Megathon'22

Team: *Ozzy Mann*

Abhinaba Bala

Question-2

- Image Detection/Segmentation using AI algorithms

- Implementing MQTT (or other) protocol or secure cloud communication protocol

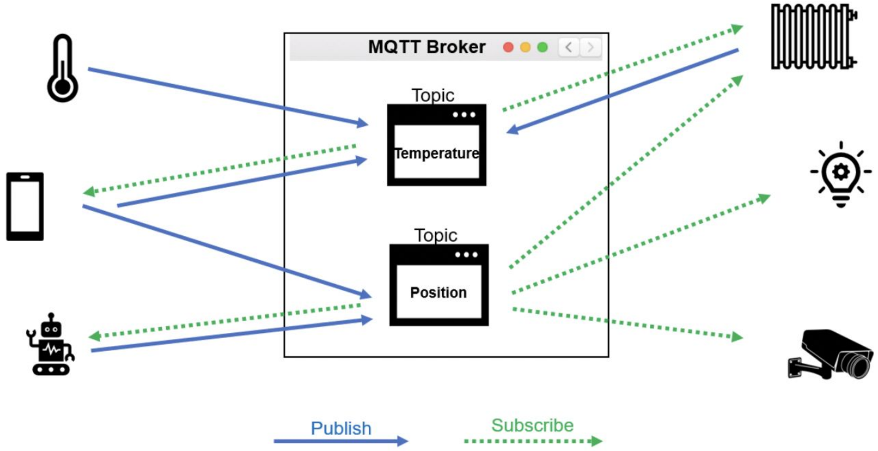


Image Detection/Segmentation using AI algorithms

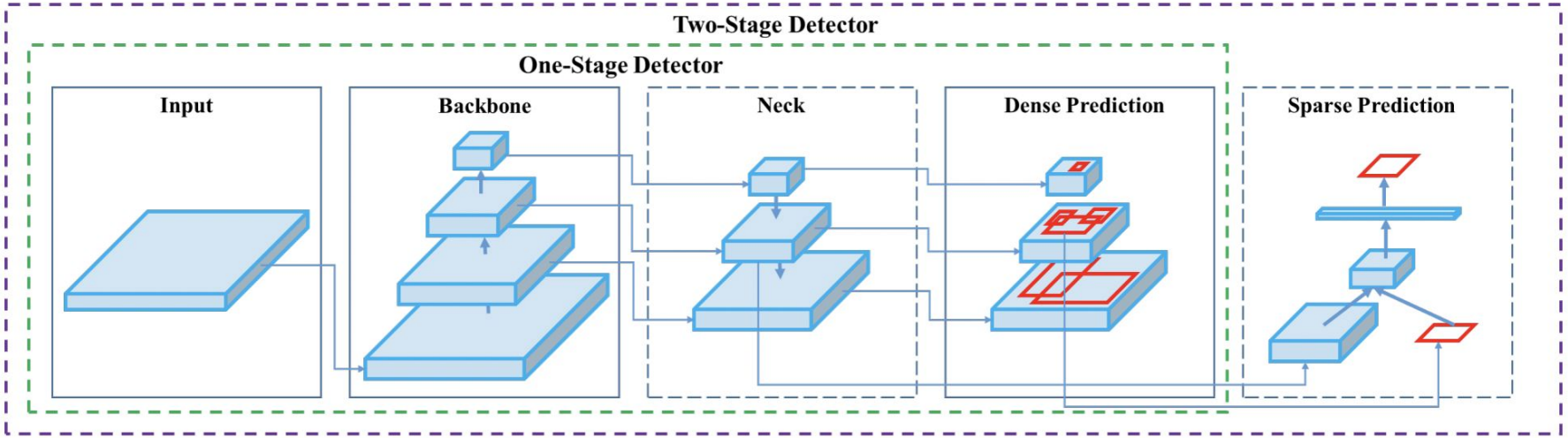
Objective

- Object segmentation (Panoptic Segmentation)
- Real-time object detection

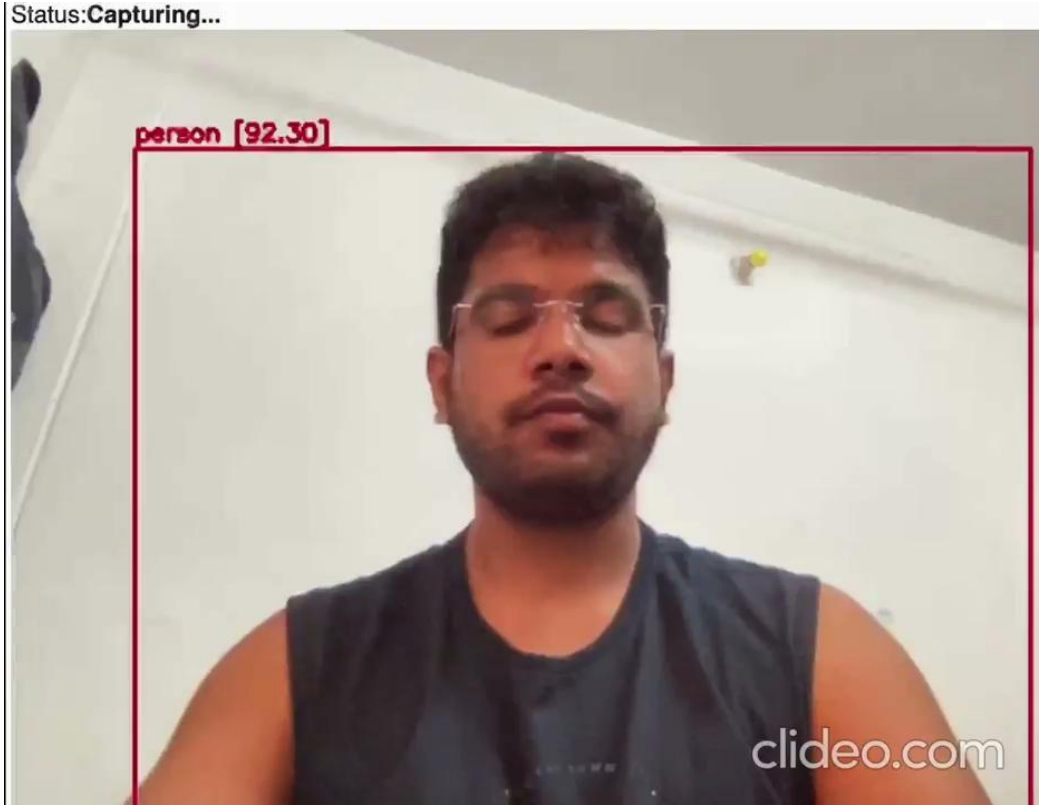
Motivation

- We want our solutions to have both accuracy and responsiveness.
- In addition to detection we might require extra semantic information.

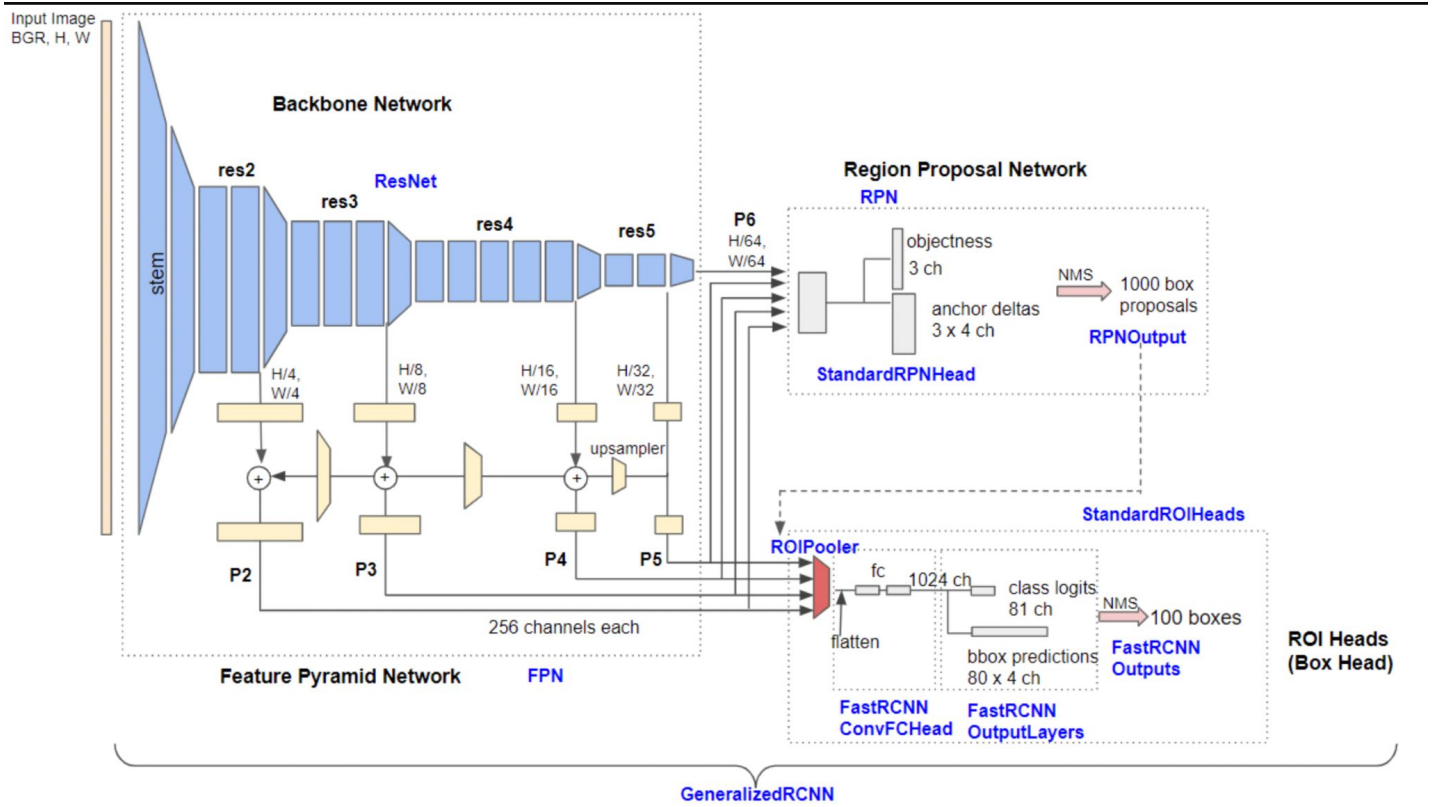
Architecture (YOLOv4)



Results (YOLOv4)



Detectron2

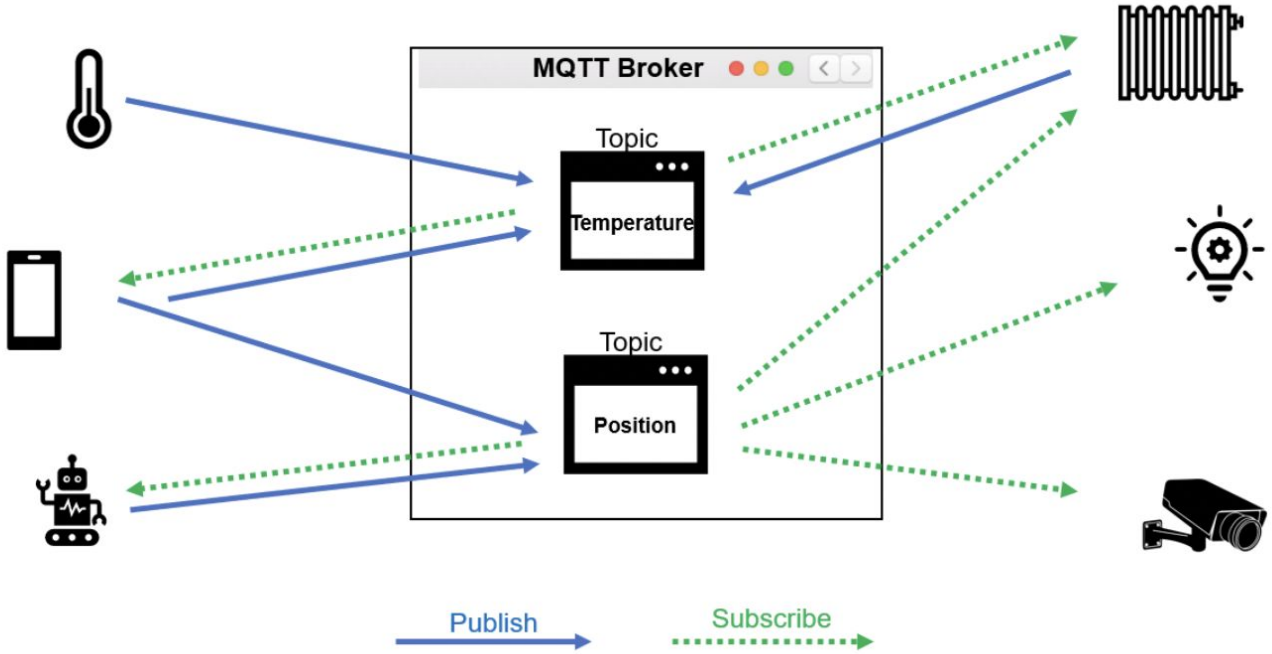

Input Image
BGR, H, W
Backbone Network
stem
res2
res3
res4
res5
ResNet
H/4, W/4
H/8, W/8
H/16, W/16
H/32, W/32
upsampler
P2
P3
P4
P5
256 channels each
Feature Pyramid Network
FPN
P6
H/64, W/64
Region Proposal Network
RPN
objectness
3 ch
anchor deltas
3 x 4 ch
NMS
1000 box proposals
RPNOutput
StandardRPNHead
StandardROIHeads
ROIPooler
fc
1024 ch
class logits
81 ch
NMS
100 boxes
flatten
bbox predictions
80 x 4 ch
FastRCNN Outputs
FastRCNN ConvFCHead
FastRCNN OutputLayers
ROI Heads (Box Head)
GeneralizedRCNN

Results (Detectron2)

Results (cont.)

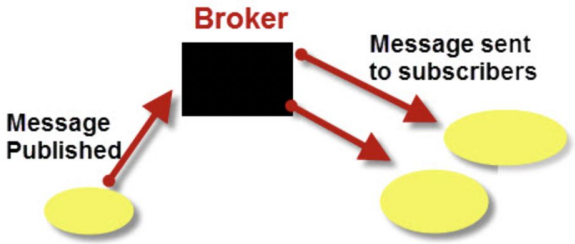
Implementing MQTT (or other) protocol or secure cloud communication protocol

MQTT


MQTT Broker
Topic
Temperature
Topic
Position
Publish
Subscribe

Motivation behind MQTT

- Although HTTP and MQTT both run over TCP, MQTT was designed for IoT.
- Once an MQTT connection is established, any number of messages can be sent through it in both directions, data from sensor to back-end, and commands the other way.
- It aims to minimize data overhead of each MQTT packet.
- Publish subscribe routing, which allows the easy addition of more consumers and producers of data.



MQTT- Publish Subscribe Model

References

- Real-time YOLOv4 Object Detection on Webcam
- Detectron2
- MQTT vs HTTP for IoT