



University of Colorado  
Boulder



# Deep Learning Applications for Computer Vision

Lecture 14: Neural Network Tutorial with  
TensorFlow



University of Colorado **Boulder**

# Image Classification Pipeline

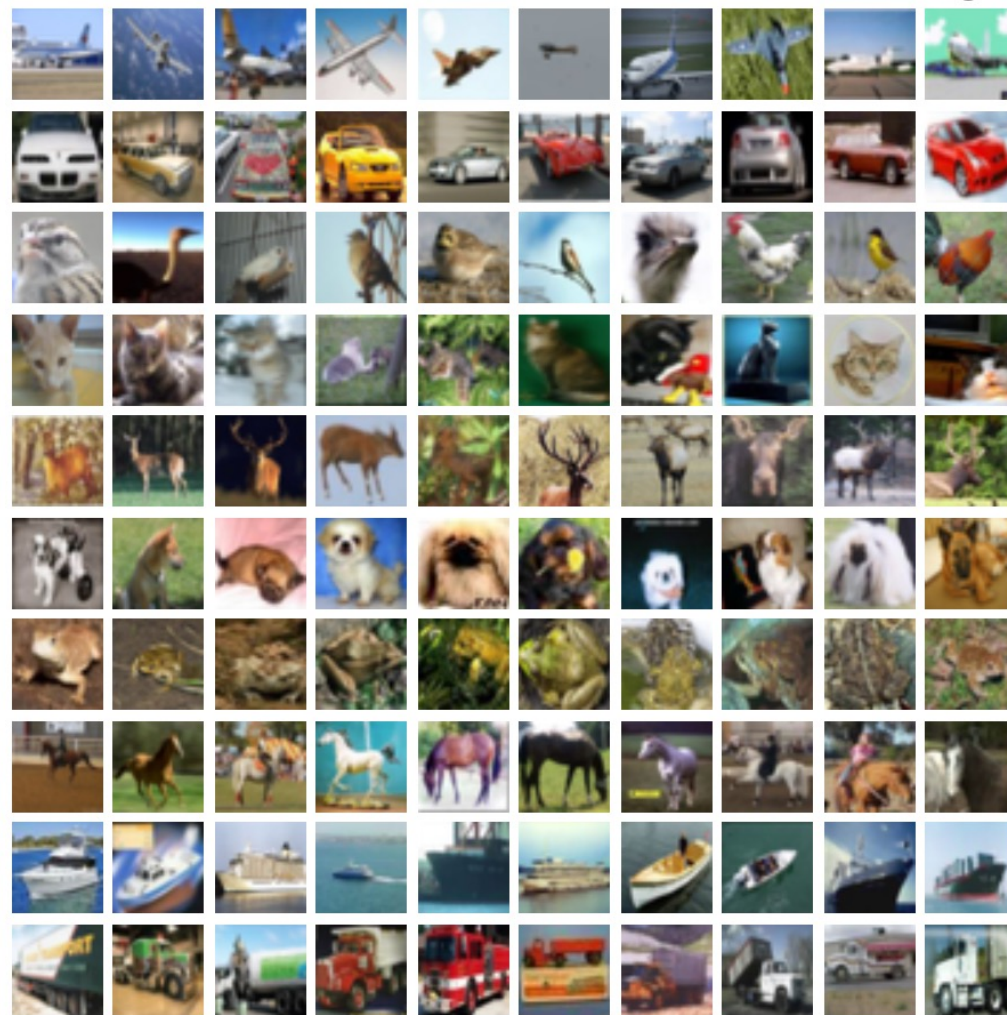
*Last time:* CIFAR-10 data

Our model:

- Input layer
- Output layer

*Today:* let's implement the model in *TensorFlow*

- *build*
- *train*
- *assess*
- *predict*



# *TensorFlow* tutorial

*File name:*

- Build\_train\_NN\_CIFAR10.ipynb



# What have we learned?

1. Import *TensorFlow* and helper libraries
2. Load the data set.
3. Pre-process data. Verify data shape and display
4. Build the network model
  - Sequential
  - Stack layers, one at a time
5. Choose Optimizer and loss function
6. Compile and train. Observe loss and accuracy over time
7. Run on *Testing Data*. Observe accuracy
8. Predict on new images



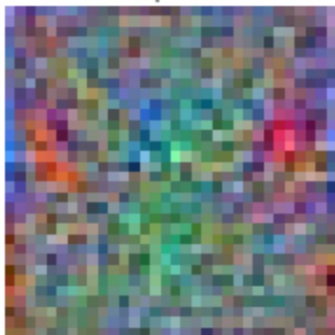
# System performance

- Time to train: on the order of seconds
- Overall accuracy:
  - 40% on training data
  - 33.89% on testing data
- Best/worst class accuracy

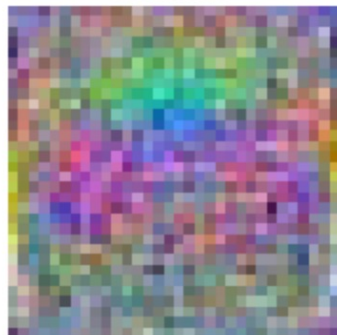


# Visualizing the filters

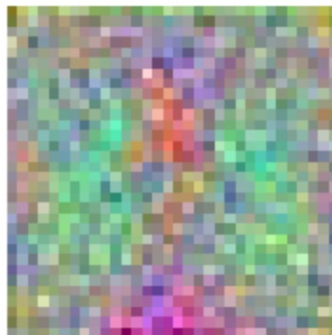
Airplane



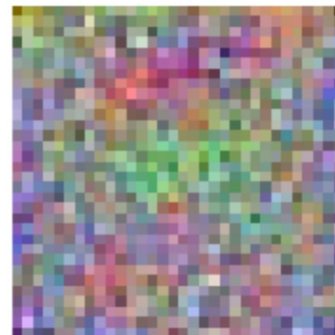
Automobile



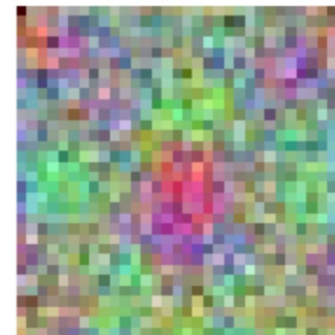
Bird



Cat



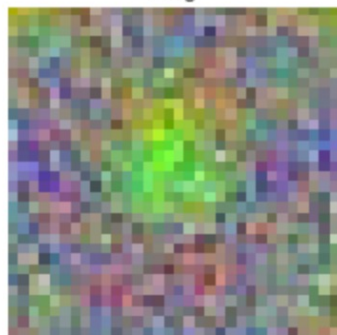
Deer



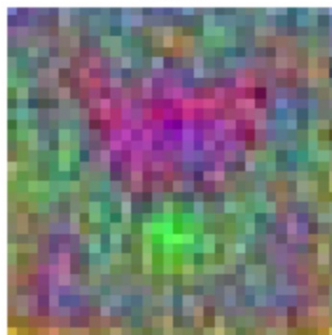
Dog



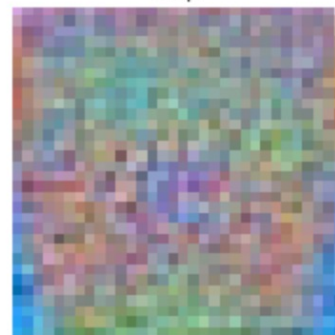
Frog



Horse



Ship



Truck

