nodeflux

Extending Vision Beyond Imagination

Week 3 - Surveillance Case

Martin Dominikus
Muhammad Rizky M

www.nodeflux.io

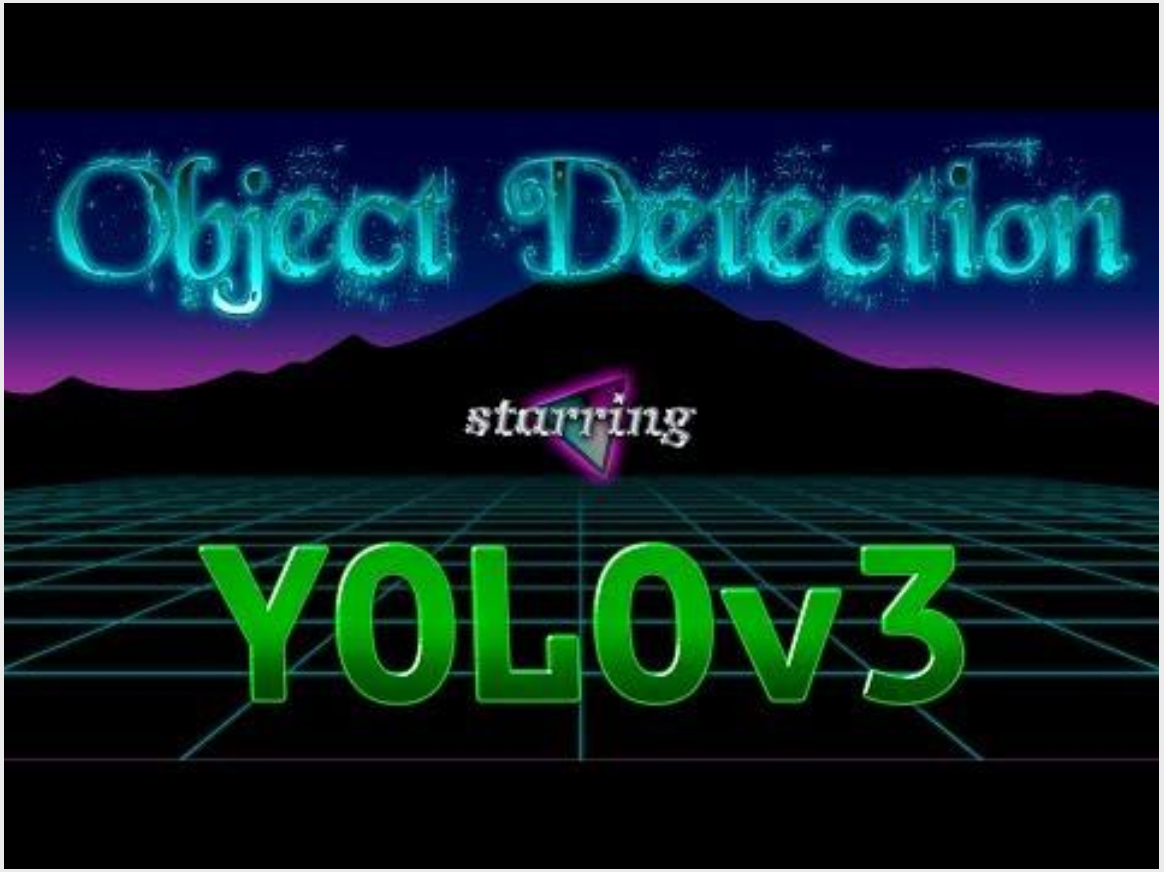
Outline

- Section 1 Introduction
- Section 2 Object Detection
- Section 3 Object Tracker
- Section 4 Simple Case

nodeflux

Extending Vision Beyond Imagination

Section 1 - Introduction


Object Detection
starring
YOLOv3

Object Detection

Expensive

+

=

Insight Data

More Expensive

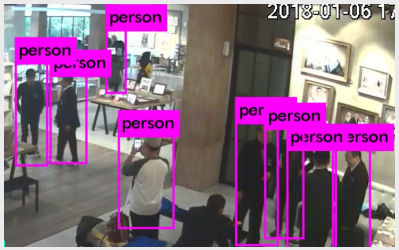
Object Detection

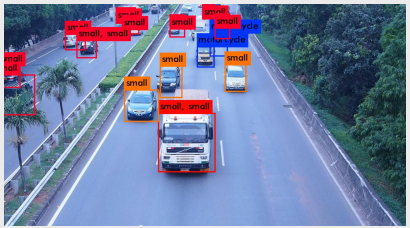
Expensive

Insight Data

e

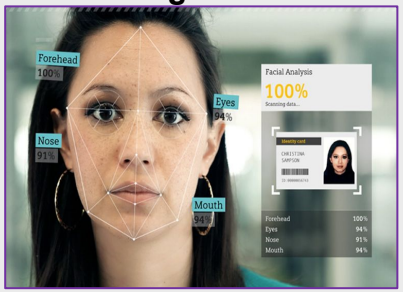
What's Next, After Object Detection ??



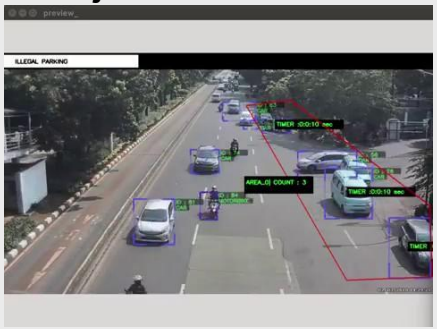


Alerting

Face recognition



Object Restriction

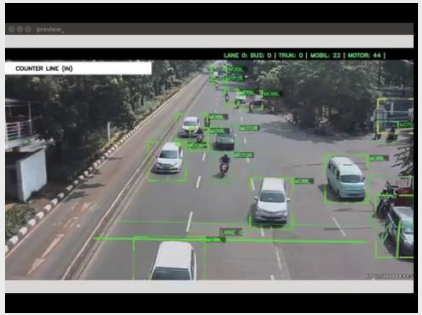


Data Analytics

Dwelling Time

Dwell heatmap

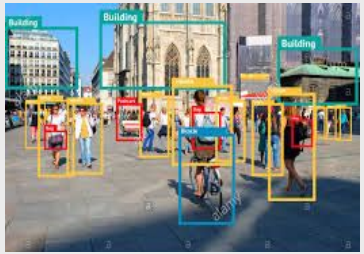
Object Counter



General Flow

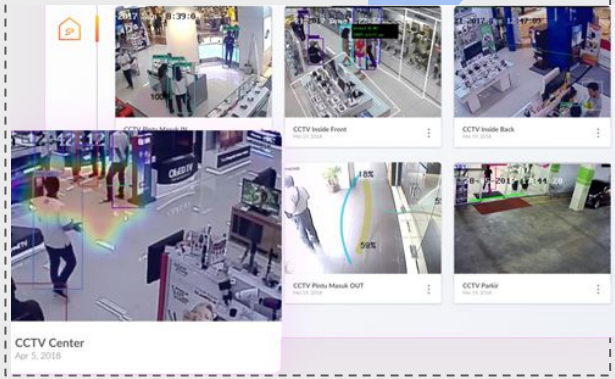
Video Grabber

Object Detection



Object Tracker

Object Analytic

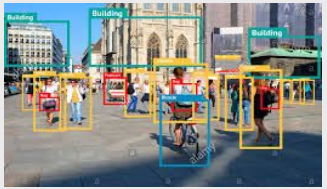


General Flow & Method proposed

Video Grabber

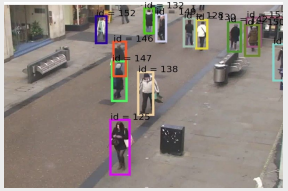
CCTV/Video

Object Detection



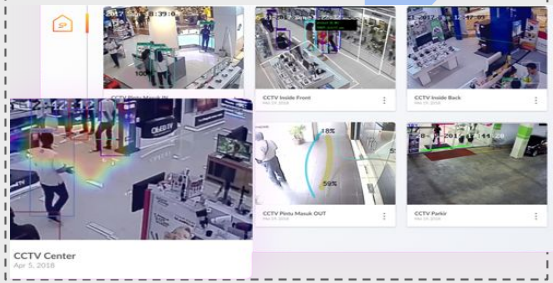
YOLO

Object Tracker



Sort Tracker

Object Analysis



Analysis Data Trajectory

- Object Counter
- Dwelling Time

nodeflux

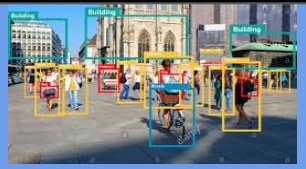
Extending Vision Beyond Imagination

Section 2 - Object Detection

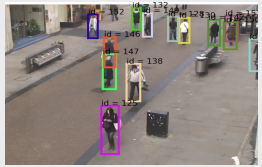
Object Detection [YOLO]

Video Grabber

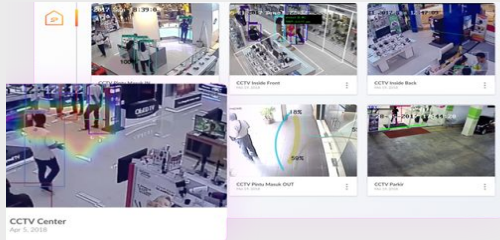
Object Detection

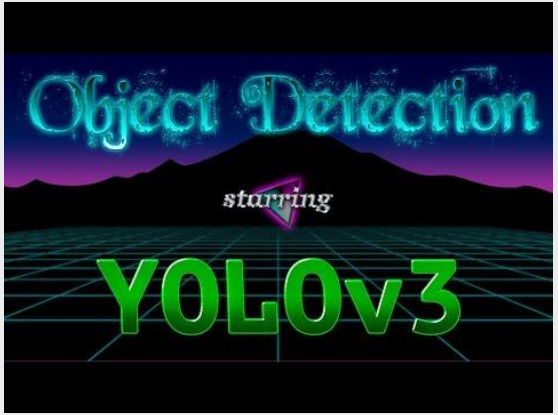


Object Tracker



Object Analytic





Object Detection

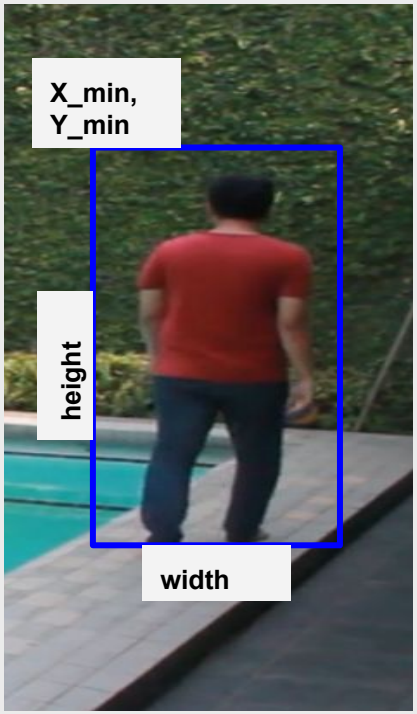
https://drive.google.com/open?id=1rHNRe5evoRNsjZI47svPYrAFmEGfDUGIn9Qw-L5IIu4

nodeflux

Extending Vision Beyond Imagination

Section 3 - Object Tracker

Object Detection [YOLO]




```
[
    ('person',
    0.7308904528617859,
        (
            345.1903076171875,
            148.33767700195312,
            42.11083984375,
            182.61672973632812
        )
    )
]
```

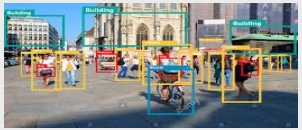
Meta Data :

- Label
- Confidence level
- BBOX= x_min,y_min, width, height

Object Tracker Concept

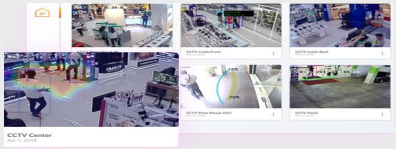
Video Grabber

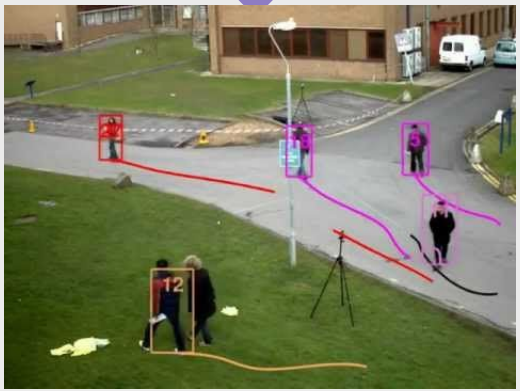
Object Detection



Object Tracker

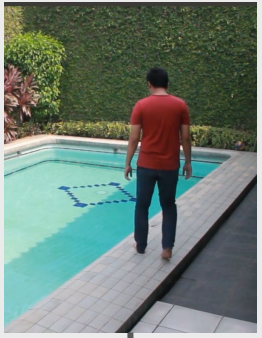
Object Analysis



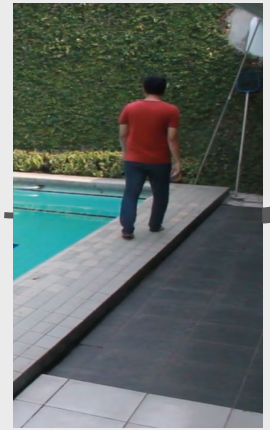


Object Tracker Concept

Previous frame

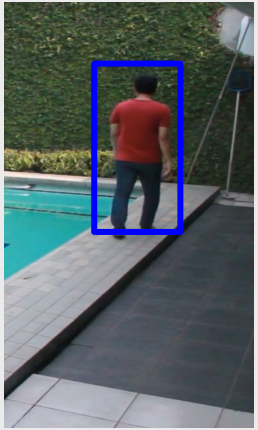


Current frame



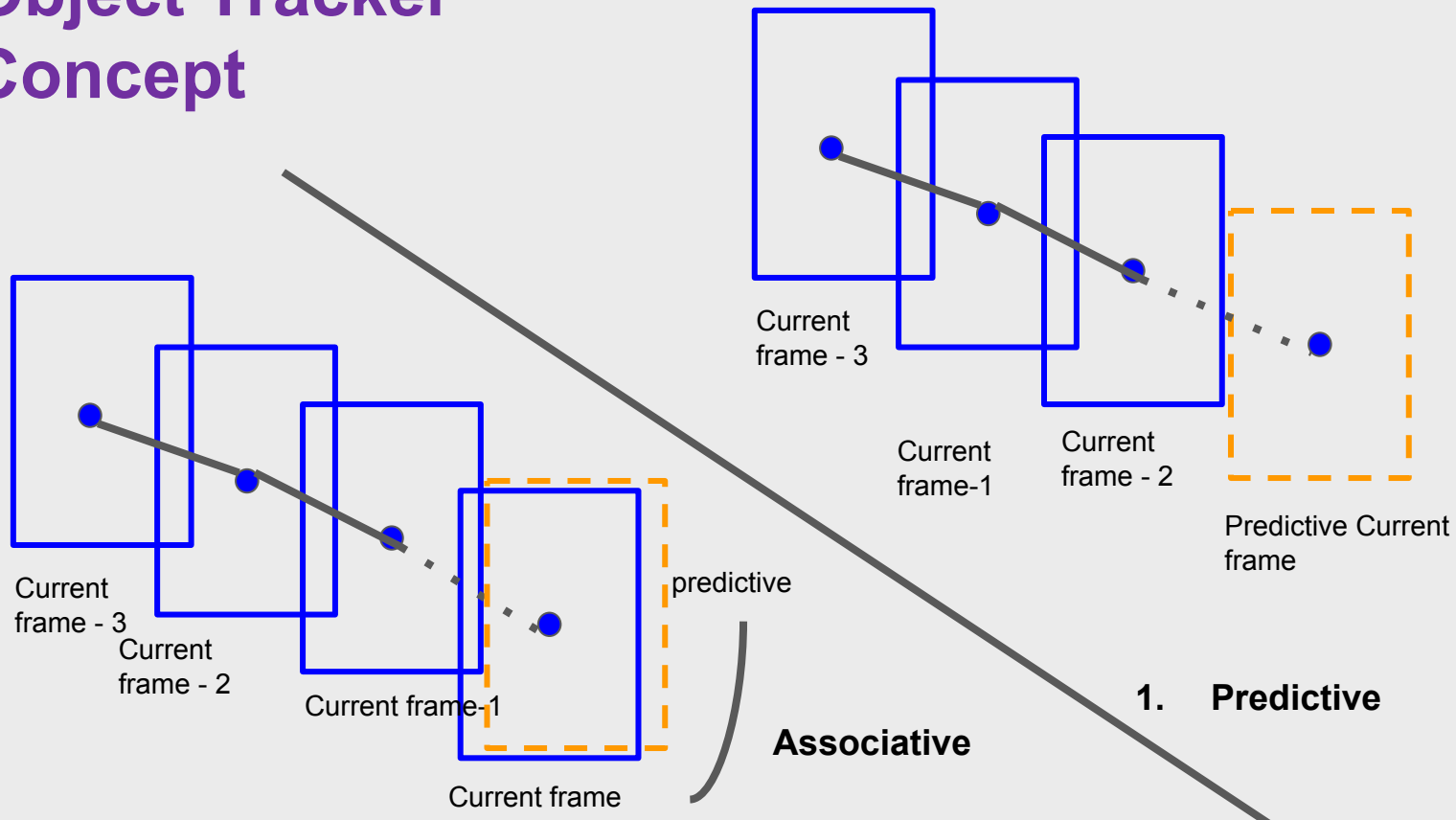
Methods

Current frame tracking output



- Distance (Euclidean distance)
- Correlations (Regression, Kalman Filter)
- Feature similarity (NN, CNN)
- Combinations

Object Tracker Concept



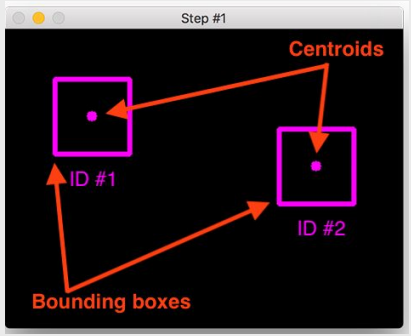
2. Predictive, Correlative, Associative

- **Need object detector / bounding box**

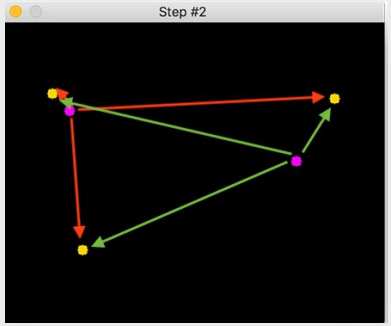
Object Tracker

[Distance similarity]

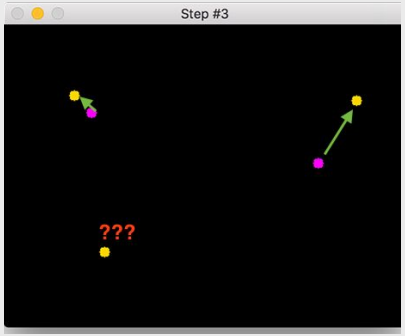
The centroid tracking algorithm



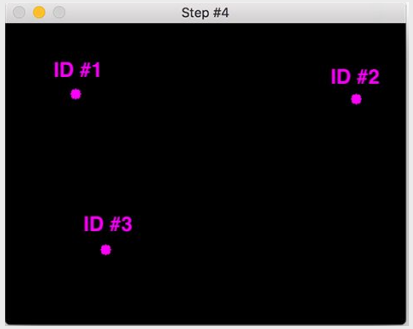
Step #1: Accept bounding box coordinates and compute centroids



Step #2: Compute Euclidean distance between new bounding boxes and existing objects



Step #3: Update *(x, y)*-coordinates of existing objects

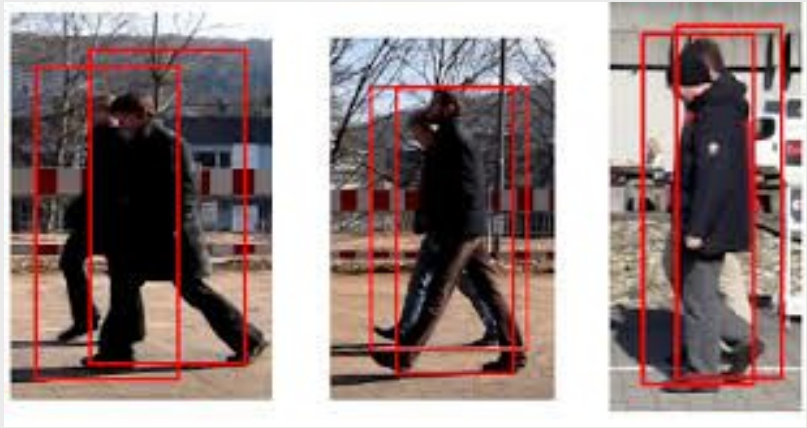


Step #4: Register new objects

Object Tracker

[CHALLENGES]

- What happens when an object overlaps/occluded with another one?
- What if, Object detector disappear on the frame.
- What if, being Frame skipping??



Object Tracker
[SORT Tracker]

Simple Online and Realtime Tracking

Alex Bewley, Zongyuan Ge, Lionel Ott, Fabio Ramos, Ben Upcroft

https://github.com/abewley/sort

The main focus is to associate objects efficiently for online and realtime applications
Combining Kalman Filter and Hungarian algorithm

Others Tracker

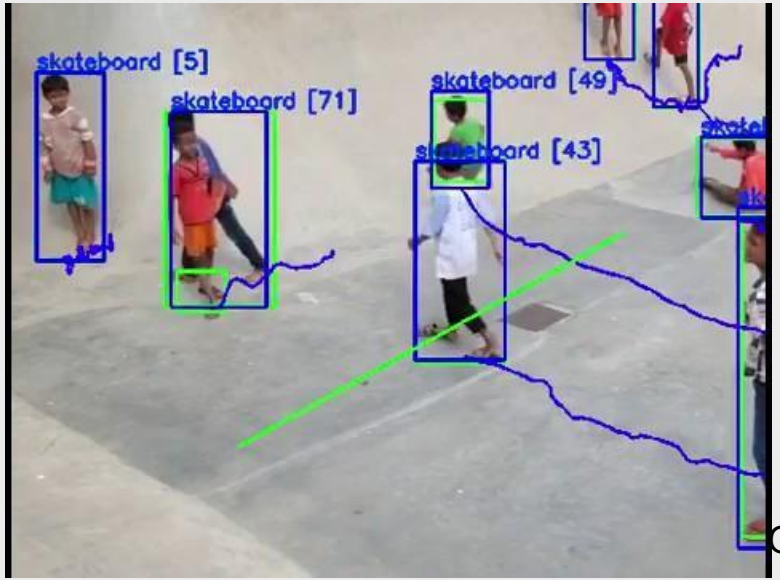
Tracker	OpenCV 3.0	OpenCV 3.1	OpenCV 3.2	OpenCV 3.3	OpenCV 3.4+
CSRT	N/A	Could not compile	No	No	Yes
KCF	N/A	Could not compile	Yes	Yes	Yes
Boosting	N/A	Could not compile	Yes	Yes	Yes
MIL	N/A	Could not compile	Yes	Yes	Yes
TLD	N/A	Could not compile	Yes	Yes	Yes
MedianFlow	N/A	Could not compile	Yes	Yes	Yes
MOSSE	N/A	Could not compile	No	No	Yes

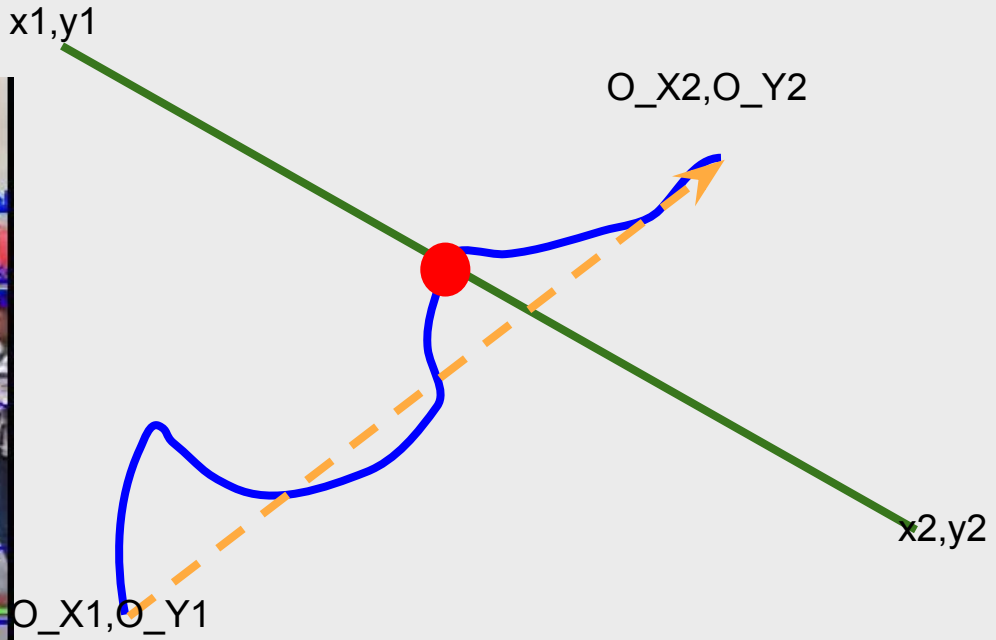
nodeflux

Extending Vision Beyond Imagination

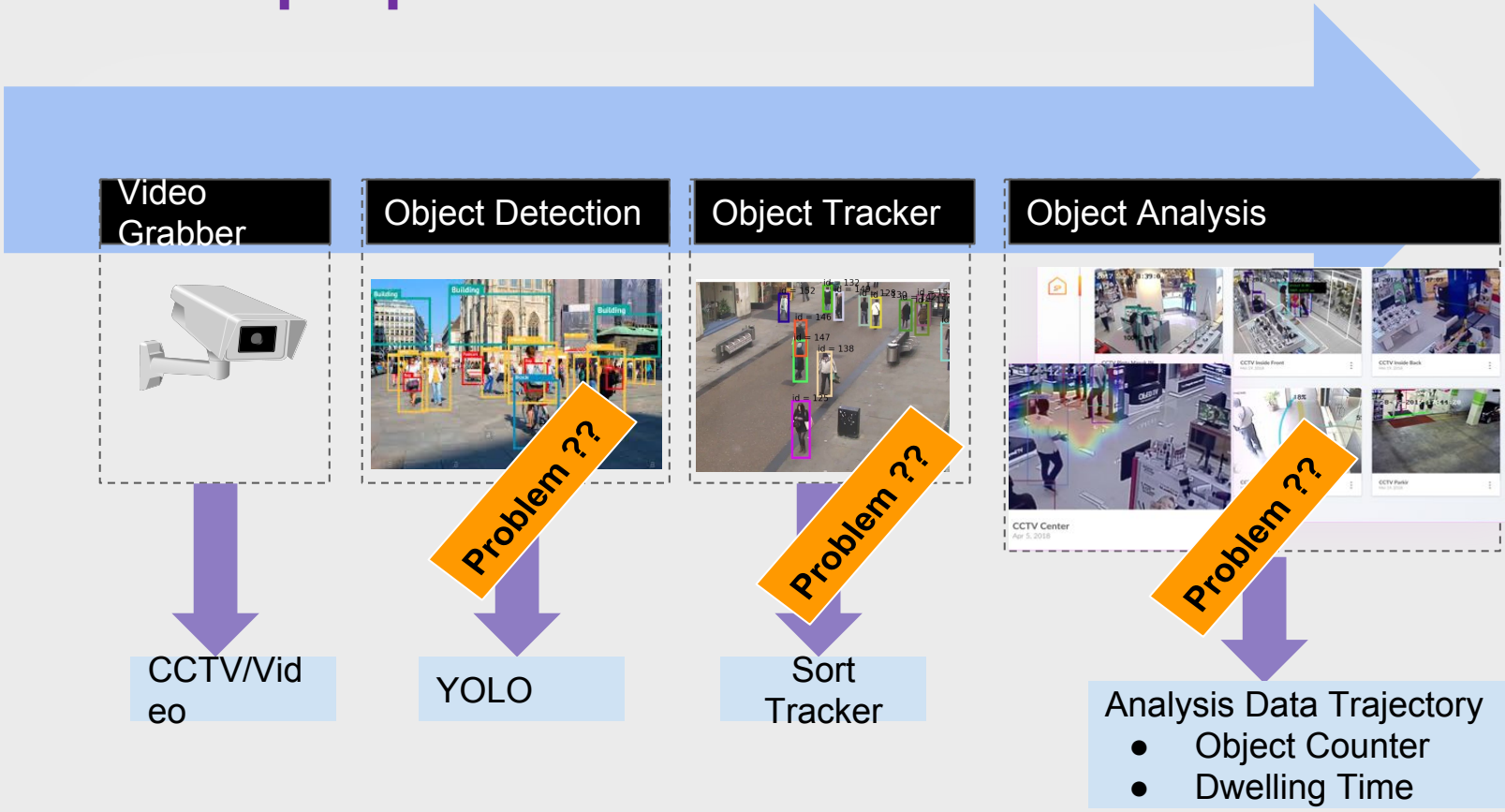
Section 4 - Simple case

Data Analytics
[Object line counter]





General flow & Method proposed



Thank you

www.nodeflux.io