YOLOV5 MODEL

Supervised Learning (Assignment 4):

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YOLO Model on Oxford Pets Dataset:

(It's a 37-category pet dataset (37 class), it has (3680) images with (2576) for train, (736) for validation and (368) for test and we download it from "roboflow public datasets") (link in instructions file).

Classes: 37

['cat-Abyssinian', 'cat-Bengal', 'cat-Birman', 'cat-Bombay', 'cat-British_Shorthair', 'cat-Egyptian_Mau', 'cat-Maine_Coon', 'cat-Persian', 'cat-Ragdoll', 'cat-Russian_Blue', 'cat-Siamese', 'cat-Sphynx', 'dog-american_bulldog', 'dog-american_pit_bull_terrier', 'dog-basset_hound', 'dog-beagle', 'dog-boxer', 'dog-chihuahua', 'dog-english_cocker_spaniel', 'dog-english_setter', 'dog-german_shorthaired', 'dog-great_pyrenees', 'dog-havanese', 'dog-japanese_chin', 'dog-keeshond', 'dog-leonberger', 'dog-miniature_pinscher', 'dog-newfoundland', 'dog-pomeranian', 'dog-pug', 'dog-saint_bernard', 'dog-samoyed', 'dog-scottish_terrier', 'dog-shiba_inu', 'dog-staffordshire_bull_terrier', 'dog-wheaten_terrier', 'dog-yorkshire_terrier']

Yolo Architecture:

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Layers:

```yaml
# YOLOv5 v6.0 backbone
backbone:
  # [from, number, module, args]
  [[-1, 1, Conv, [64, 6, 2, 2]],  # 0-P1/2
   [-1, 1, Conv, [128, 3, 2]],  # 1-P2/4
   [-1, 3, C3, [128]],
   [-1, 1, Conv, [256, 3, 2]],  # 3-P3/8
   [-1, 6, C3, [256]],
   [-1, 1, Conv, [512, 3, 2]],  # 5-P4/16
   [-1, 9, C3, [512]],
   [-1, 1, Conv, [1024, 3, 2]],  # 7-P5/32
   [-1, 3, C3, [1024]],
   [-1, 1, SPPF, [1024, 5]],  # 9
  ]
```

```yaml
# YOLOv5 v6.0 head
head:
  [[-1, 1, Conv, [512, 1, 1]],
   [-1, 1, nn.Upsample, [None, 2, 'nearest']],
   [[-1, 6], 1, Concat, [1]],  # cat backbone P4
   [-1, 3, C3, [512, False]],  # 13

   [-1, 1, Conv, [256, 1, 1]],
   [-1, 1, nn.Upsample, [None, 2, 'nearest']],
   [[-1, 4], 1, Concat, [1]],  # cat backbone P3
   [-1, 3, C3, [256, False]],  # 17 (P3/8-small)

   [-1, 1, Conv, [256, 3, 2]],
   [[-1, 14], 1, Concat, [1]],  # cat head P4
   [-1, 3, C3, [512, False]],  # 20 (P4/16-medium)

   [-1, 1, Conv, [512, 3, 2]],
   [[-1, 10], 1, Concat, [1]],  # cat head P5
   [-1, 3, C3, [1024, False]],  # 23 (P5/32-large)

   [[17, 20, 23], 1, Detect, [nc, anchors]],  # Detect(P3, P4, P5)
  ]
```

Activation functions: leaky ReLU and sigmoid

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Loss Function: Binary cross-entropy with logits loss

Optimizers: SGD

Image size: 416

Batch size: 128

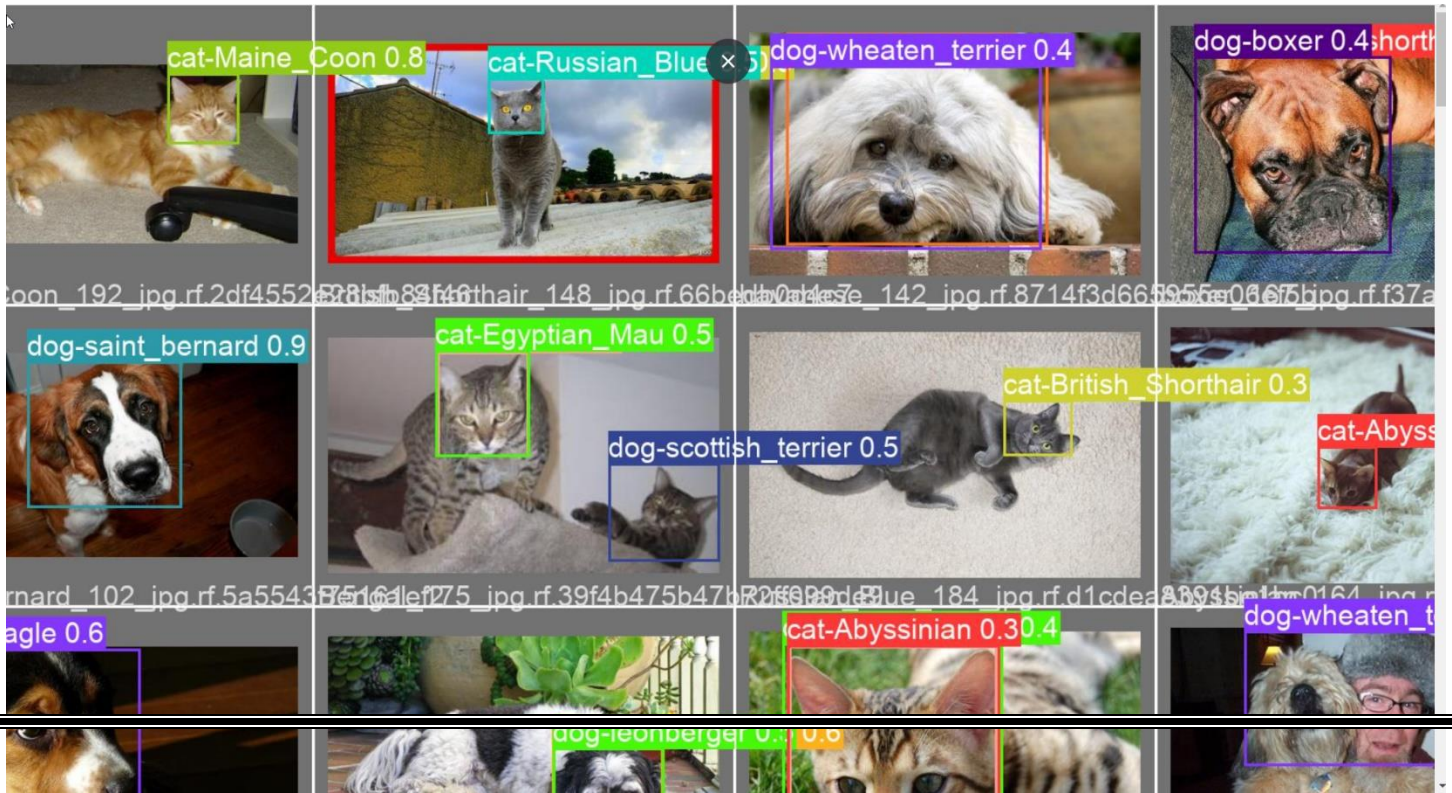
Learning rate: 0.01 (initial)

Epochs: 80

Anchors:

```
anchors:
  - [10,13, 16,30, 33,23]  # P3/8
  - [30,61, 62,45, 59,119]  # P4/16
  - [116,90, 156,198, 373,326]  # P5/32
```

Predicated images:



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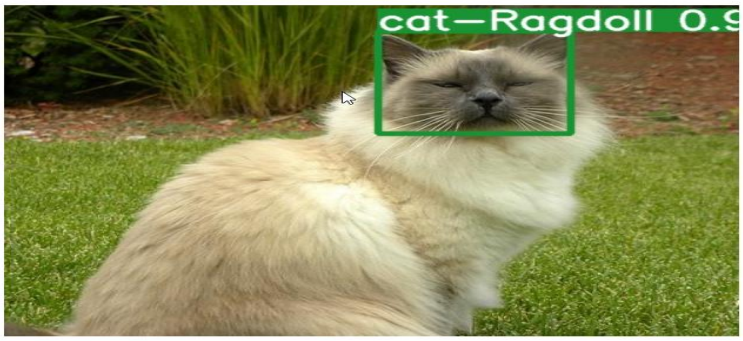

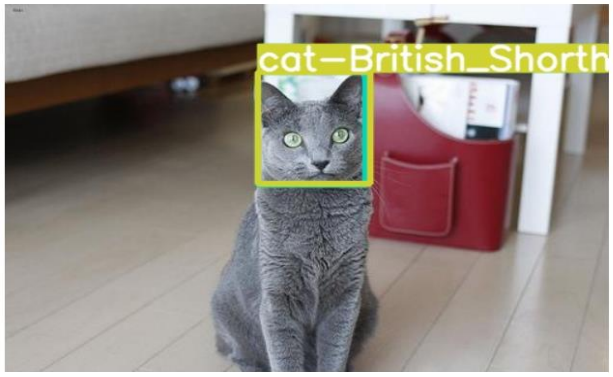

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Using Custom Dataset: (Dice)

(It's a 6-category pet dataset (6 class), it has (95) images with (60) for train, (25) for validation and (10) for test

(link in instructions file)

Classes: 6

['1', '2', '3', '4', '5', '6']

Layers:

```yaml
# YOLOv5 v6.0 backbone
backbone:
  # [from, number, module, args]
  [[-1, 1, Conv, [64, 6, 2, 2]],  # 0-P1/2
   [-1, 1, Conv, [128, 3, 2]],  # 1-P2/4
   [-1, 3, C3, [128]],
   [-1, 1, Conv, [256, 3, 2]],  # 3-P3/8
   [-1, 6, C3, [256]],
   [-1, 1, Conv, [512, 3, 2]],  # 5-P4/16
   [-1, 9, C3, [512]],
   [-1, 1, Conv, [1024, 3, 2]],  # 7-P5/32
   [-1, 3, C3, [1024]],
   [-1, 1, SPPF, [1024, 5]],  # 9
  ]
```

```yaml
# YOLOv5 v6.0 head
head:
  [[-1, 1, Conv, [512, 1, 1]],
   [-1, 1, nn.Upsample, [None, 2, 'nearest']],
   [[-1, 6], 1, Concat, [1]],  # cat backbone P4
   [-1, 3, C3, [512, False]],  # 13

   [-1, 1, Conv, [256, 1, 1]],
   [-1, 1, nn.Upsample, [None, 2, 'nearest']],
   [[-1, 4], 1, Concat, [1]],  # cat backbone P3
   [-1, 3, C3, [256, False]],  # 17 (P3/8-small)

   [-1, 1, Conv, [256, 3, 2]],
   [[-1, 14], 1, Concat, [1]],  # cat head P4
   [-1, 3, C3, [512, False]],  # 20 (P4/16-medium)

   [-1, 1, Conv, [512, 3, 2]],
   [[-1, 10], 1, Concat, [1]],  # cat head P5
   [-1, 3, C3, [1024, False]],  # 23 (P5/32-large)

   [[17, 20, 23], 1, Detect, [nc, anchors]],  # Detect(P3, P4, P5)
  ]
```

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Activation functions: leaky ReLU and sigmoid

Loss Function: Binary cross-entropy with logits loss

Optimizers: SGD

Image size: 224

Batch size: 16

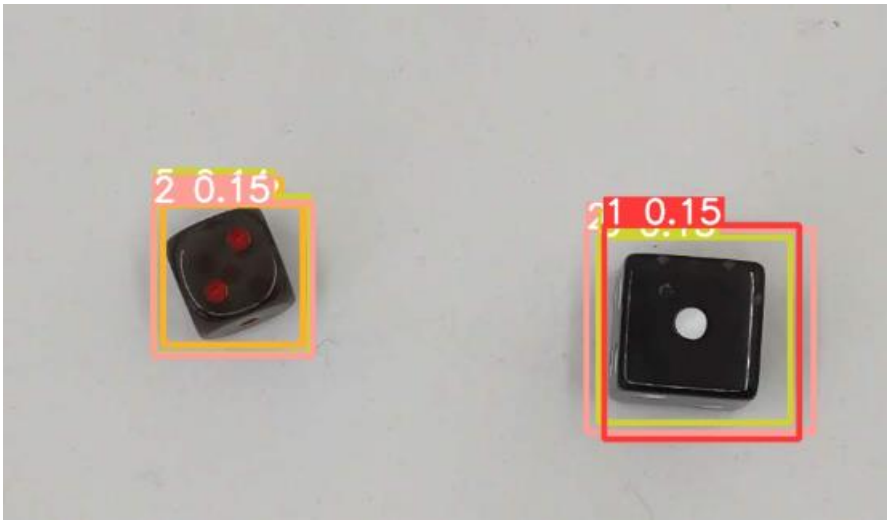
Learning rate: 0.01 (initial)

Epochs: 120

Anchors:

```
anchors:
  - [10,13, 16,30, 33,23]  # P3/8
  - [30,61, 62,45, 59,119]  # P4/16
  - [116,90, 156,198, 373,326]  # P5/32
```

Predicated images:



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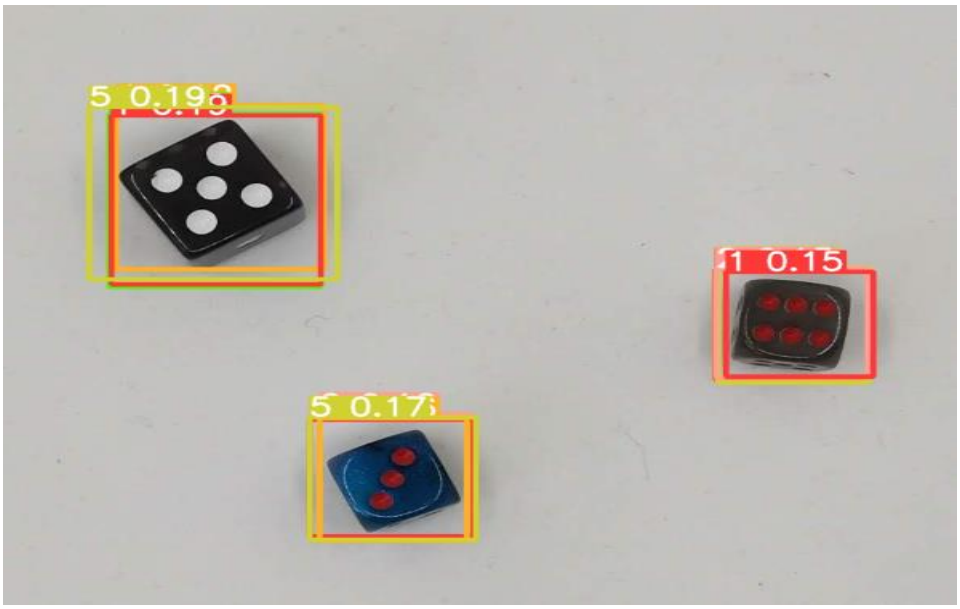

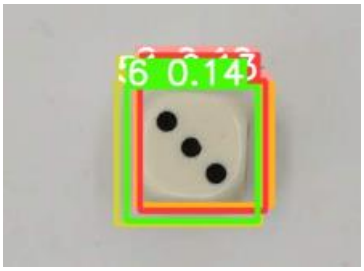

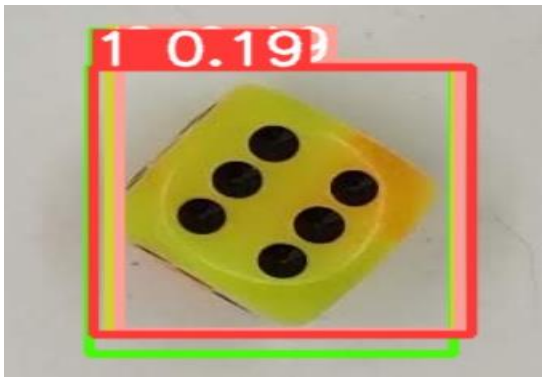
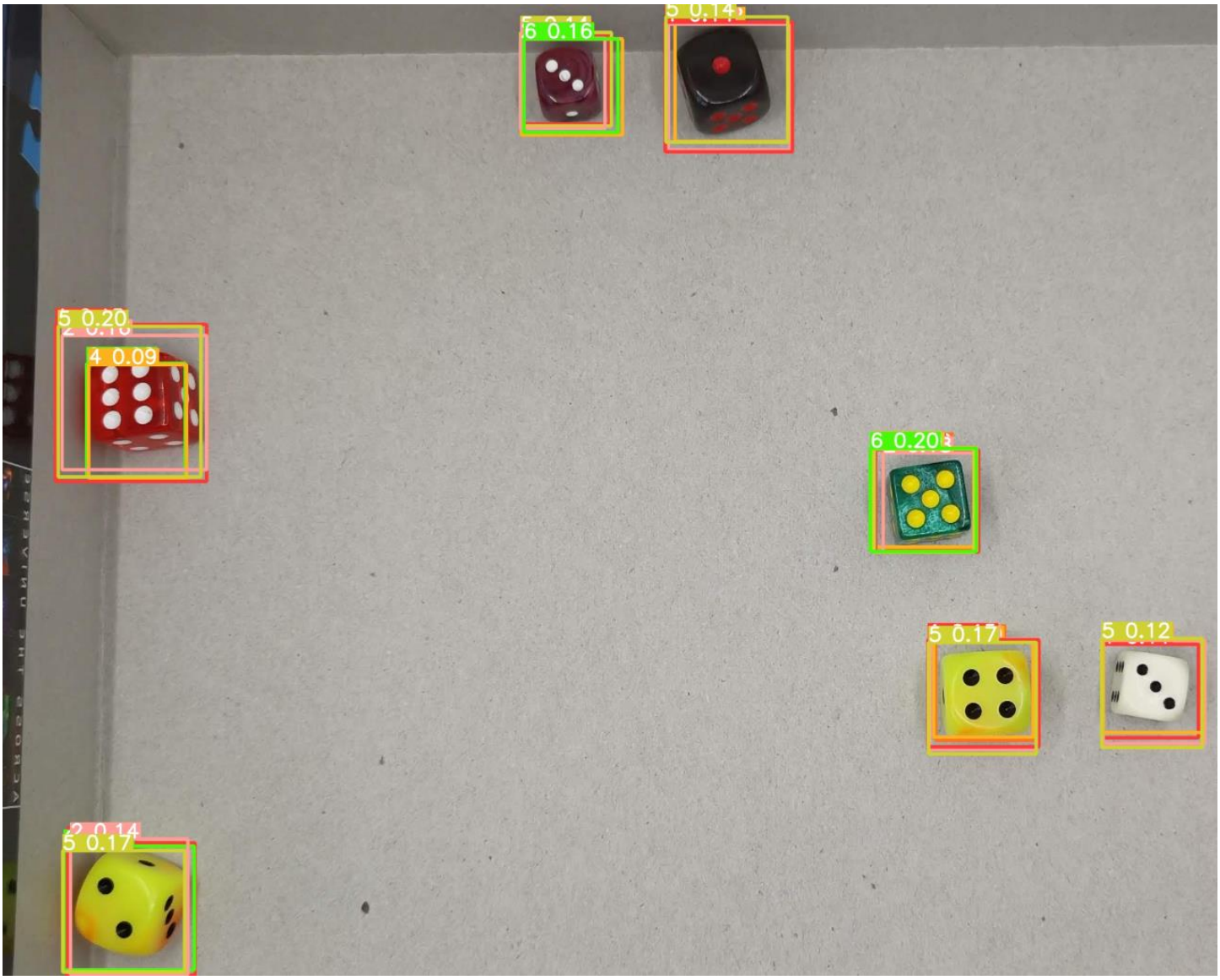
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