



기계학습과 응용

G r o u p 1 0

김상훈 변상준 심재헌 정희명

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Idea

Method

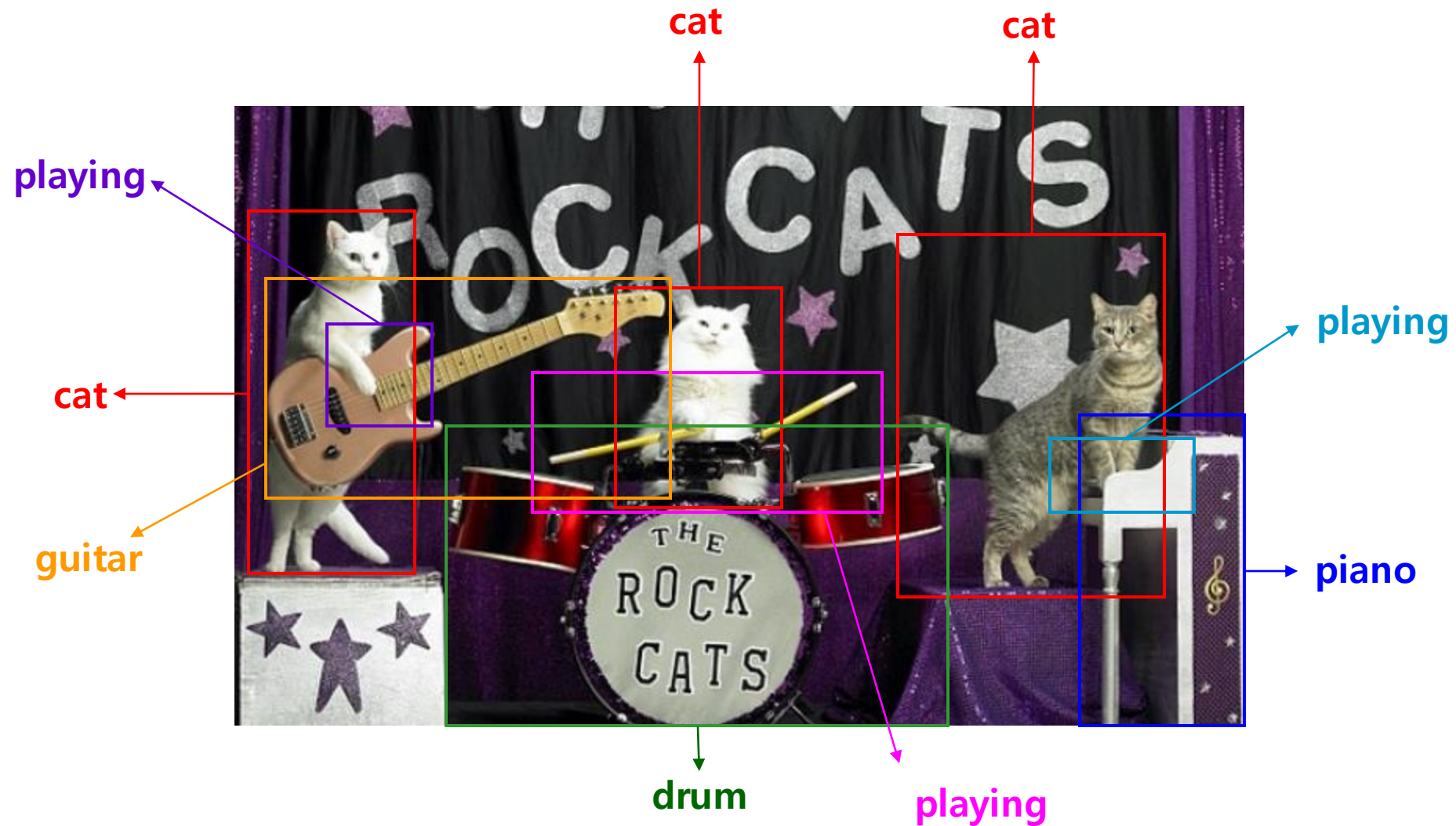
Modeling

Conclusion

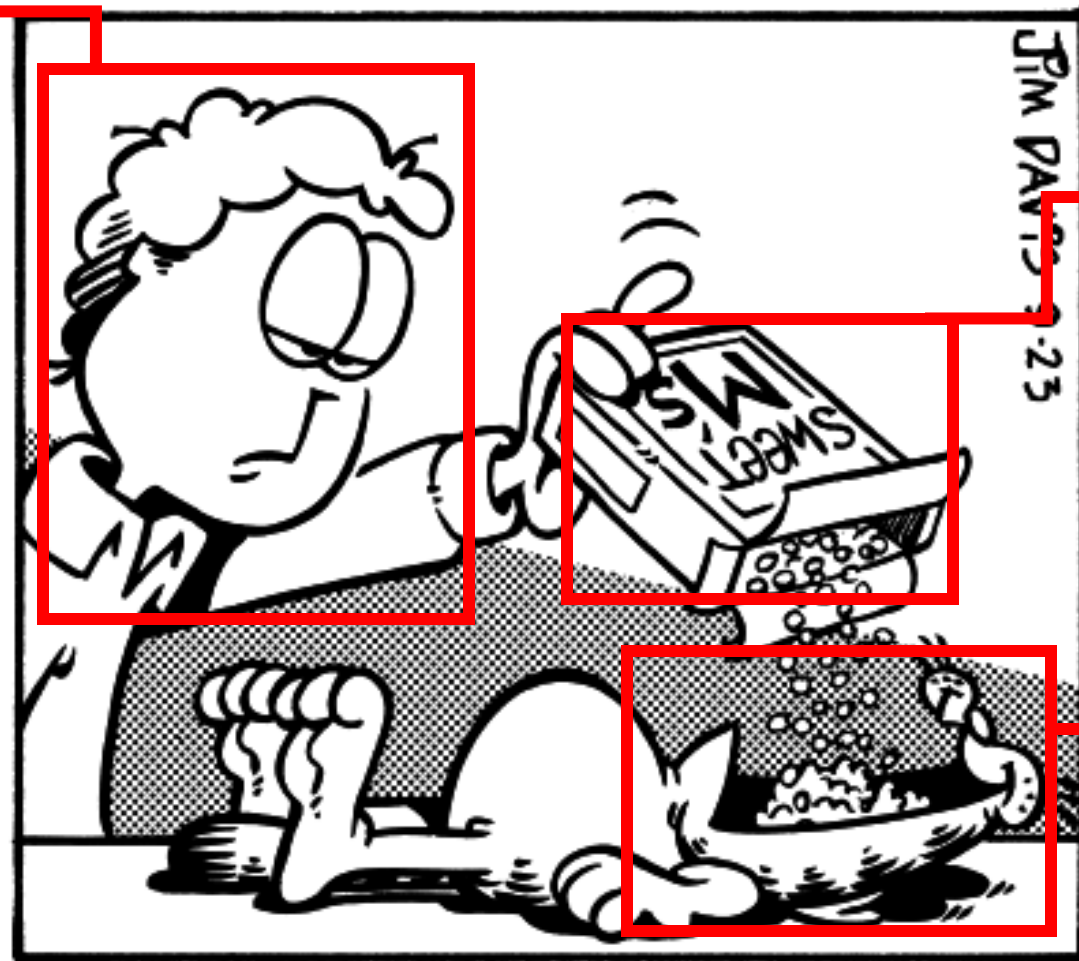


Idea

What's our goal?



Man

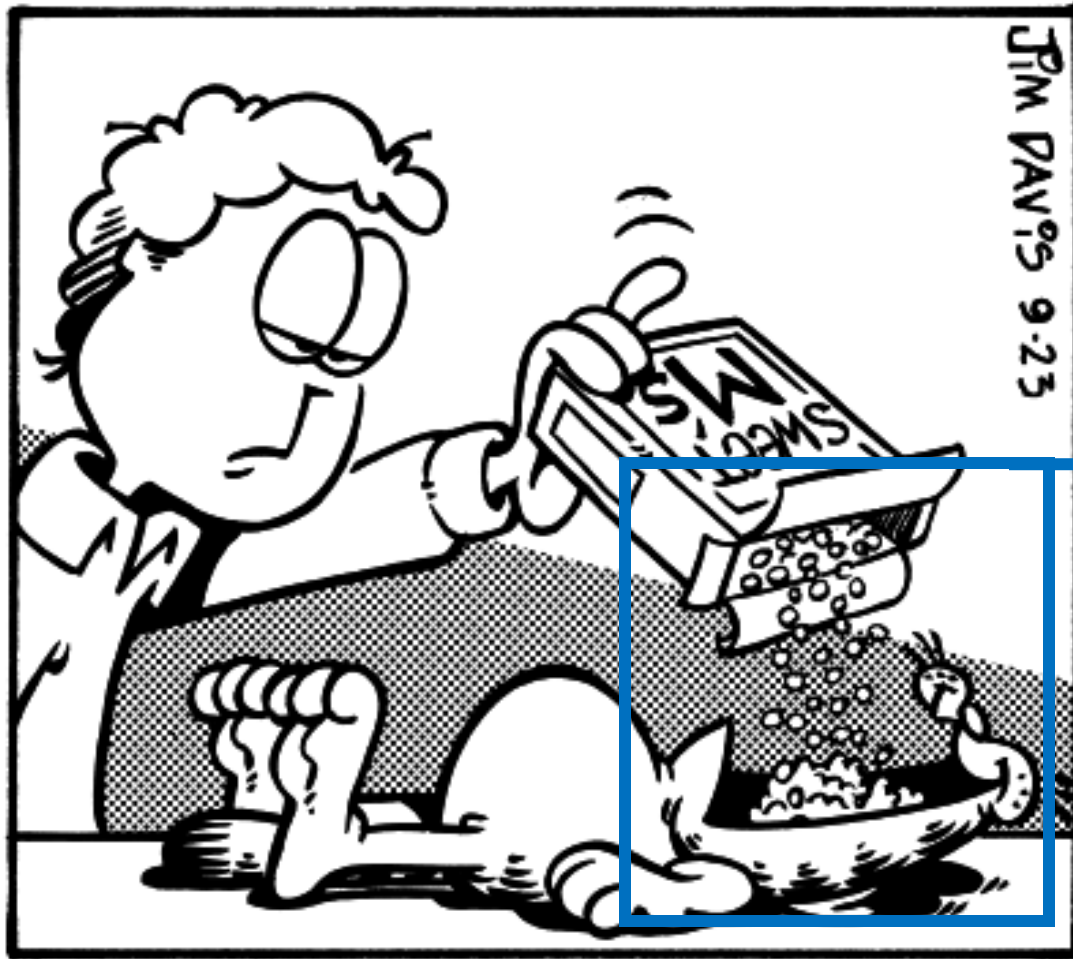


Cereal

Cat

Object Detection

1. Man
2. Cereal
3. Cat

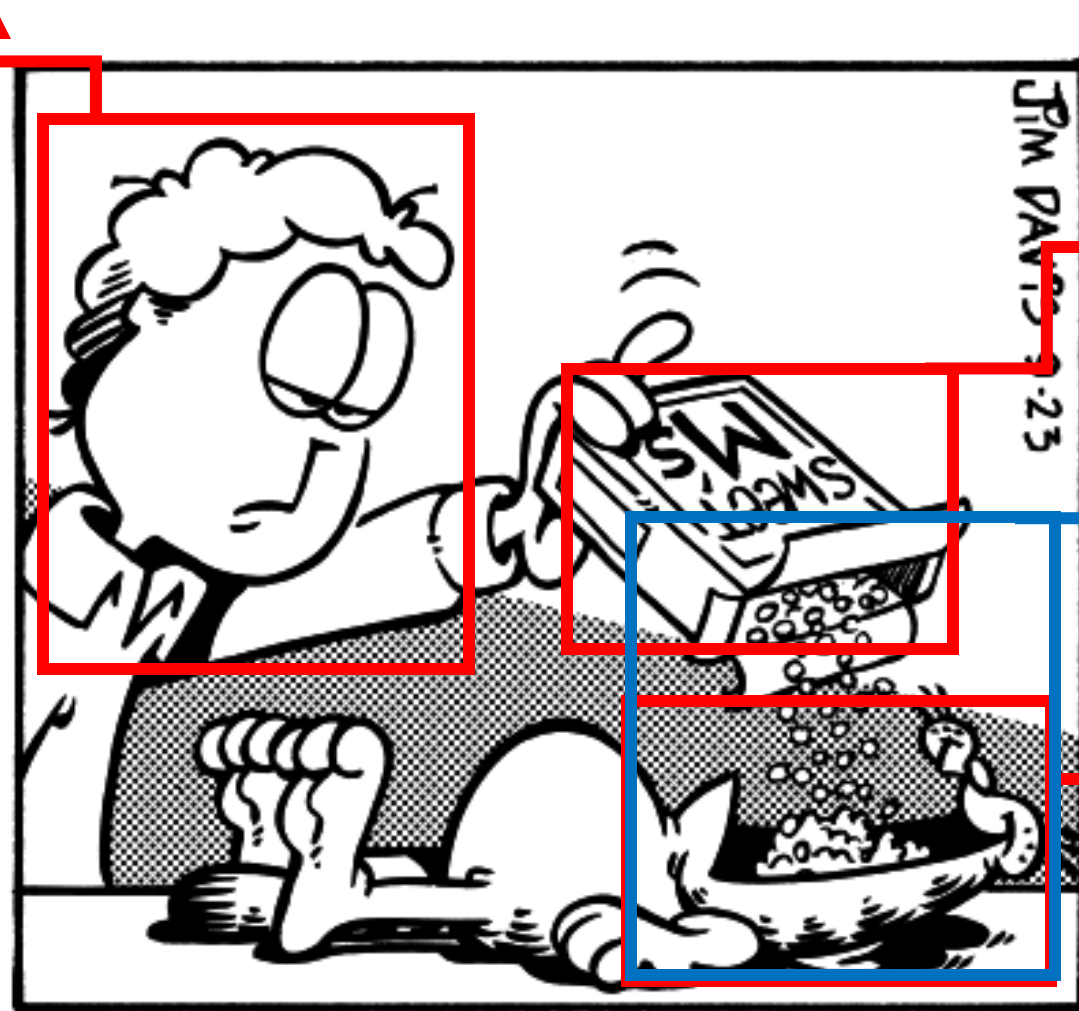


Eating

Action Detection

1. Eating

Man



Cereal

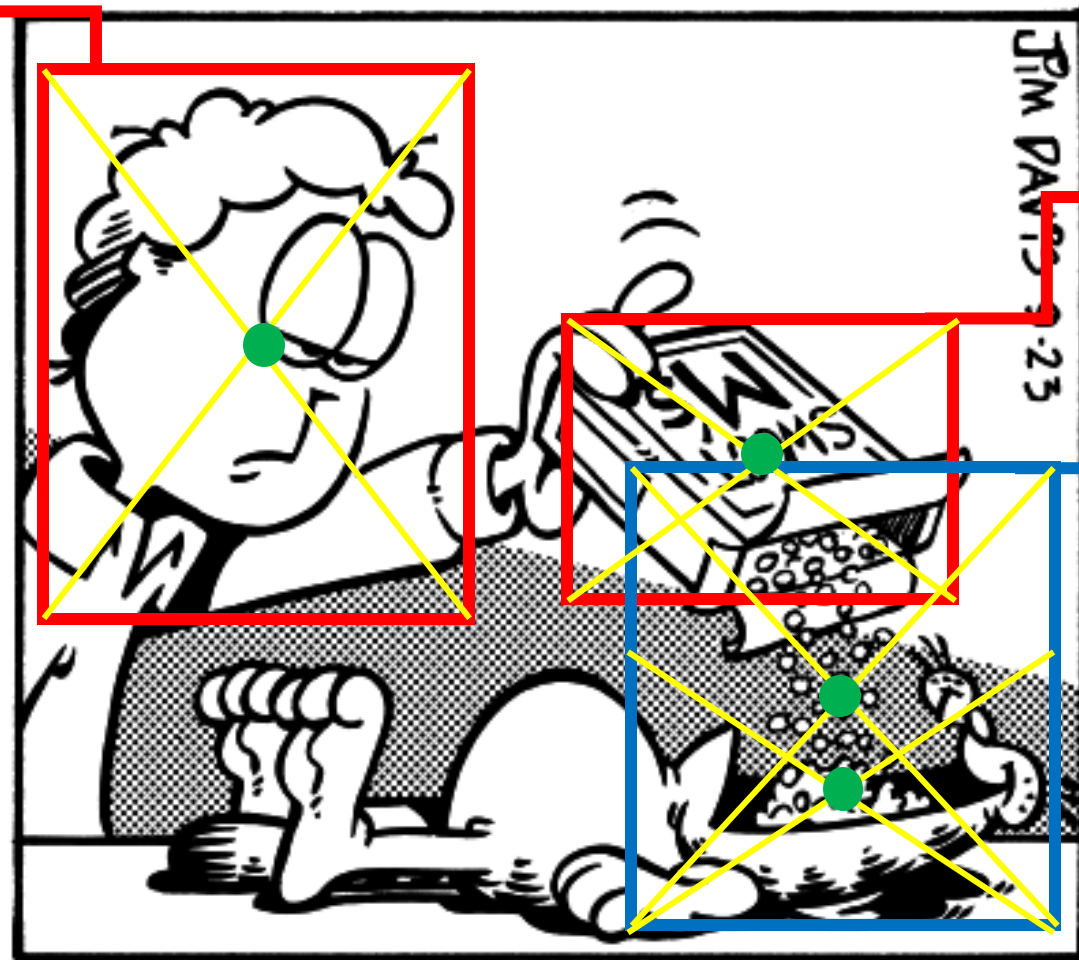
Eating

Cat

Result

1. Man
2. Cereal
3. Cat
4. Eating

Man



Cereal

Eating

Cat

Grouping

1. Man

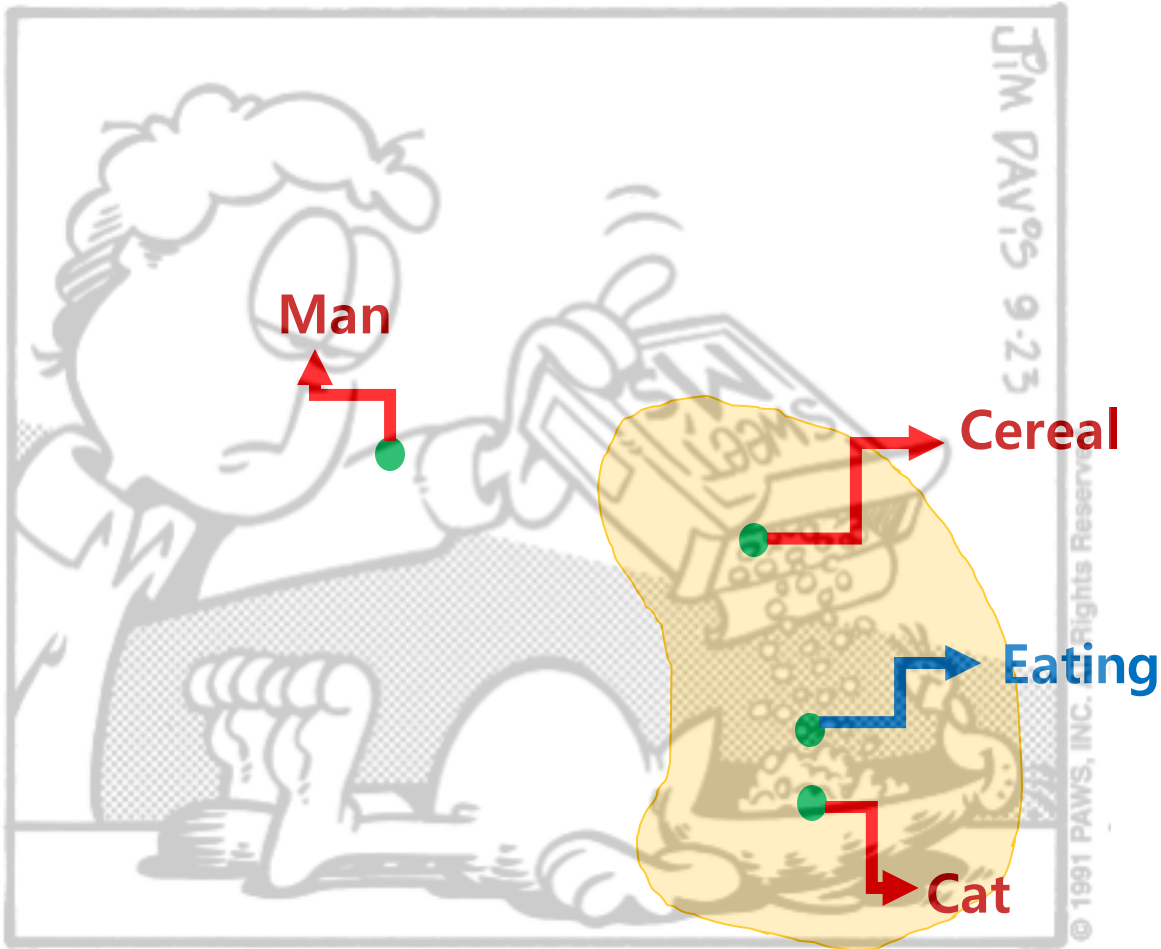
2. Cereal

3. Cat

4. Eating

Method

K-Nearest Neighbor(KNN)

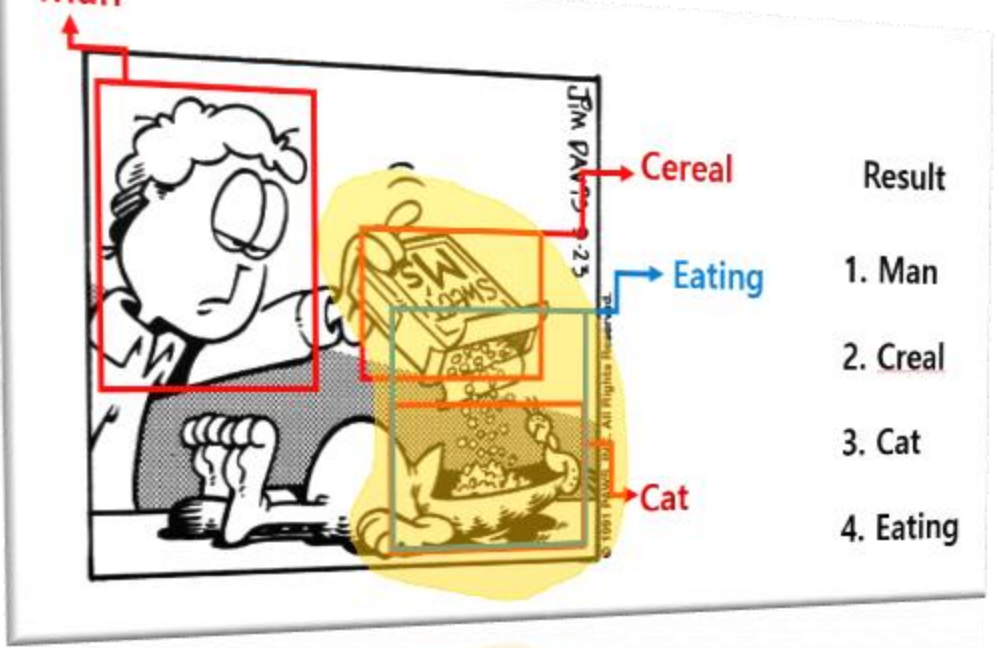
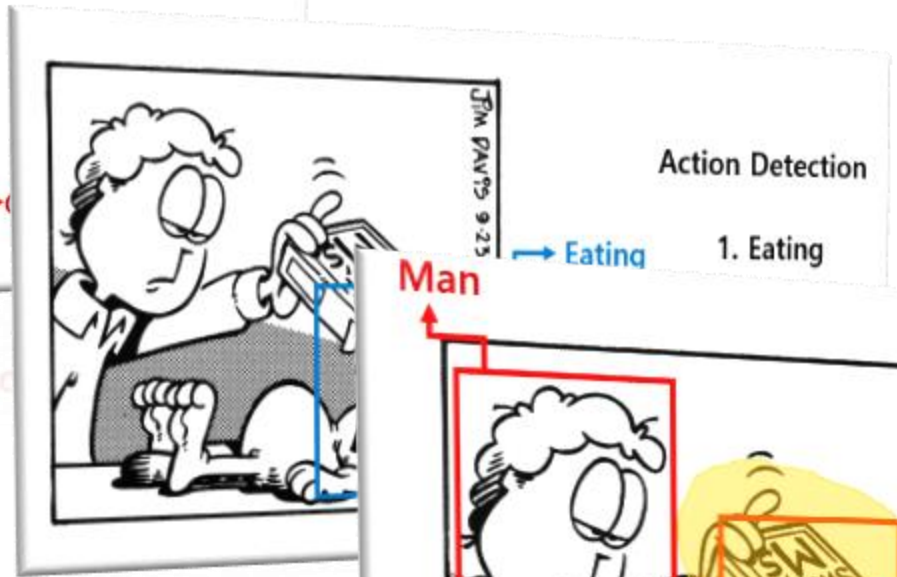
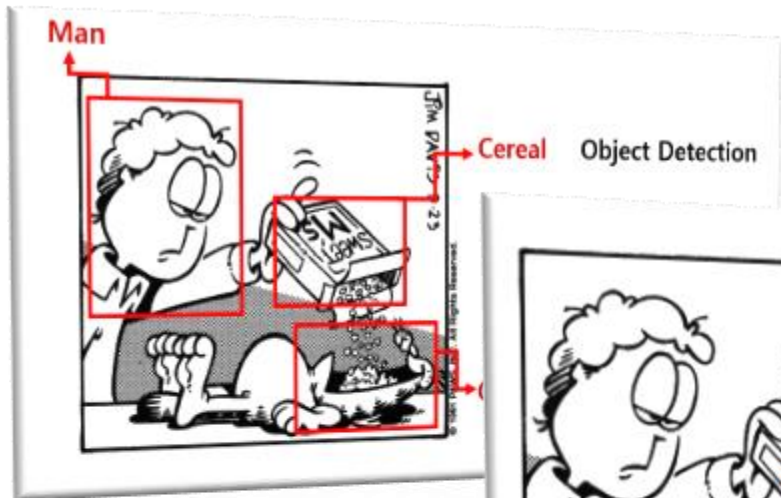


$$d_{Mahalanobis(X,Y)} = \sqrt{(\vec{X} - \vec{Y})^T \Sigma^{-1} (\vec{X} - \vec{Y})}$$

Σ^{-1} = inverse of covariance matrix

$$d_{RankCorr(X,Y)} = 1 - \rho_{XY}$$

$$\rho_{XY} = 1 - \frac{6}{n(n^2 - 1)} \sum_{i=1}^n (\text{rank}(x_i) - \text{rank}(y_i))^2$$

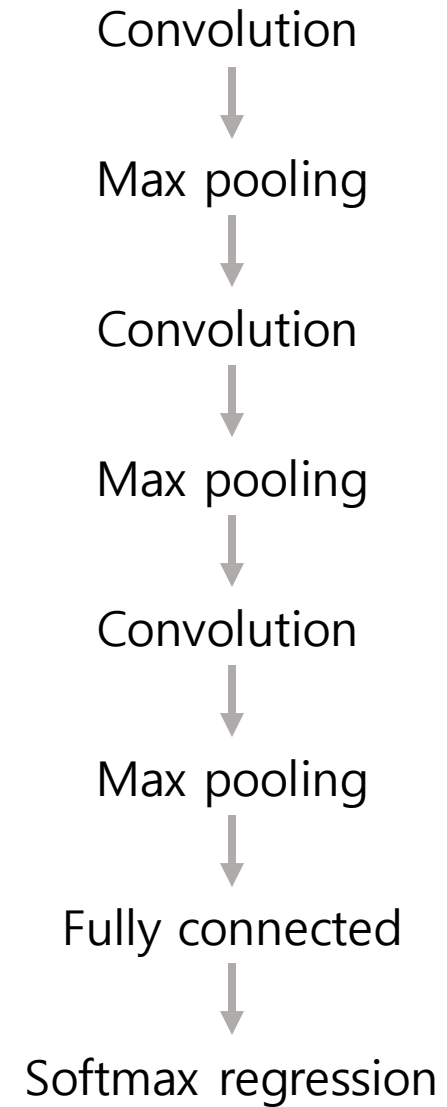
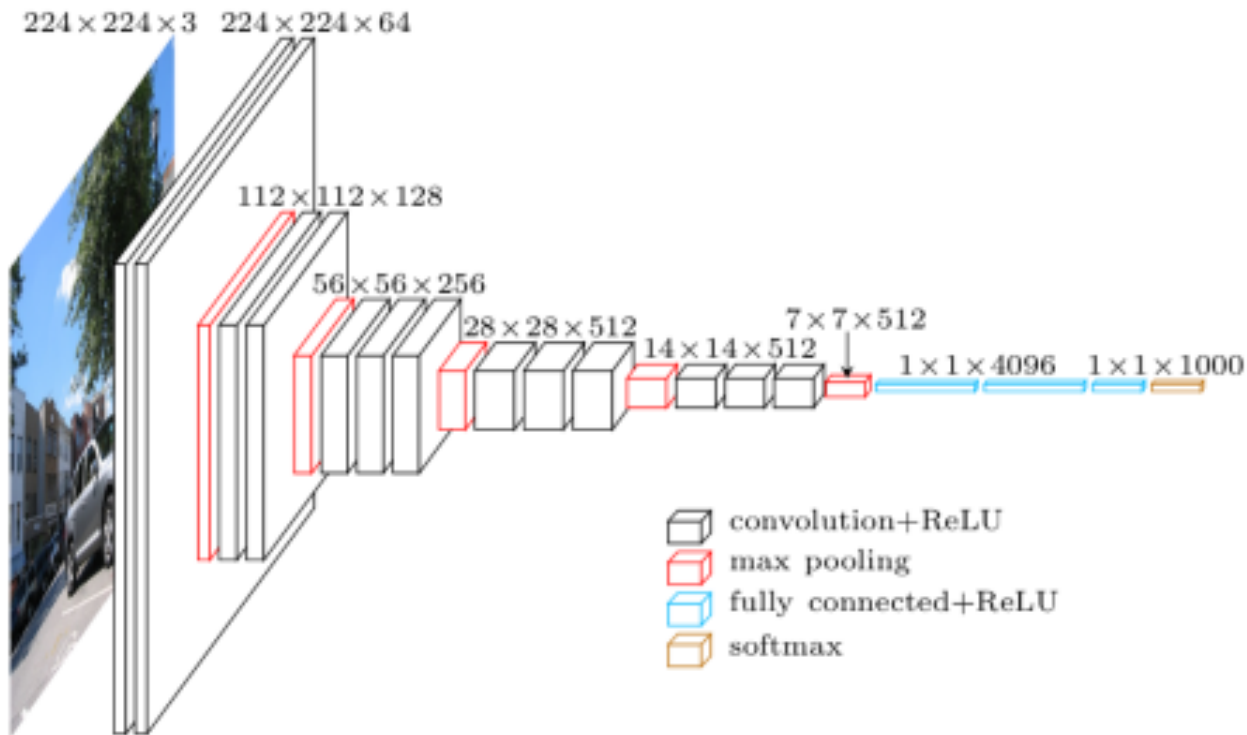




Method

Method

Convolutional Neural Network (CNN)



CNN Algorithm Comparison

- There are many algorithm models: **ResNet**, **InceptionV3**, DenseNet, SqueezeNet etc.

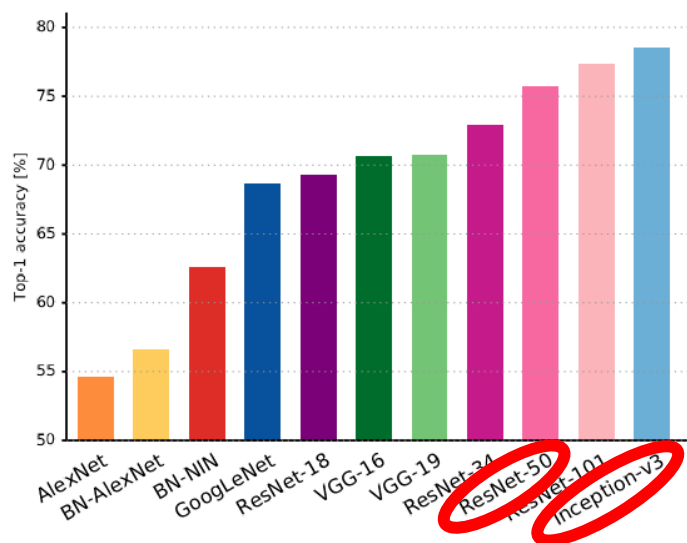


Figure 1: **Top1 vs. network.** Single-crop top-1 validation accuracies for top scoring single-model architectures. We introduce with this chart our choice of colour scheme, which will be used throughout this publication to distinguish effectively different architectures and their correspondent authors. Notice that network of the same group share colour, for example ResNet are all variations of pink.

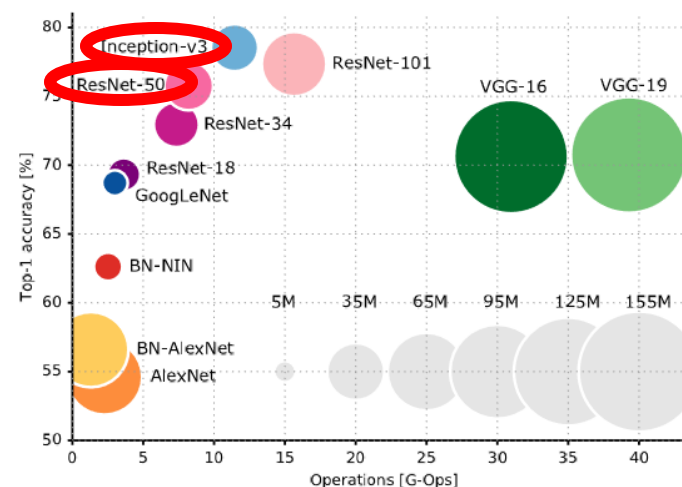


Figure 2: **Top1 vs. operations, size and parameters.** Top-1 one-crop accuracy versus amount of operations required for a single forward pass. The size of the blobs is proportional to the number of network parameters; a legend is reported in the bottom right corner, spanning from 5×10^6 to 155×10^6 params.

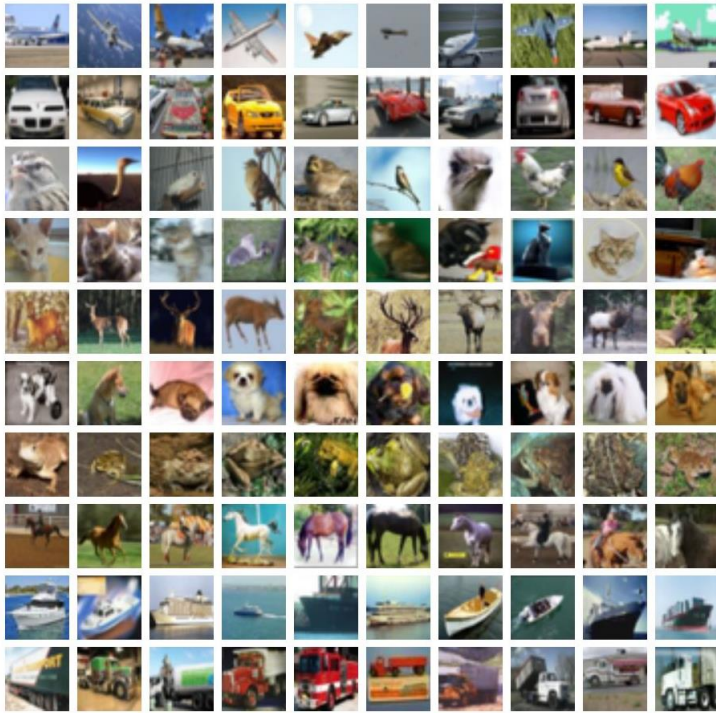


Modeling

Modeling

Training Dataset

CIFAR-10 Datasets



Dog(200)

Cat(200)



Training

ResNet-50

InceptionV3

Modeling

Training Models(ResNet, Inception-V3)

```
1  # Training ResNet Model
2
3  from imageai.Prediction.Custom import ModelTraining
4
5  model_trainer = ModelTraining()
6  model_trainer.setModelTypeAsResNet()
7  model_trainer.setDataDirectory("jaecheon/colab/pets")
8  model_trainer.trainModel(num_objects=2, num_experiments=100, enhance_data=True, batch_size=25, show_network_summary=True)
```

ResNet

```
1  # Training Inception-V3 Model
2
3  from imageai.Prediction.Custom import ModelTraining
4
5
6  model_trainer = ModelTraining()
7  model_trainer.setModelTypeAsInceptionV3()
8  model_trainer.setDataDirectory("pets")
9  model_trainer.trainModel(num_objects=2, num_experiments=100, enhance_data=True, batch_size=25, show_network_summary=True)
```

Inception-V3

Modeling Training

```
In [*]: from imageai.Prediction.Custom import ModelTraining
```

```
model_trainer = ModelTraining()  
model_trainer.setModelTypeAsInceptionV3()  
model_trainer.setDataDirectory("pets")  
model_trainer.trainModel(num_objects=2, num_experiments=100, enhance_data=True, batch_size=25, show_network_summary=True)
```

```
16/16 [=====] - 544s 34s/step - loss: 0.3407 - acc: 0.8525 - val_loss: 0.9190 - val_acc: 0.6400
```

```
Epoch 26/100
```

```
15/16 [=====>...] - ETA: 32s - loss: 0.3112 - acc: 0.8747
```

```
Epoch 00026: saving model to pets\models\model_ex-026_acc-0.620000.h5
```

```
16/16 [=====] - 546s 34s/step - loss: 0.3110 - acc: 0.8725 - val_loss: 1.2728 - val_acc: 0.6200
```

```
Epoch 27/100
```

```
15/16 [=====>...] - ETA: 53s - loss: 0.3760 - acc: 0.8480
```

```
Epoch 00027: saving model to pets\models\model_ex-027_acc-0.660000.h5
```

```
16/16 [=====] - 898s 56s/step - loss: 0.3756 - acc: 0.8525 - val_loss: 0.9130 - val_acc: 0.6600
```

```
Epoch 28/100
```

```
15/16 [=====>...] - ETA: 38s - loss: 0.3092 - acc: 0.8693
```

```
Epoch 00028: saving model to pets\models\model_ex-028_acc-0.570000.h5
```

```
16/16 [=====] - 629s 39s/step - loss: 0.3142 - acc: 0.8675 - val_loss: 2.1252 - val_acc: 0.5700
```

```
Epoch 29/100
```

```
15/16 [=====>...] - ETA: 39s - loss: 0.2817 - acc: 0.8827
```

```
Epoch 00029: saving model to pets\models\model_ex-029_acc-0.580000.h5
```

```
16/16 [=====] - 662s 41s/step - loss: 0.2949 - acc: 0.8725 - val_loss: 1.8313 - val_acc: 0.5800
```

```
Epoch 30/100
```

```
1/16 [>.....] - ETA: 11:14 - loss: 0.1012 - acc: 0.9600
```



Conclusion

Conclusion

ResNet-50

```
Epoch 99/100
15/16 [=====>...] - ETA: 3s - loss: 0.1892 - acc: 0.9173
Epoch 00096: saving model to jaeheon/colab/pets/models/model_ex-096_acc-0.690000.h5
16/16 [=====] - 88s 6s/step - loss: 0.1811 - acc: 0.9225 - val_loss: 0.9801 - val_acc: 0.6900
Epoch 97/100
15/16 [=====>...] - ETA: 2s - loss: 0.2092 - acc: 0.9173
Epoch 00097: saving model to jaeheon/colab/pets/models/model_ex-097_acc-0.690000.h5
16/16 [=====] - 76s 5s/step - loss: 0.2163 - acc: 0.9150 - val_loss: 0.9766 - val_acc: 0.6900
Epoch 98/100
15/16 [=====>...] - ETA: 4s - loss: 0.2069 - acc: 0.9173
Epoch 00098: saving model to jaeheon/colab/pets/models/model_ex-098_acc-0.690000.h5
16/16 [=====] - 102s 6s/step - loss: 0.2026 - acc: 0.9175 - val_loss: 0.9805 - val_acc: 0.6900
Epoch 99/100
15/16 [=====>...] - ETA: 2s - loss: 0.1624 - acc: 0.9333
Epoch 00099: saving model to jaeheon/colab/pets/models/model_ex-099_acc-0.690000.h5
16/16 [=====] - 69s 4s/step - loss: 0.1596 - acc: 0.9350 - val_loss: 0.9809 - val_acc: 0.6900
Epoch 100/100
15/16 [=====>...] - ETA: 2s - loss: 0.2092 - acc: 0.9253
Epoch 00100: saving model to jaeheon/colab/pets/models/model_ex-100_acc-0.690000.h5
16/16 [=====] - 52s 3s/step - loss: 0.2029 - acc: 0.9250 - val_loss: 0.9815 - val_acc: 0.6900
```

Conclusion

InceptionV3

```
Epoch 75/100
15/16 [=====>..] - ETA: 34s - loss: 0.0174 - acc: 0.9947
Epoch 00075: saving model to pets\models\model_ex-075_acc-0.790000.h5
16/16 [=====] - 581s 36s/step - loss: 0.0171 - acc: 0.9950 - val_loss: 0.8029 - val_acc: 0.7900
Epoch 76/100
15/16 [=====>..] - ETA: 36s - loss: 0.0260 - acc: 0.9920
Epoch 00076: saving model to pets\models\model_ex-076_acc-0.790000.h5
16/16 [=====] - 617s 39s/step - loss: 0.0248 - acc: 0.9925 - val_loss: 0.8083 - val_acc: 0.7900
Epoch 77/100
15/16 [=====>..] - ETA: 41s - loss: 0.0164 - acc: 0.9947
Epoch 00077: saving model to pets\models\model_ex-077_acc-0.800000.h5
16/16 [=====] - 705s 44s/step - loss: 0.0195 - acc: 0.9950 - val_loss: 0.8113 - val_acc: 0.8000
Epoch 78/100
15/16 [=====>..] - ETA: 34s - loss: 0.0116 - acc: 1.0000
Epoch 00078: saving model to pets\models\model_ex-078_acc-0.800000.h5
16/16 [=====] - 565s 35s/step - loss: 0.0118 - acc: 1.0000 - val_loss: 0.8108 - val_acc: 0.8000
Epoch 79/100
15/16 [=====>..] - ETA: 34s - loss: 0.0292 - acc: 0.9893
Epoch 00079: saving model to pets\models\model_ex-079_acc-0.780000.h5
16/16 [=====] - 581s 36s/step - loss: 0.0287 - acc: 0.9900 - val_loss: 0.8115 - val_acc: 0.7800
```

Conclusion

InceptionV3



```
: from imageai.Prediction.Custom import CustomImagePrediction
import os
execution_path = os.getcwd()

prediction = CustomImagePrediction()
prediction.setModelTypeAsInceptionV3()
prediction.setModelPath(os.path.join(execution_path, "model_ex-078_acc-0.800000.h5"))
prediction.setJsonPath(os.path.join(execution_path, "model_class.json"))
prediction.loadModel(num_objects=2)

predictions, probabilities = prediction.predictImage(os.path.join(execution_path, "5.jpg"), result_count=2)

for eachPrediction, eachProbability in zip(predictions, probabilities):
    print(eachPrediction + " : " + eachProbability)
```

```
cat : 99.99308586120605
dog : 0.006908018985996023
```

Conclusion

InceptionV3



```
from imageai.Prediction.Custom import CustomImagePrediction
import os
execution_path = os.getcwd()

prediction = CustomImagePrediction()
prediction.setModelTypeAsInceptionV3()
prediction.setModelPath(os.path.join(execution_path, "model_ex-078_acc-0.800000.h5"))
prediction.setJsonPath(os.path.join(execution_path, "model_class.json"))
prediction.loadModel(num_objects=2)

|
predictions, probabilities = prediction.predictImage(os.path.join(execution_path, "1.jpg"), result_count=2)

for eachPrediction, eachProbability in zip(predictions, probabilities):
    print(eachPrediction + " : " + eachProbability)
```

```
dog : 99.02809858322144
cat : 0.9719012305140495
```

THANK YOU