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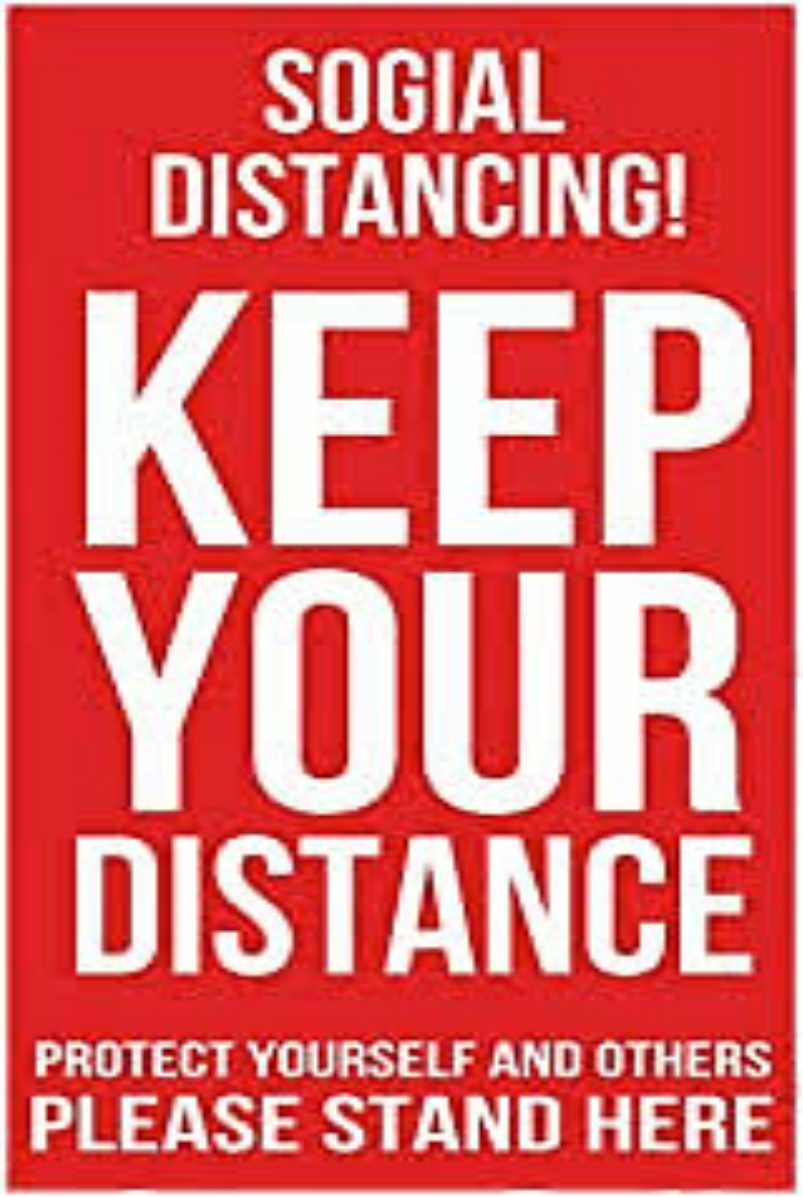

Analyzing Social Distancing Based on Sensory Inputs

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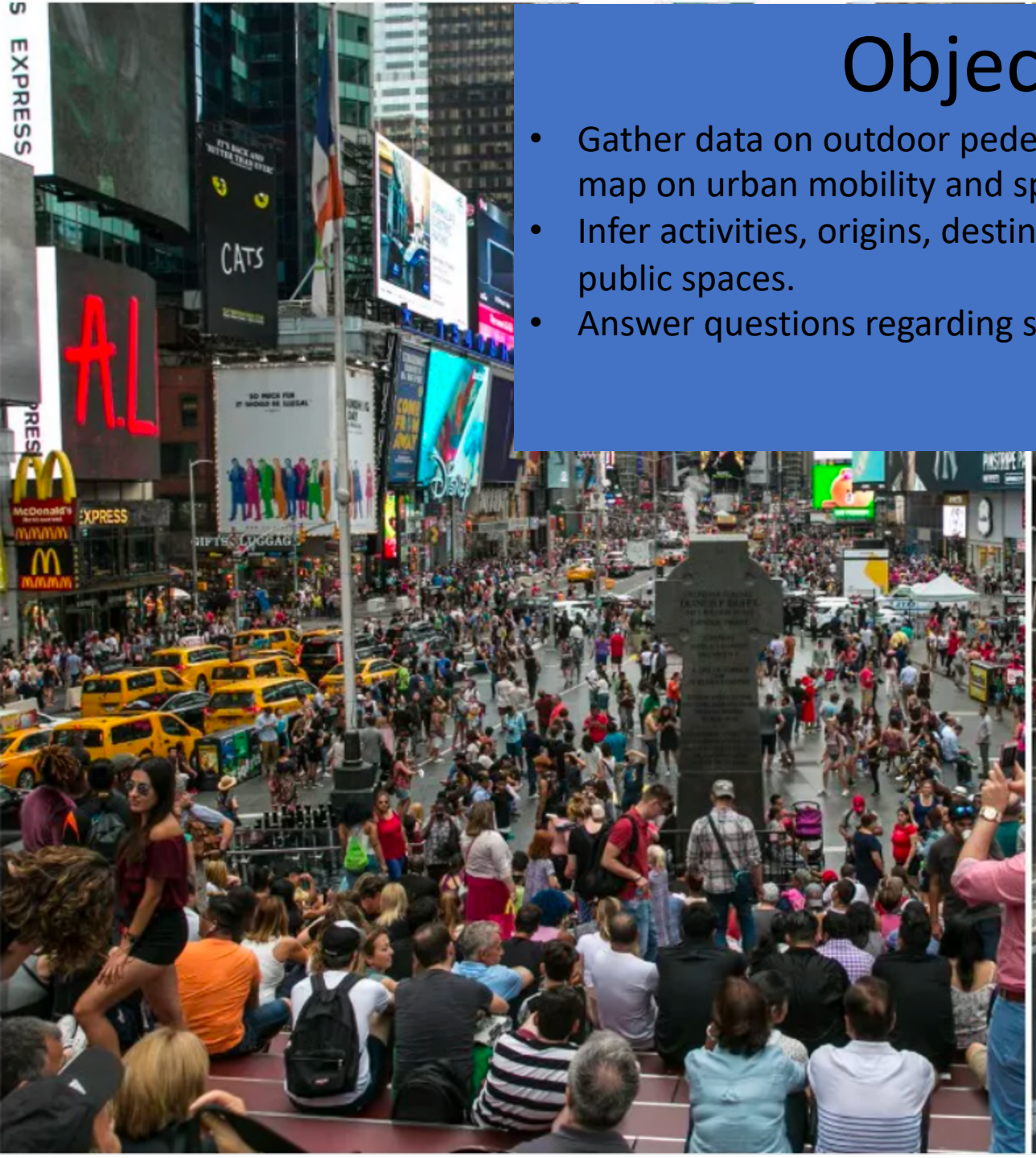
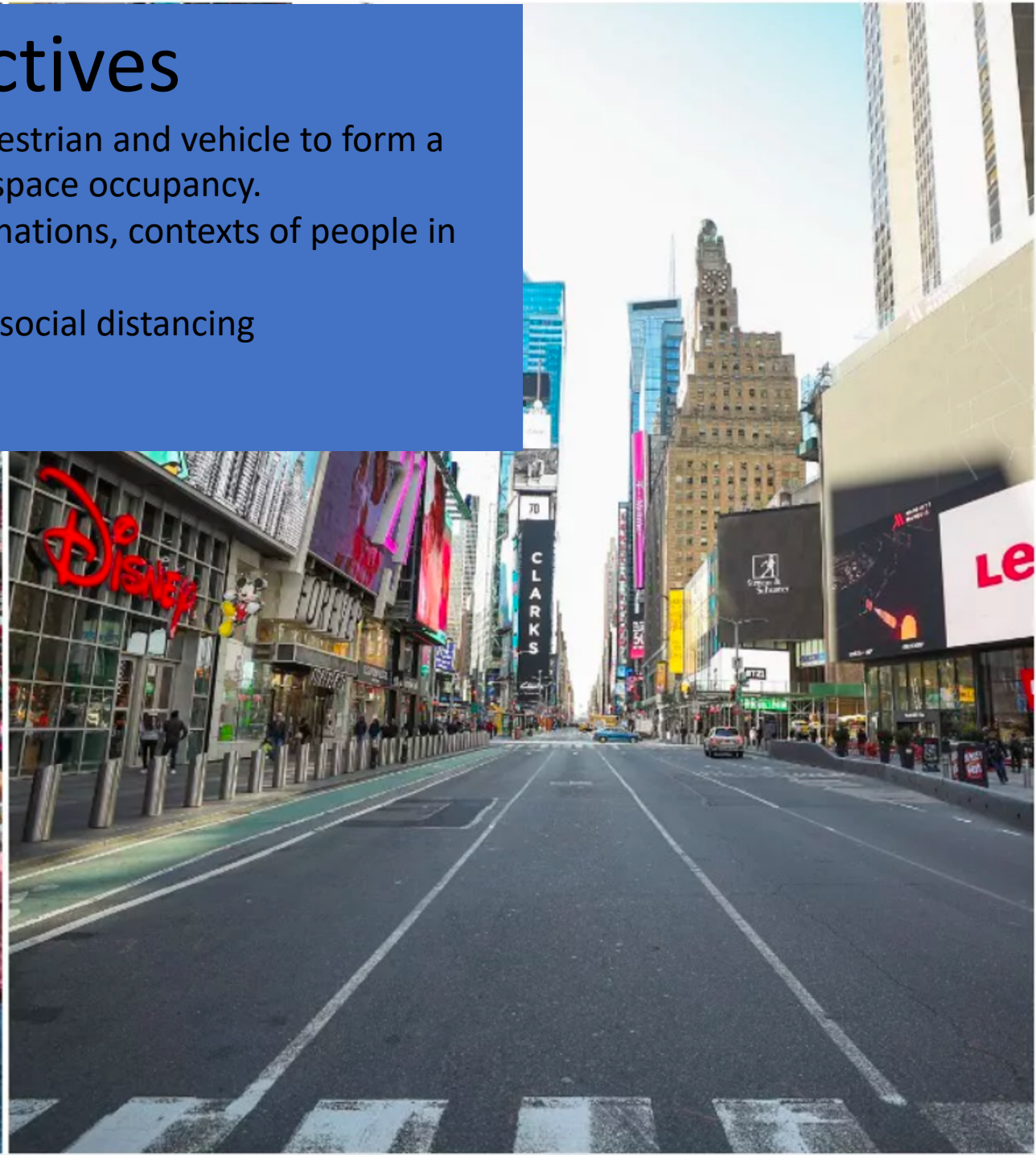
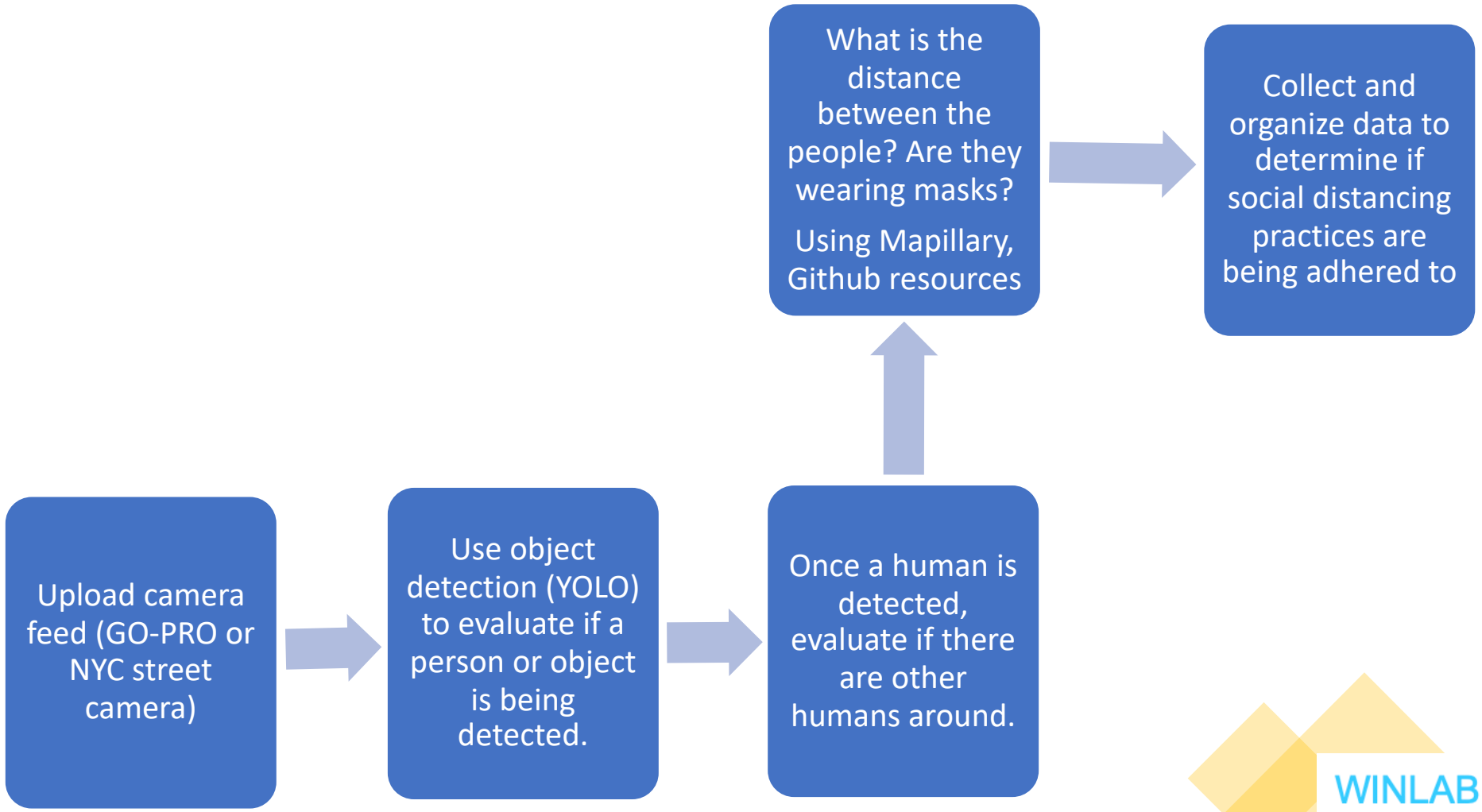
Objectives

- Gather data on outdoor pedestrian and vehicle to form a map on urban mobility and space occupancy.
- Infer activities, origins, destinations, contexts of people in public spaces.
- Answer questions regarding social distancing



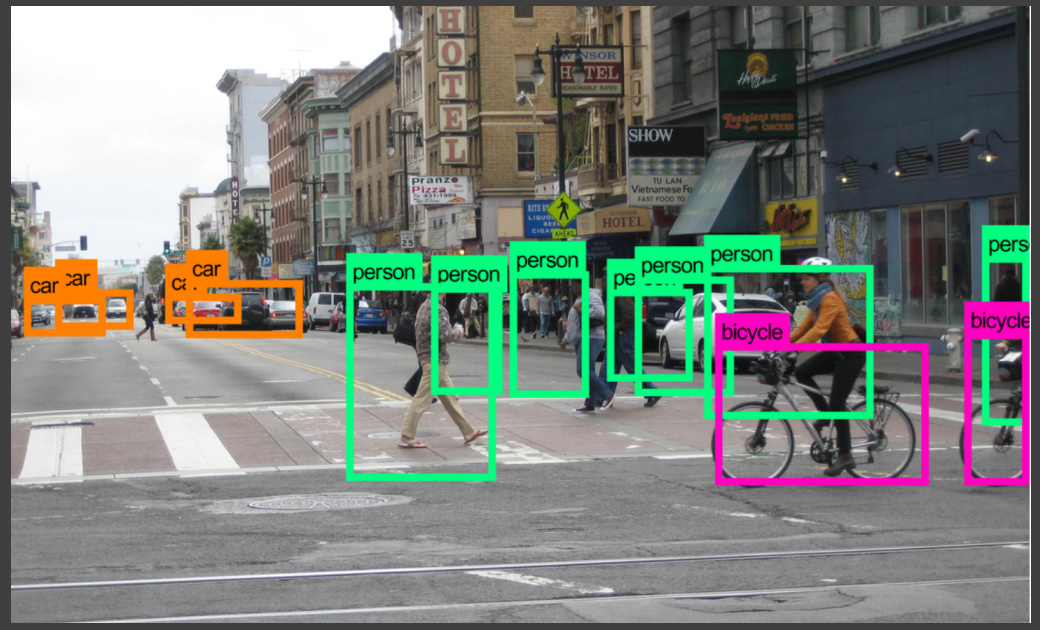


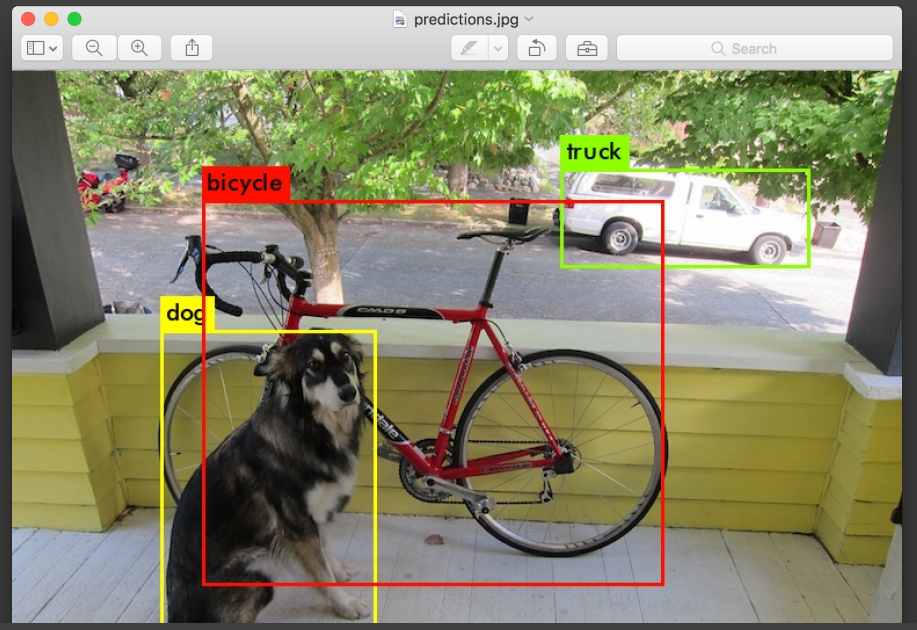
Project Pipeline



What is Yolo?

- Yolo is a framework that uses deep learning and neural networks for object detection.





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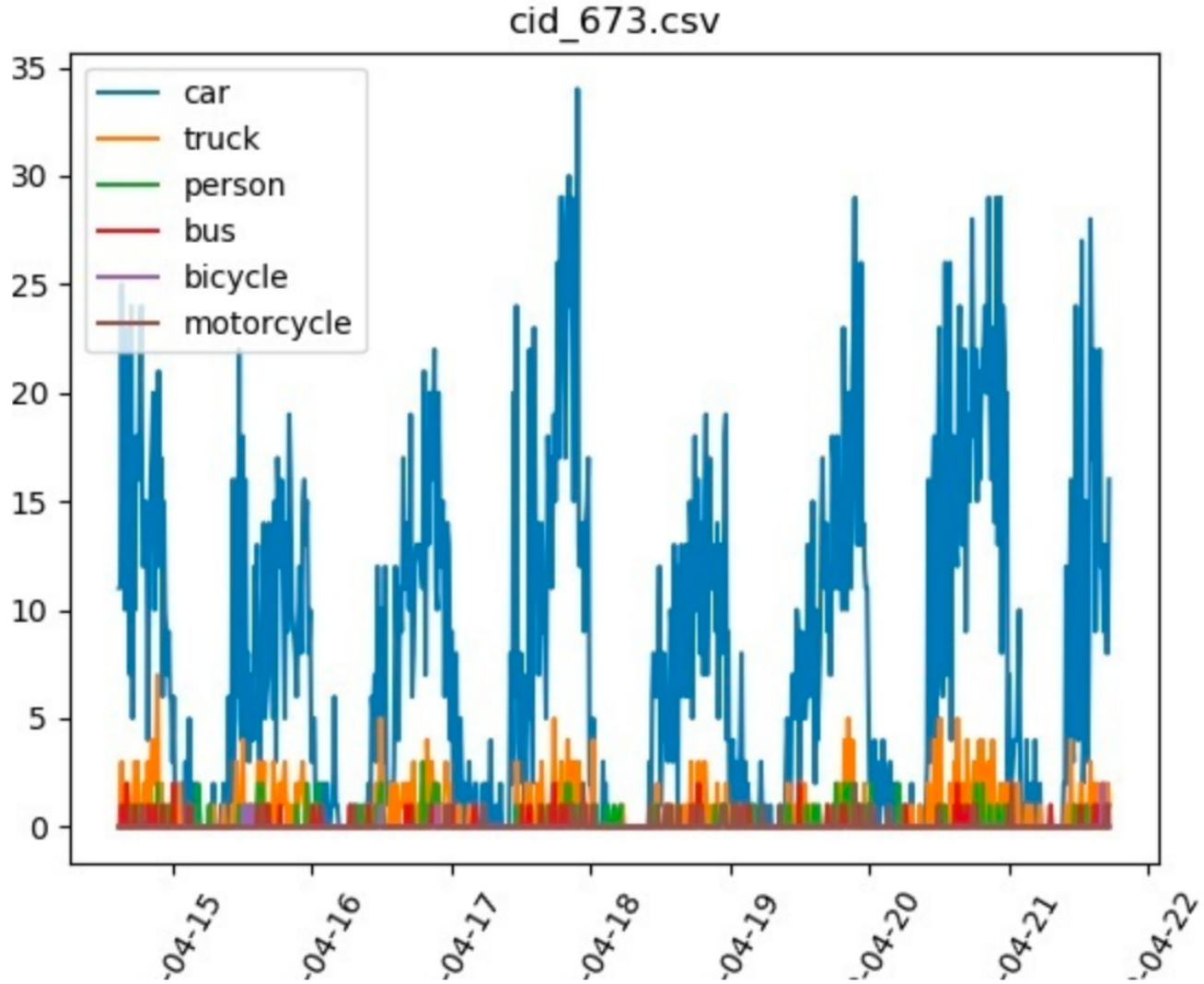
How Are We Using Yolo?

- Running yolo on thousands of photos from the department of transportation and counting the amount of objects in each photo (people, traffic lights, cars, bus)

```
person: 44%     (left_x:  344   top_y:   88   width:    8   height:   22)
Enter Image Path: /home/sd/covid19/data/7/1589834568.jpg: Predicted in 36.537000 milli-seconds.
person: 60%     (left_x:  139   top_y:  127   width:   15   height:   34)
person: 33%     (left_x:  147   top_y:  112   width:   12   height:   20)
pottedplant: 26%        (left_x:  160   top_y:   94   width:   16   height:   23)
car: 27%        (left_x:  167   top_y:   74   width:   20   height:   23)
car: 68%        (left_x:  168   top_y:   53   width:   18   height:   16)
car: 63%        (left_x:  200   top_y:   18   width:    7   height:    6)
traffic light: 28%      (left_x:  208   top_y:    5   width:    6   height:    7)
truck: 72%      (left_x:  210   top_y:   18   width:   22   height:   22)
car: 47%        (left_x:  247   top_y:   40   width:   14   height:    8)
person: 90%     (left_x:  304   top_y:  120   width:   13   height:   33)
Enter Image Path: /home/sd/covid19/data/7/1589835386.jpg: Predicted in 35.803000 milli-seconds.
person: 49%     (left_x:  160   top_y:   34   width:    4   height:   13)
car: 28%        (left_x:  167   top_y:   73   width:   21   height:   24)
person: 47%     (left_x:  169   top_y:  111   width:   13   height:   26)
car: 77%        (left_x:  169   top_y:   52   width:   18   height:   18)
car: 37%        (left_x:  184   top_y:   28   width:    8   height:   10)
car: 63%        (left_x:  193   top_y:   28   width:   11   height:   11)
car: 95%        (left_x:  227   top_y:   41   width:   19   height:   18)
car: 83%        (left_x:  252   top_y:   41   width:   11   height:    8)
Enter Image Path: /home/sd/covid19/data/7/1589836206.jpg: Predicted in 36.190000 milli-seconds.
traffic light: 32%      (left_x:   68   top_y:   66   width:    6   height:   16)
traffic light: 45%      (left_x:   78   top_y:   66   width:    6   height:   23)
person: 83%     (left_x:  133   top_y:  122   width:    8   height:   29)
pottedplant: 40%        (left_x:  152   top_y:  146   width:   22   height:   22)
pottedplant: 31%        (left_x:  160   top_y:   95   width:   17   height:   22)
truck: 44%      (left_x:  169   top_y:   29   width:   17   height:   35)
car: 29%        (left_x:  195   top_y:   11   width:    5   height:    7)
person: 56%     (left_x:  240   top_y:   92   width:    7   height:   28)
car: 66%        (left_x:  251   top_y:   42   width:   12   height:    7)
person: 71%     (left_x:  313   top_y:   56   width:    5   height:   16)
person: 32%     (left_x:  321   top_y:   56   width:    5   height:   16)
Enter Image Path: /home/sd/covid19/data/7/1589837024.jpg: Predicted in 35.568000 milli-seconds.
traffic light: 52%      (left_x:   76   top_y:   67   width:    9   height:   23)
person: 86%     (left_x:  117   top_y:  116   width:   13   height:   37)
truck: 40%      (left_x:  169   top_y:   47   width:   21   height:   39)
truck: 28%      (left_x:  171   top_y:   47   width:   18   height:   16)
person: 90%     (left_x:  176   top_y:  125   width:   11   height:   39)
car: 61%        (left_x:  197   top_y:   24   width:    7   height:    9)
traffic light: 29%      (left_x:  207   top_y:    5   width:    6   height:   11)
bus: 95%        (left_x:  211   top_y:   18   width:   20   height:   21)
car: 63%        (left_x:  249   top_y:   42   width:   14   height:    8)
person: 49%     (left_x:  273   top_y:   41   width:    4   height:   10)
Enter Image Path: /home/sd/covid19/data/7/1589837850.jpg: Predicted in 35.926000 milli-seconds.
person: 81%     (left_x:   47   top_y:  106   width:   12   height:   36)
traffic light: 63%      (left_x:   76   top_y:   66   width:    9   height:   24)
person: 61%     (left_x:  148   top_y:   91   width:    9   height:   30)
pottedplant: 37%        (left_x:  153   top_y:  148   width:   21   height:   22)
pottedplant: 27%        (left_x:  163   top_y:   96   width:   12   height:    9)
car: 51%        (left_x:  168   top_y:   57   width:   22   height:   29)
truck: 38%      (left_x:  168   top_y:   57   width:   22   height:   29)
car: 71%        (left_x:  197   top_y:   28   width:   10   height:    9)
car: 98%        (left_x:  246   top_y:   41   width:   20   height:   17)
person: 82%     (left_x:  297   top_y:   62   width:    7   height:   18)
person: 58%     (left_x:  322   top_y:   60   width:    7   height:   17)
person: 33%     (left_x:  327   top_y:   50   width:    8   height:   17)
Enter Image Path: /home/sd/covid19/data/7/1589838667.jpg: Predicted in 36.168000 milli-seconds.
person: 71%     (left_x:   45   top_y:  129   width:   15   height:   40)
handbag: 27%    (left_x:   49   top_y:  159   width:   10   height:   12)
traffic light: 49%      (left_x:   76   top_y:   66   width:    9   height:   24)
person: 78%     (left_x:  101   top_y:  111   width:   13   height:   35)
person: 58%     (left_x:  143   top_y:   83   width:    9   height:   30)
```

Graphed Output



Final Output

1st analysis

Geolocation data:
Street corner, upper east side. mixed use = residential +commercial

2nd analysis

Socioeconomi
CS
Demorphics
Pandemic statistics

Skyline
Indicates density + land use

PERSON
Gender - Male
Age - Under 50
Activity - walking

PERSON
Gender - Female
Age - Over 50
Activity - walking

2

1

3

MASK

Street Signs
Function and reason to b
out

12ft

10ft

12ft

Width of sidewalk
Dictates distance between people

SHOPPING BAG

Place

People

Distance

Activity

Posture

Equipment

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Future Aspirations

Analyze data and answer critical questions about

- When and where
- Small scale human interaction
- Infection patterns in relation to social distancing compliance