Convolutional Neural Networks

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Inspiration

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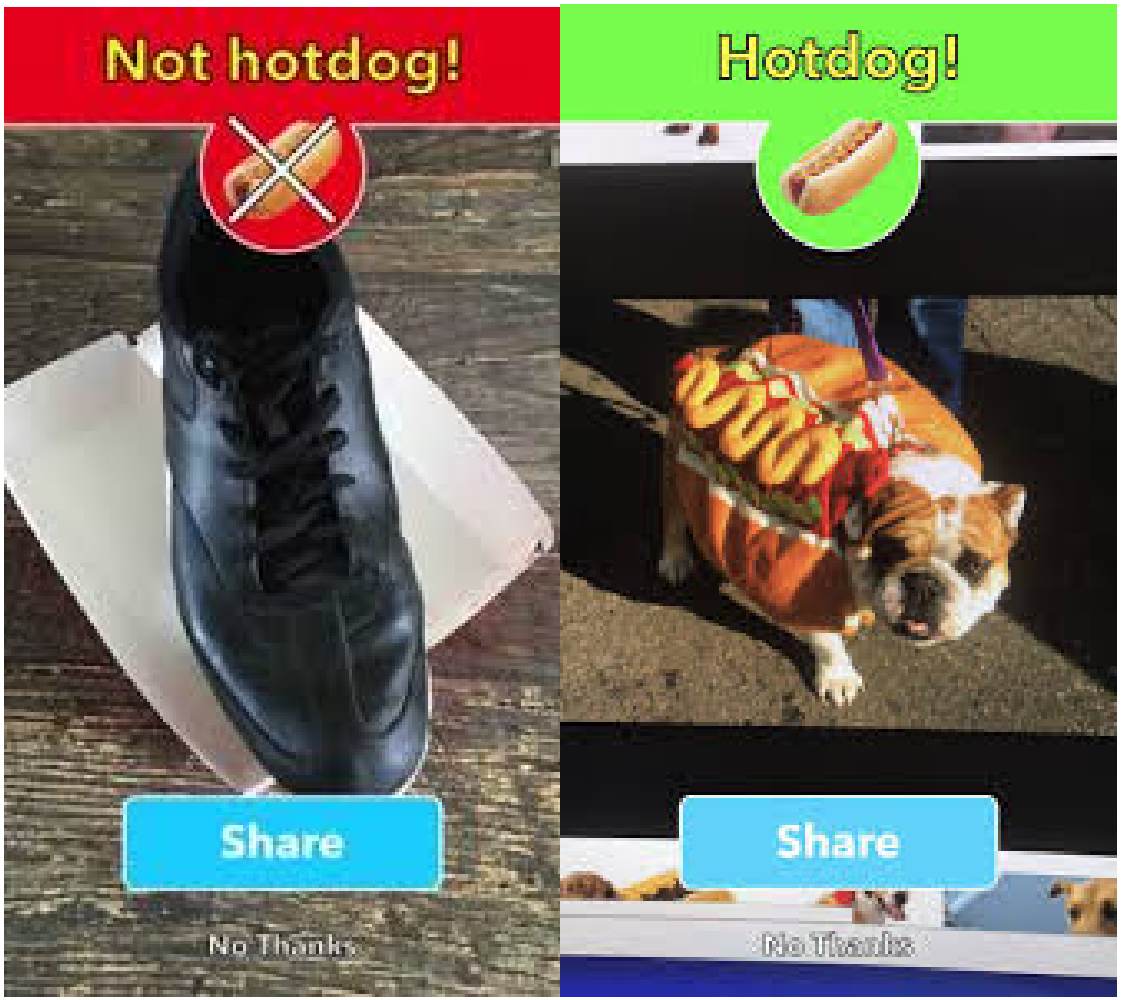


Convolutional Neural Networks, CNN

Supervised Learning

Narrow-AI

Great For Image Recognition

Data To Train The Model

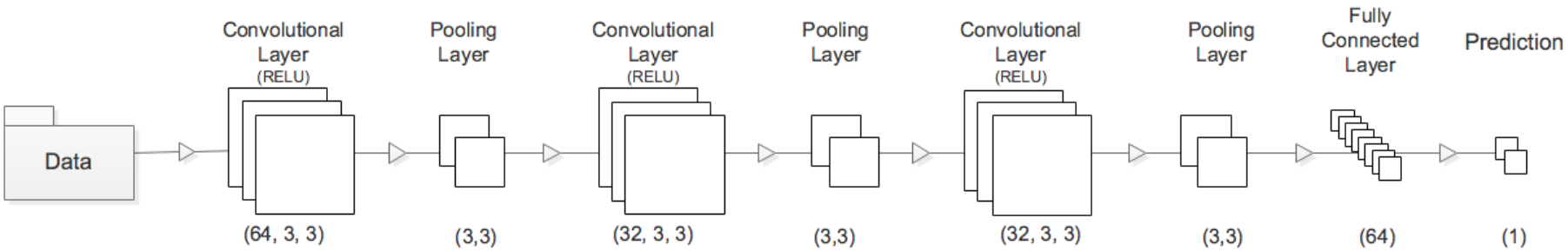
Training Set: 20,000 Images

- Cats: 10,000
- Dogs: 10,000

Test Set: 4,0000

- Cats: 2,000
- Dogs: 2,000

CNN Architecture



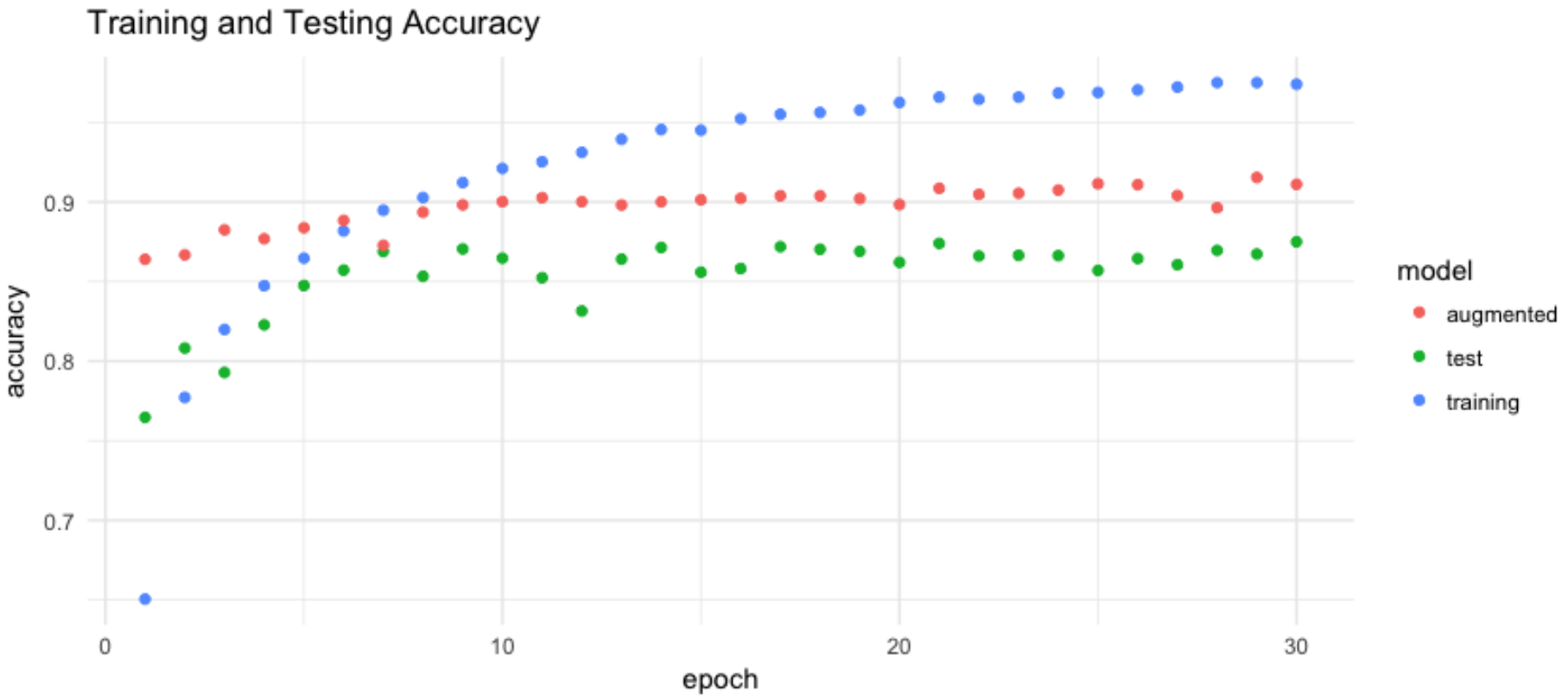
CNN Architecture

CNN Architecture Code

```
#layer 1
model = Sequential()
model.add(Conv2D(32, (3, 3), input_shape=(img_width, img_height,3)))
model.add(Activation('relu'))
model.add(MaxPooling2D(pool_size=(3, 3)))

#layer 2
model.add(Conv2D(32, (3, 3)))
model.add(Activation('relu'))
model.add(MaxPooling2D(pool_size=(3, 3)))

#layer 3
model.add(Conv2D(64, (3, 3)))
model.add(Activation('relu'))
model.add(MaxPooling2D(pool_size=(3, 3)))

#paramters
model.add(Flatten())
model.add(Dense(64))
model.add(Activation('relu'))
model.add(Dropout(0.5))
model.add(Dense(1))
model.add(Activation('sigmoid'))

model.compile(loss='binary_crossentropy',
              optimizer='adam',
              metrics=['accuracy'])
```

CNN Architecture Code

Model Performance



Performance

Model Analysis

Adjust Various Parameters Of Model For Each Experiment

- Experiment 1: Different Optimization Techniques
- Experiment 2: Fully Connected Layers
- Experiment 3: Dropout Layers
- Experiment 4: Data Augmentation

Methodology: Experiment 1

Different Optimization Techniques

Optimizer	Accuracy
rmsprop	0.72631744
sgd	0.630703011
adam	0.738472396
adamax	0.716436637
nadam	0.731649937
adagrad	0.720671267

Methodology: Experiment 2

Fully Connected Layers

Fully Connected Layers	Dropout Layers	Accuracy
2	0	0.722474906
5	4	0.4981179422835634
2	1	0.738472396

Table: Using Adam

Methodology: Experiment 3

Dropout Layers

Dropout	Accuracy
0.5	0.7206712672521958
0.00001	0.7527446675031367

Table: Using Adagrad

Methodology: Experiment 4

Data Augmentation

Model Type	Accuracy
Training	0.974
Testing	0.875
Augmented	0.9111

Findings

1. Adam was the best optimizer
2. Too many fully connected layers hurt the models performance
3. Dropout of 0.000001's performance due to overfitting
4. Augmented Data Performs Better

Conclusion

CNN's resembles the human visual vortex

More Data, Data Augmentation, adam, and a Dropout Layer of 0.5 seem to result in the best performance

Better performance can result from more RD

Significance and Use Cases

Live Test

Test Data: Donald's Cat