ME 6543

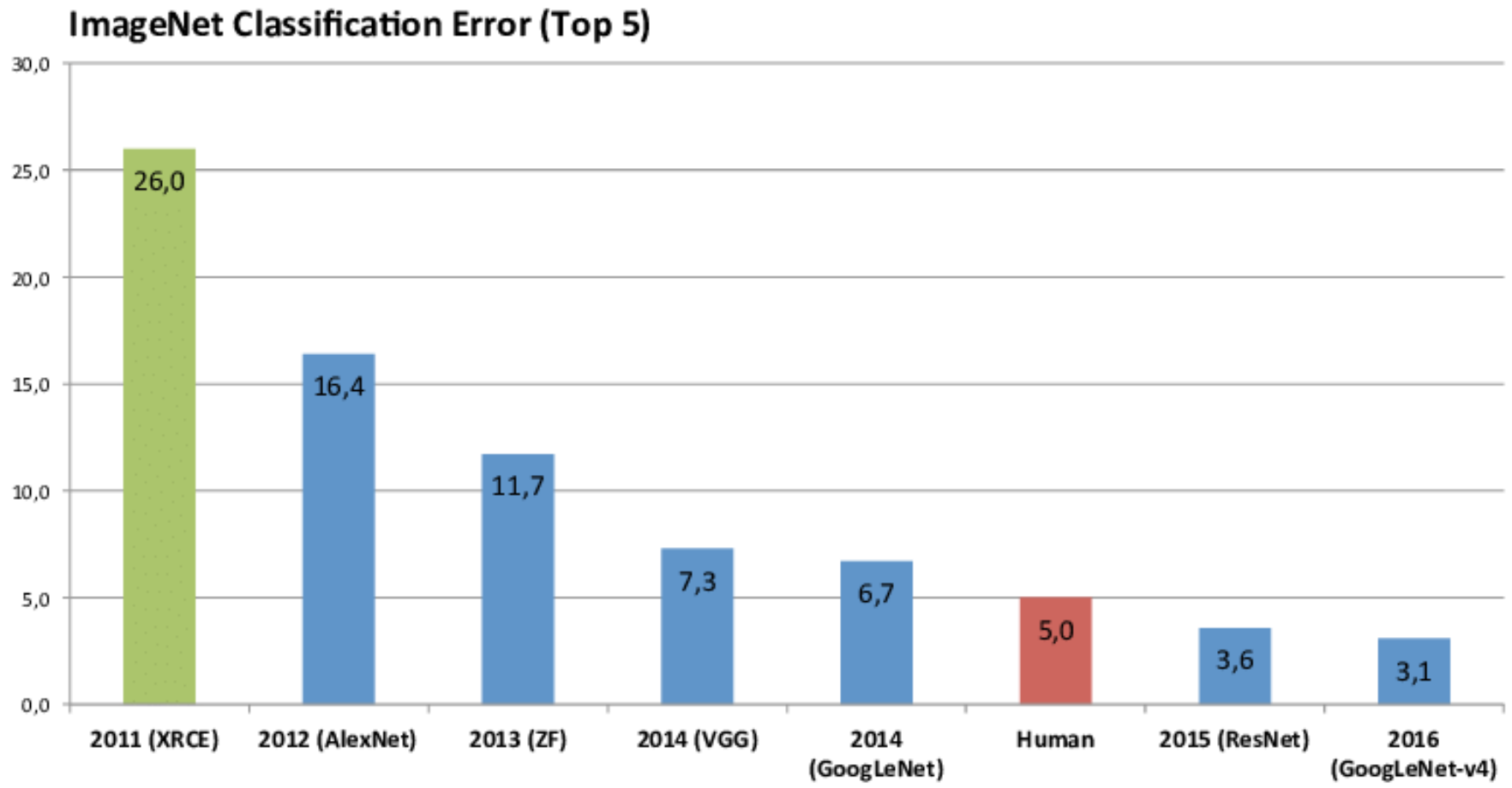
Hands on Sample Project

Cats vs Dogs

Image Classification Problem

Source: ImageNet

Image Classification Problem



Source: ImageNet Challenge

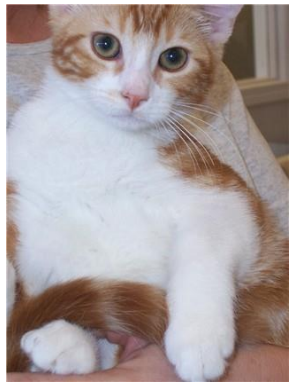
Problem Statement

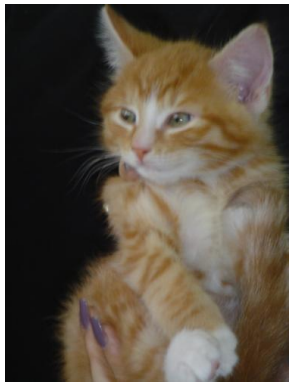
- Data Download Link: https://www.microsoft.com/en-us/download/details.aspx?id=54765
- Asirra (Animal Species Image Recognition for Restricting Access) is a HIP (Human Interactive Proof) that works by asking users to identify photographs of cats and dogs.
- Asirra is unique because of its partnership with Petfinder.com, the world's largest site devoted to finding homes for homeless pets. They've provided Microsoft Research with over three million images of cats and dogs, manually classified by people at thousands of animal shelters across the United States. Kaggle is fortunate to offer a subset of this data for fun and research.

Dataset








We will only distinguish between Cats and Dogs!!

Dataset

- Class Observations
  - Cats: 12,501
  - Dogs: 12,501
- Necessary Information
  - Variable (500 x 375, 327 x 500, 98 x 162, …. etc.)
  - Errors in Image
  - Large Image Size (>800 MB)

Task 1: Prepare the Data

1. Read all the images from directory
2. Image: Color vs Grey Scale
3. Resize the Images to a fixed size
4. Randomizing the image order
5. Storing the processed data
6. One-hot encoding when necessary

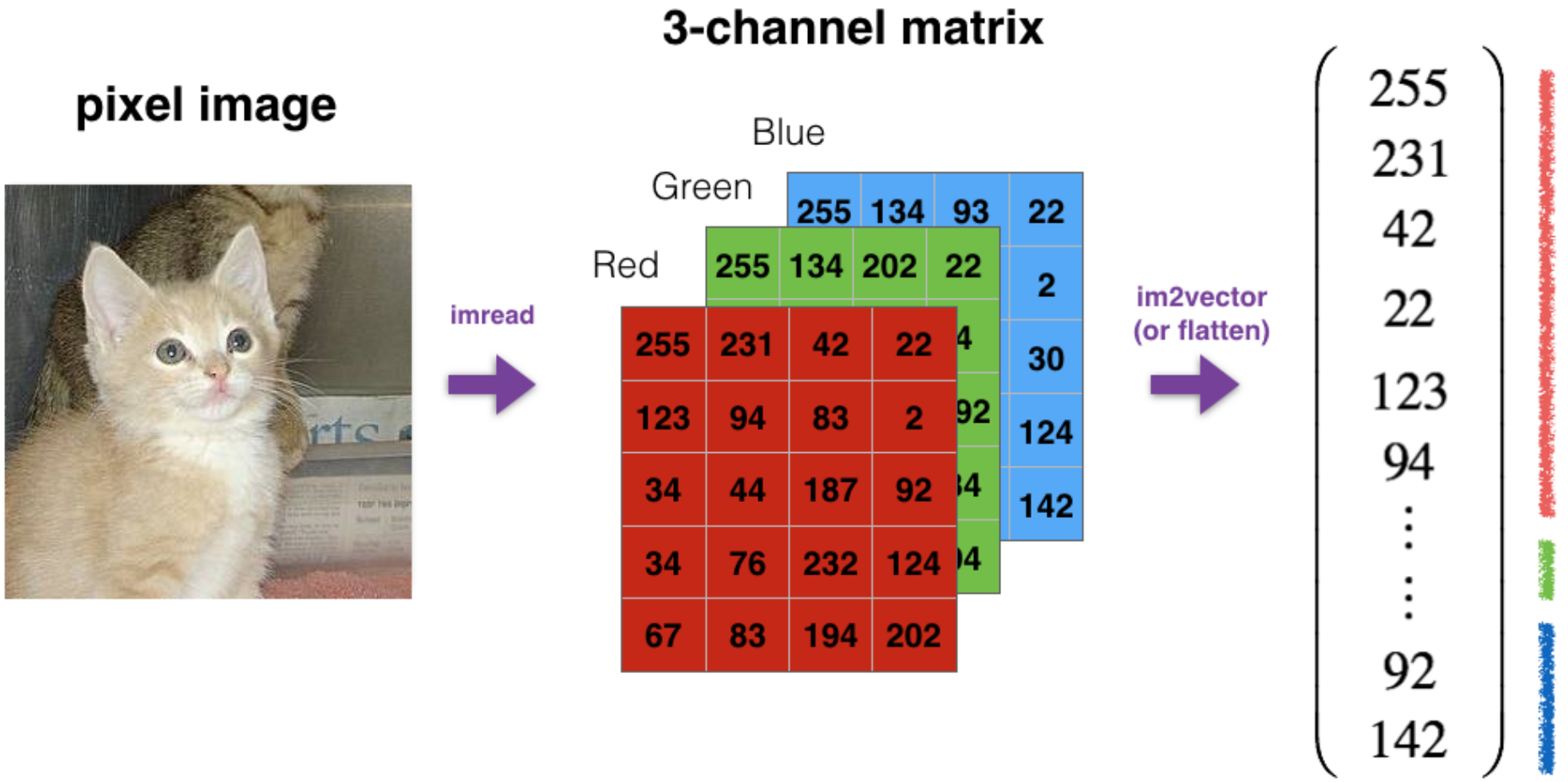
Task 2: Building the Prediction Model

Models

- Logistic Regression
- Decision Tree
- Random Forest
- Artificial Neural Network
- Convolutional Neural Network

Input Image Needs Modification

Image

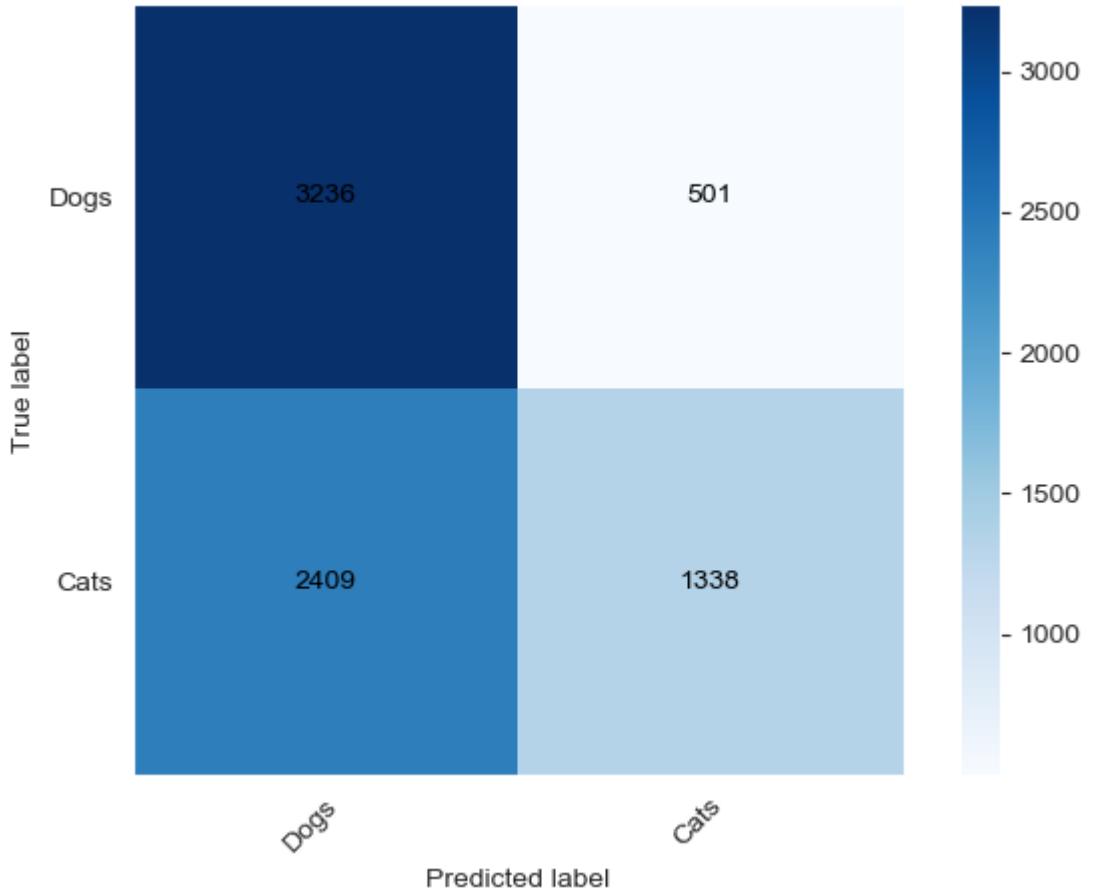


Modified Input

One-hot Encoding

Task 3: Error Analysis

- Model Evaluation Matrices can be:
  - Accuracy
  - Precision
  - Recall
  - Confusion Matrix



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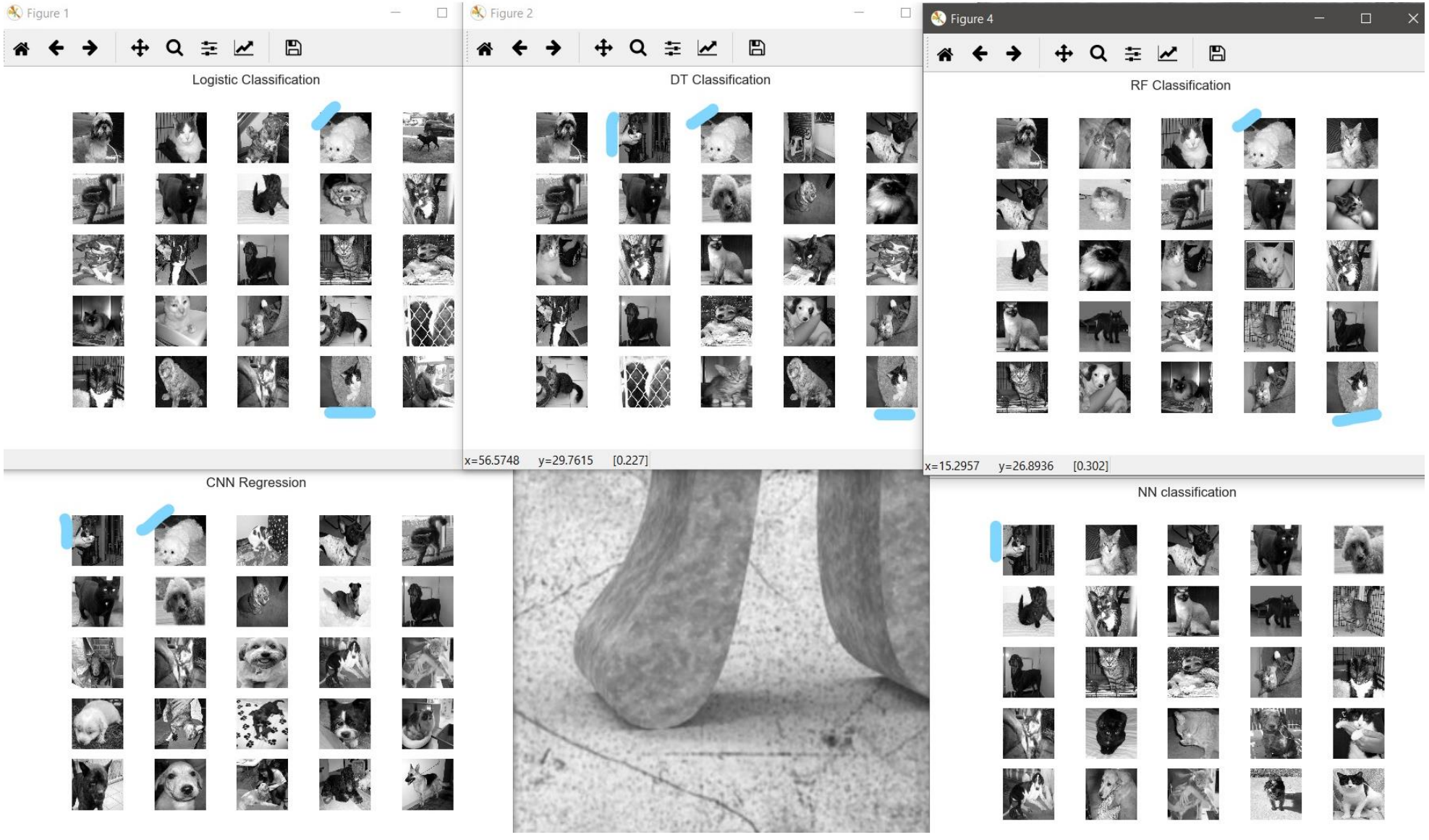
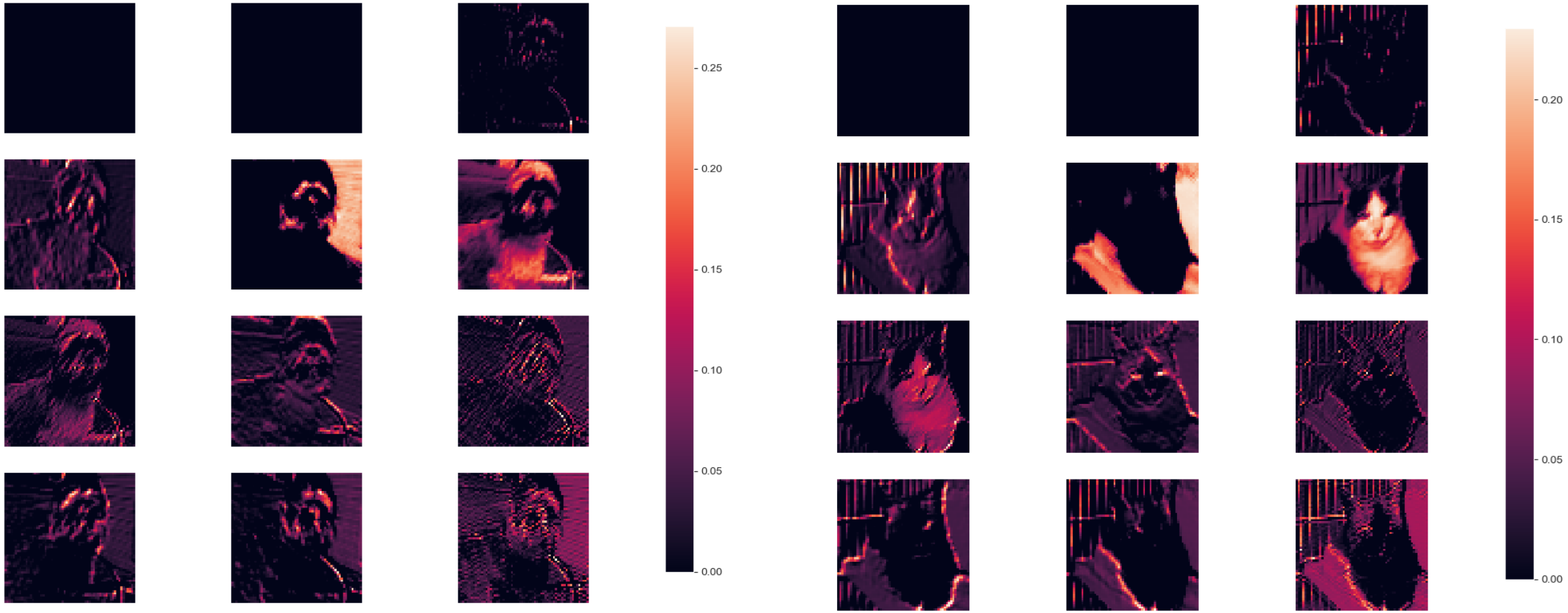


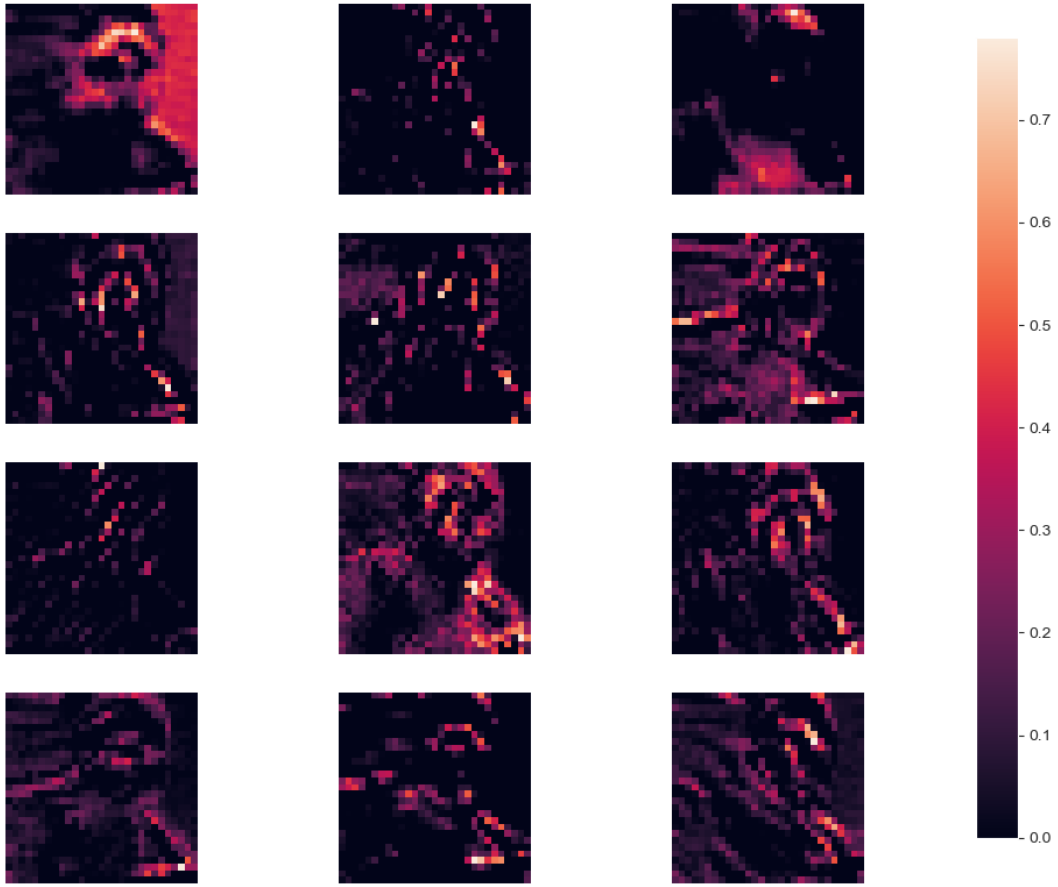
Task 3: Error Analysis (How Computer Sees Images): Layer 1



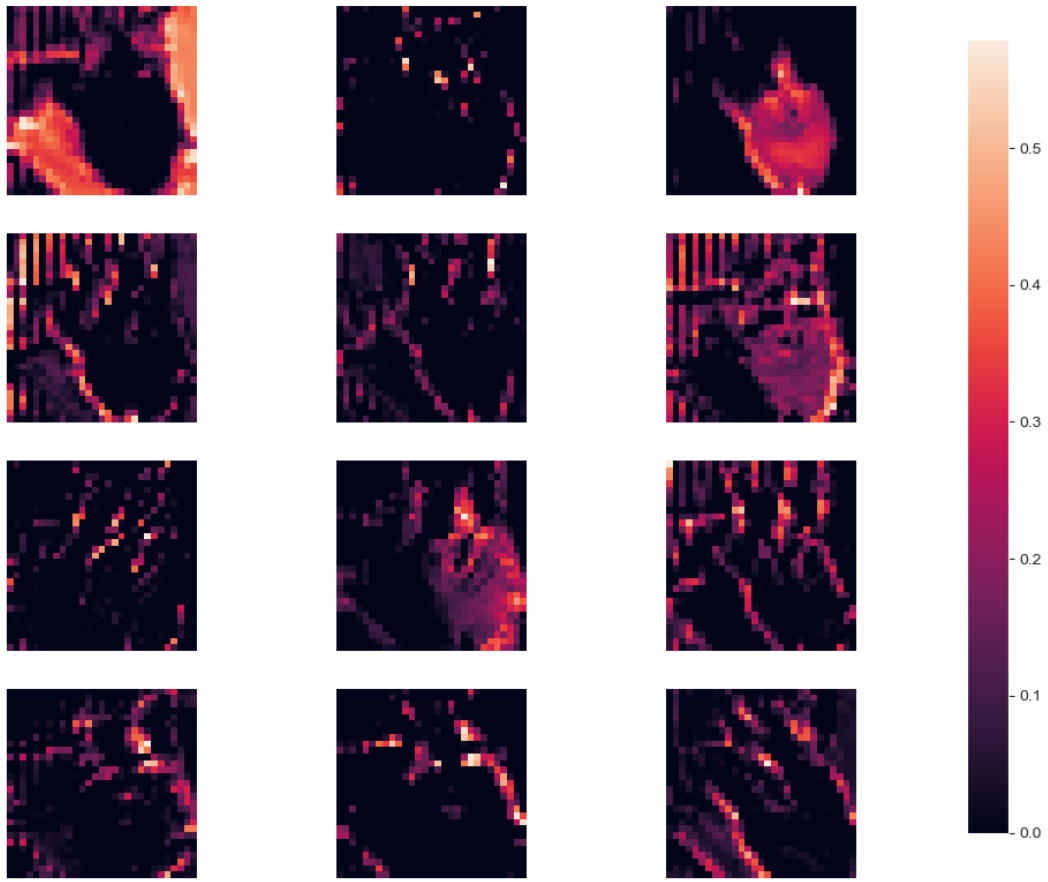
Dog

Cat

Task 3: Error Analysis (How Computer Sees Images): Layer 2



Dog



Cat

Task 4: Training Data Modification