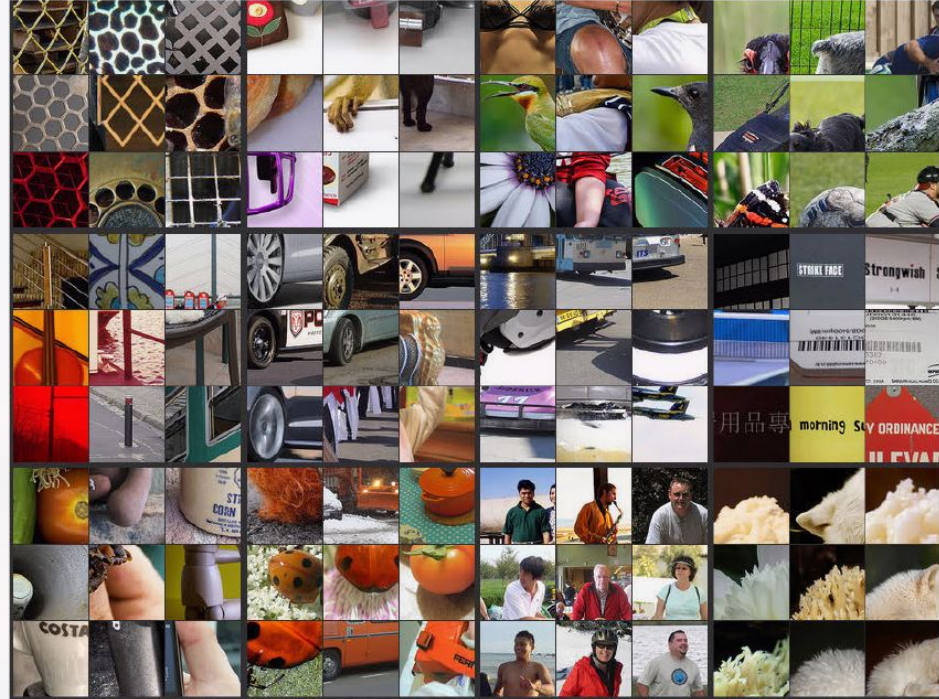
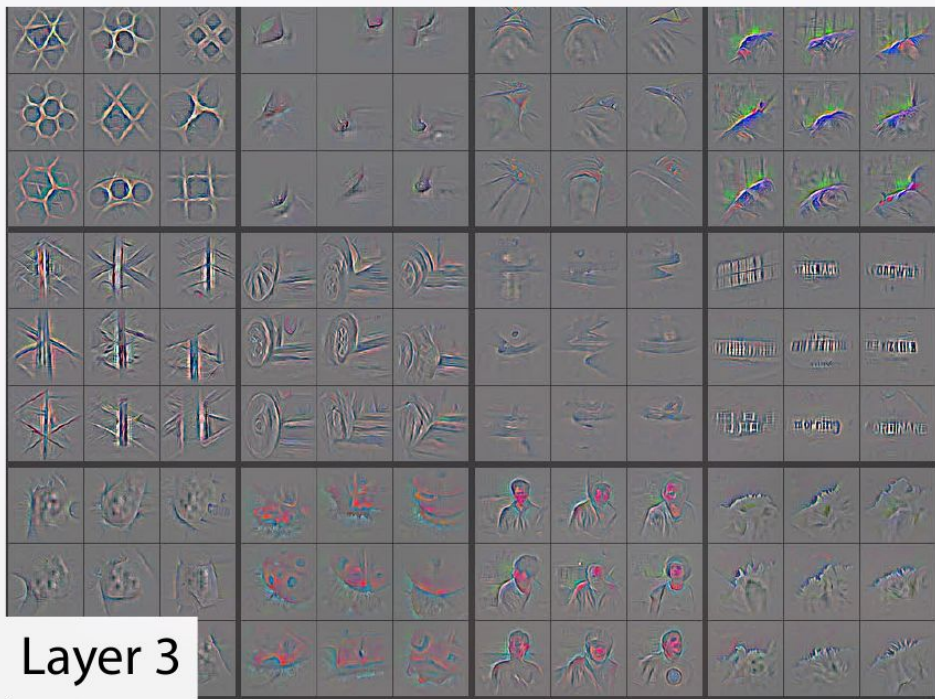
Layer 1



Layer 2

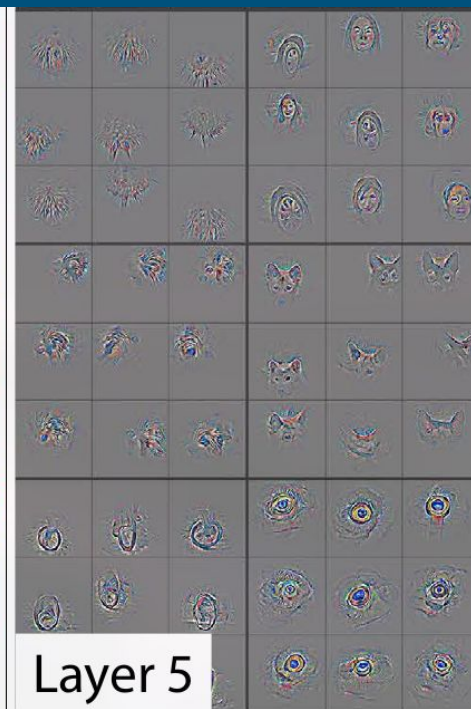
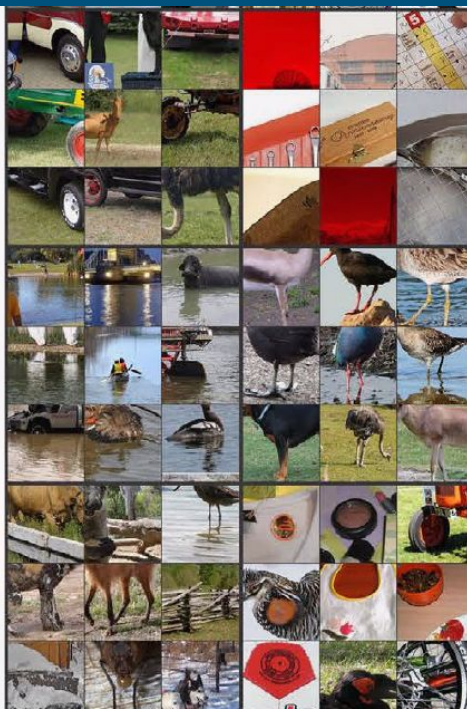




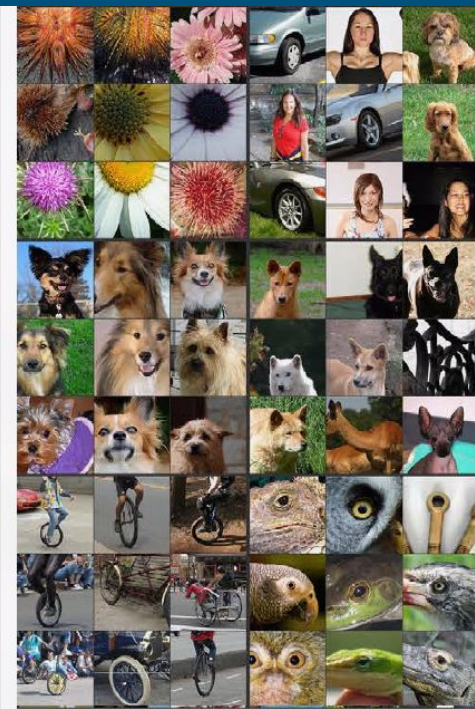




Layer 4



Layer 5



# Experiments

---



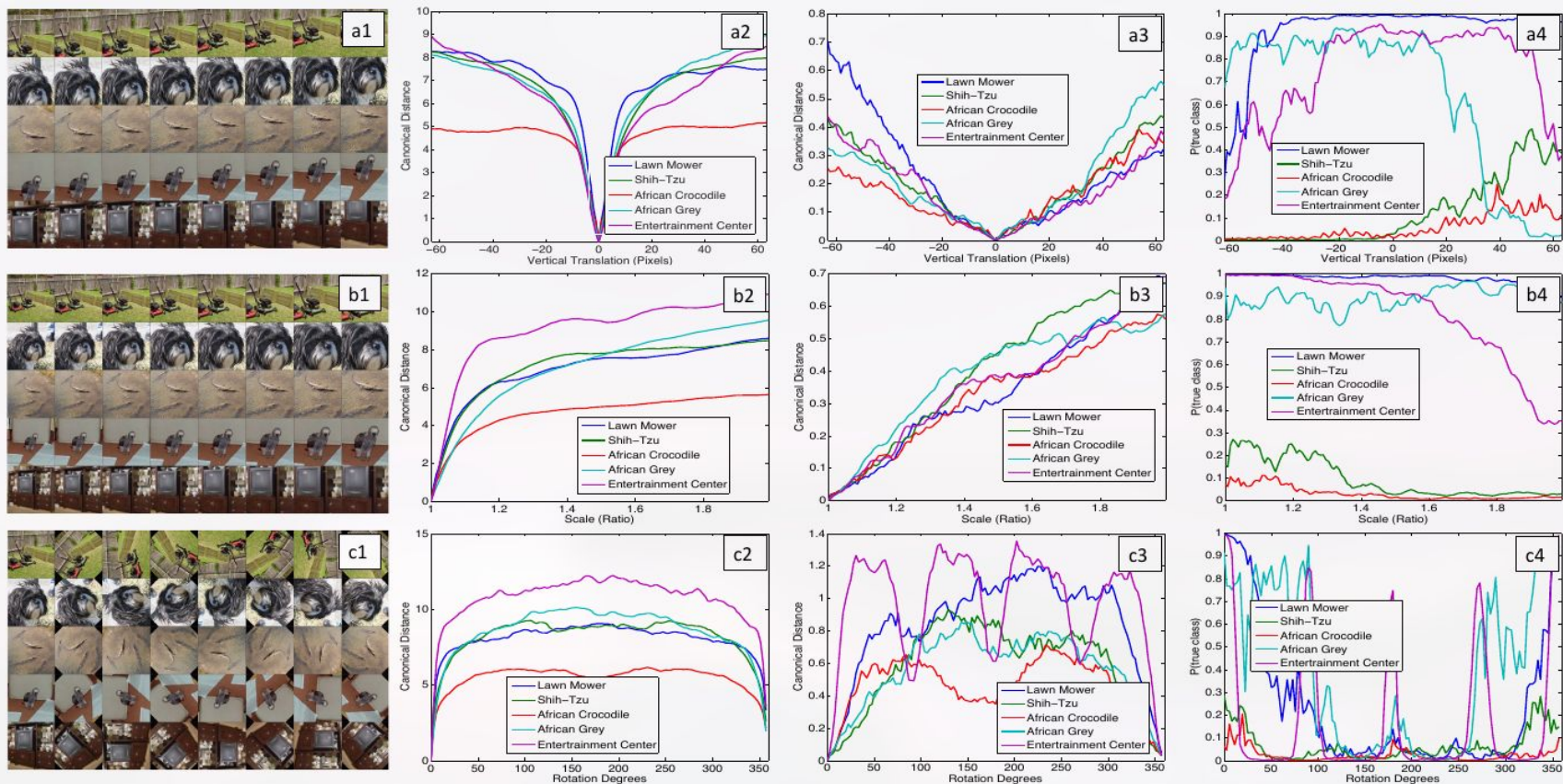


Figure 5. Analysis of vertical translation, scale, and rotation invariance within the model (rows a-c respectively). Col 1: 5 example images undergoing the transformations. Col 2 & 3: Euclidean distance between feature vectors from the original and transformed images in layers 1 and 7 respectively. Col 4: the probability of the true label for each image, as the image is transformed.

# Occlusion Sensitivity

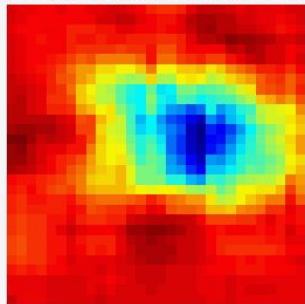
---

(a) Input Image

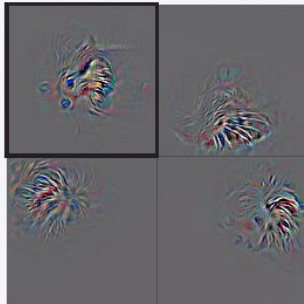


True Label: Pomeranian

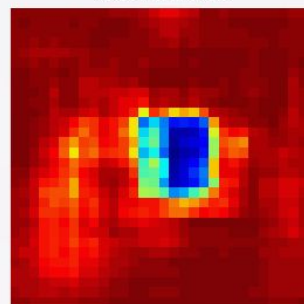
(b) Layer 5, strongest feature map



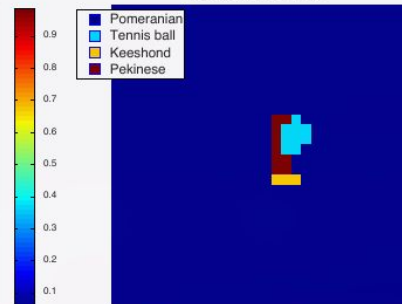
(c) Layer 5, strongest feature map projections



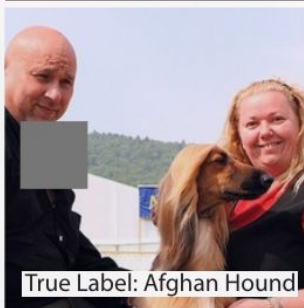
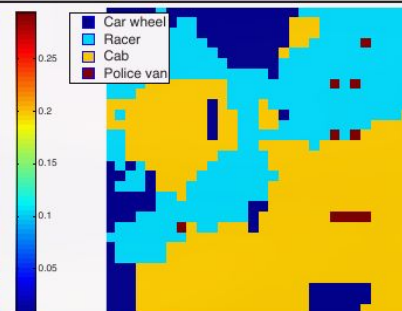
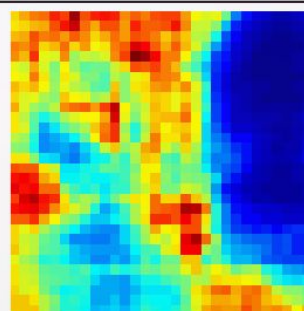
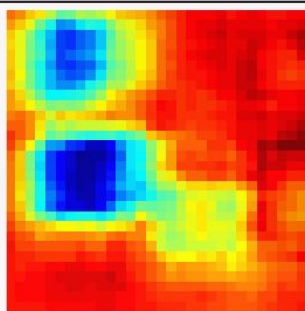
(d) Classifier, probability of correct class



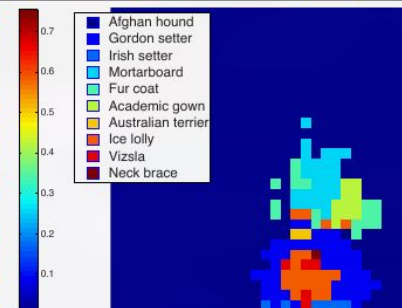
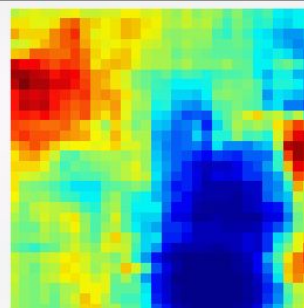
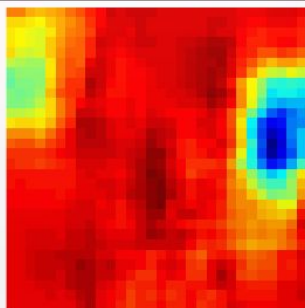
(e) Classifier, most probable class



True Label: Car Wheel



True Label: Afghan Hound



# Project Plan

---

01 Convnet & Deconvnet Implementation

02 Feature Visualization

03 Occlusion Sensitivity

## Team 49

---

Shreya Patil

Adhiraj Deshmukh

Shreyansh Agarwal

Shikhar Saxena

A teal-colored geometric shape, resembling a parallelogram or a stylized arrow, is located in the bottom right corner of the slide.





Thank you!