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CECS 553

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Report 3

1. What dataset have you chosen? Explain it. (number of images, size,..)

Ans: The current dataset is similar to last week in term of the number of images and class distribution. However, some images preprocessing steps have been applied to the images as required by YOLOv5 specification.

- Train video: https://youtu.be/rilFfbm7j8k
    - Size: 1000 images
    - Split Ratio:
        - Train: 70%
        - Validation: 20%
        - Test: 10%
    - Class distribution:
        - Tom: 562
        - Spike: 538
        - Jerry: 490
    - Preprocessing:
        - Auto-Oreint
        - Resize to 640 x 640
- Test/Demo video: https://youtu.be/cqyziA30whE

2. Explain the details you have learned from your chosen algorithms? (Specify what each person has done)

Ans: Up until now, the only major difference between the YOLOv5 and previous iterations of YOLO algorithms is the network structure. With a small network size version, YOLOv5 utilizes two new layers: C3 and SPPF. To start, C3 layers are composed of two CNN layers concatenated together where the output of the one CNN layer gets bottlenecked and the output of the other CNN layer does not. This design means that the next CNN layers are forced to learn from both encoded and non-encoded information simultaneously. Then, there are SPPF or Spatial Pixel Pair Features layers and they are designed to extract contextual and non-contextual information. The SPPF layers are composed of two CNN layers stacked sequentially and the output of the first CNN layers are partially downsampled (increases spatial awareness) using MaxPool2D before being processed by the second CNN layers.

3. Have you read any new publications? What are those?

Ans:

- Deep Residual Learning for Image Recognition
  - He, K., Zhang, X., Ren, S., & Sun, J. (2015). Deep Residual Learning for Image Recognition. arXiv [cs.CV]. Opgehaal van http://arxiv.org/abs/1512.03385
- A Hyperspectral Image Classification Framework with Spatial Pixel Pair Features
  - Ran, L., Zhang, Y., Wei, W., & Zhang, Q. (10 2017). A Hyperspectral Image Classification Framework with Spatial Pixel Pair Features. Sensors, 17, 2421. doi:10.3390/s17102421

4. Any challenge you faced during this week? If so, how are you planning to resolve it? Any solutions or ideas?

Ans: For this week, problems I encountered are mostly technical and they are related to the automation of many aspects of training a neural network such as downloading the dataset, adapting YOLOv5 source code, training models, and recording models' performance. As of writing this report, I was able to iron out a majority of the problem especially those that pertain to pre-training steps and I will be able to start the training process tomorrow. Hopefully, I will have some concrete results to show by Monday.