



EXAMPLES OF AI TESTING ASPECTS IN OBJECT DETECTION SYSTEMS



- AI is the simulation of human intelligence processes by machines, especially computer systems
- It can be used in many fields of our daily life:
 - Transport
 - Banking
 - Medicine
 - Education
 - Security
 -
- Training is based on pre prepared datasets

Objects detection

- Faces
- People
- Cars
- Animals
- Weapons
-

Actions detection

- Running
- Walking
- Stealing
- Fighting
- Biking
-

Examples of detectable subjects II



STRATEGY

HOW ROBOTS LEARN TO SEE

The benefit of AI-based image processing



Marco Braun
Strategic Technology Expert, Corporate Technology Development

1,071 views | Apr 11, 2019, 10:46am
Cambridge Startup Teaches Driverless Cars To Behave Around Cyclists, Can Deploy On Any Road Now



ANNALS OF TECHNOLOGY
SHOULD WE BE WORRIED ABOUT COMPUTERIZED FACIAL RECOGNITION?
The technology could revolutionize policing, medicine, even agriculture—but its applications can easily be weaponized.
By David Owen
December 10, 2018

HOME > TECHNOLOGY > Japanese Startup Designs AI That Can Detect Theft Before It Takes Place
TECHNOLOGY
Japanese Startup Designs AI That Can Detect Theft Before It Takes Place

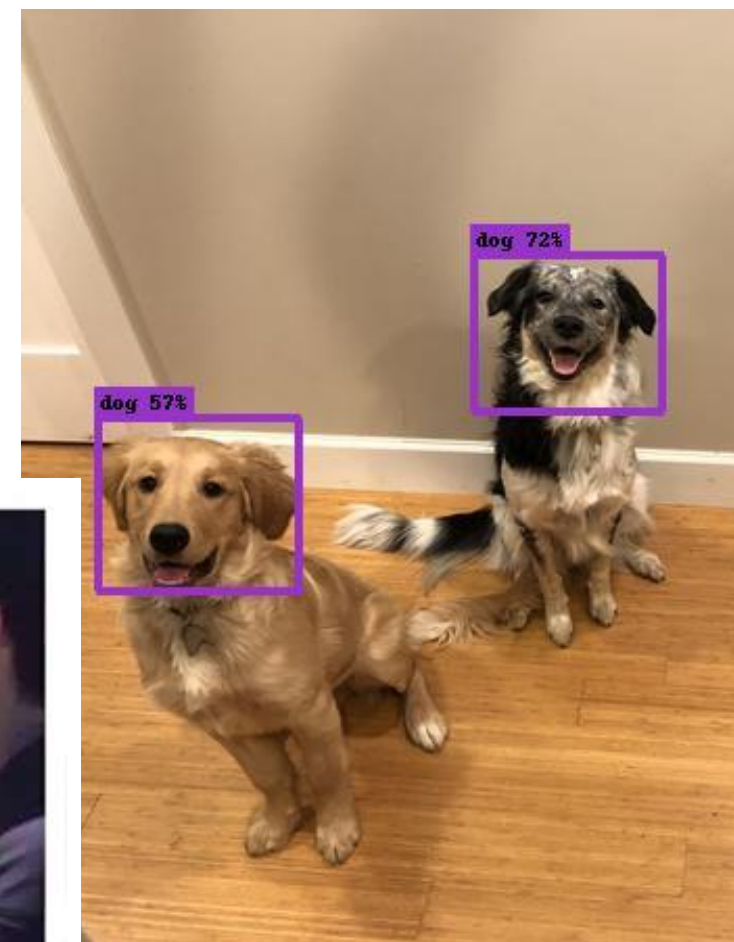
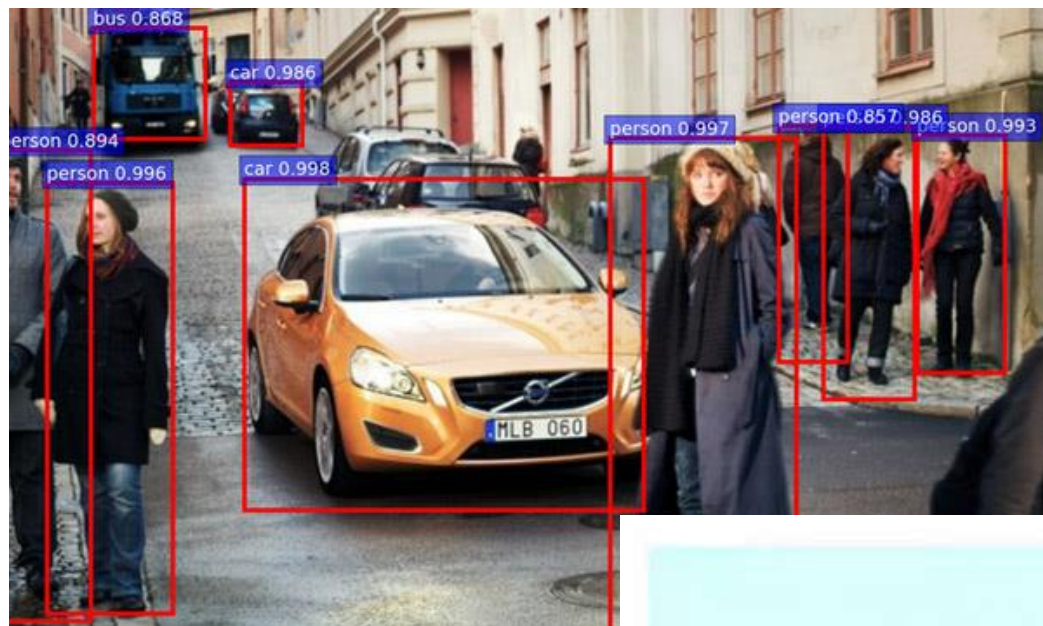
Smart Cities

Walmart has unveiled a concept store that uses cameras to automatically track stock

by Charlotte Jee | 7 days ago

— **Google buys startup that helps your phone identify objects**
"There's still a long way to go with machine learning."

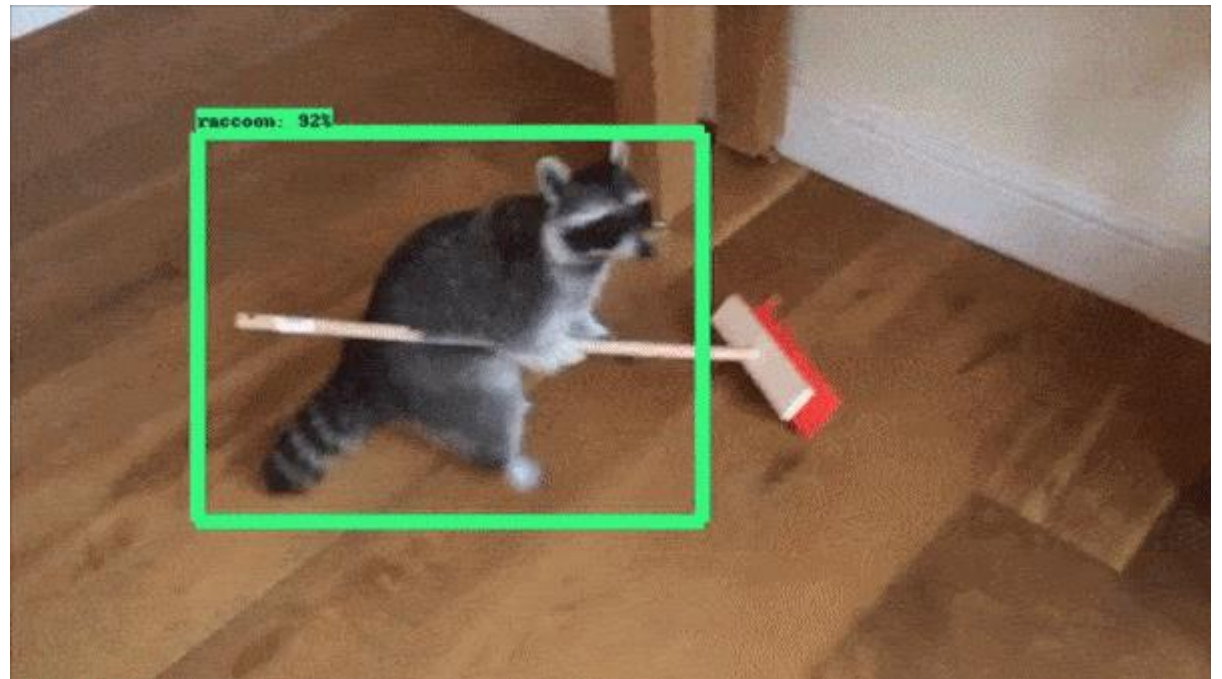
Real examples



What kind of challenges would you expect while testing AI in object detection systems?

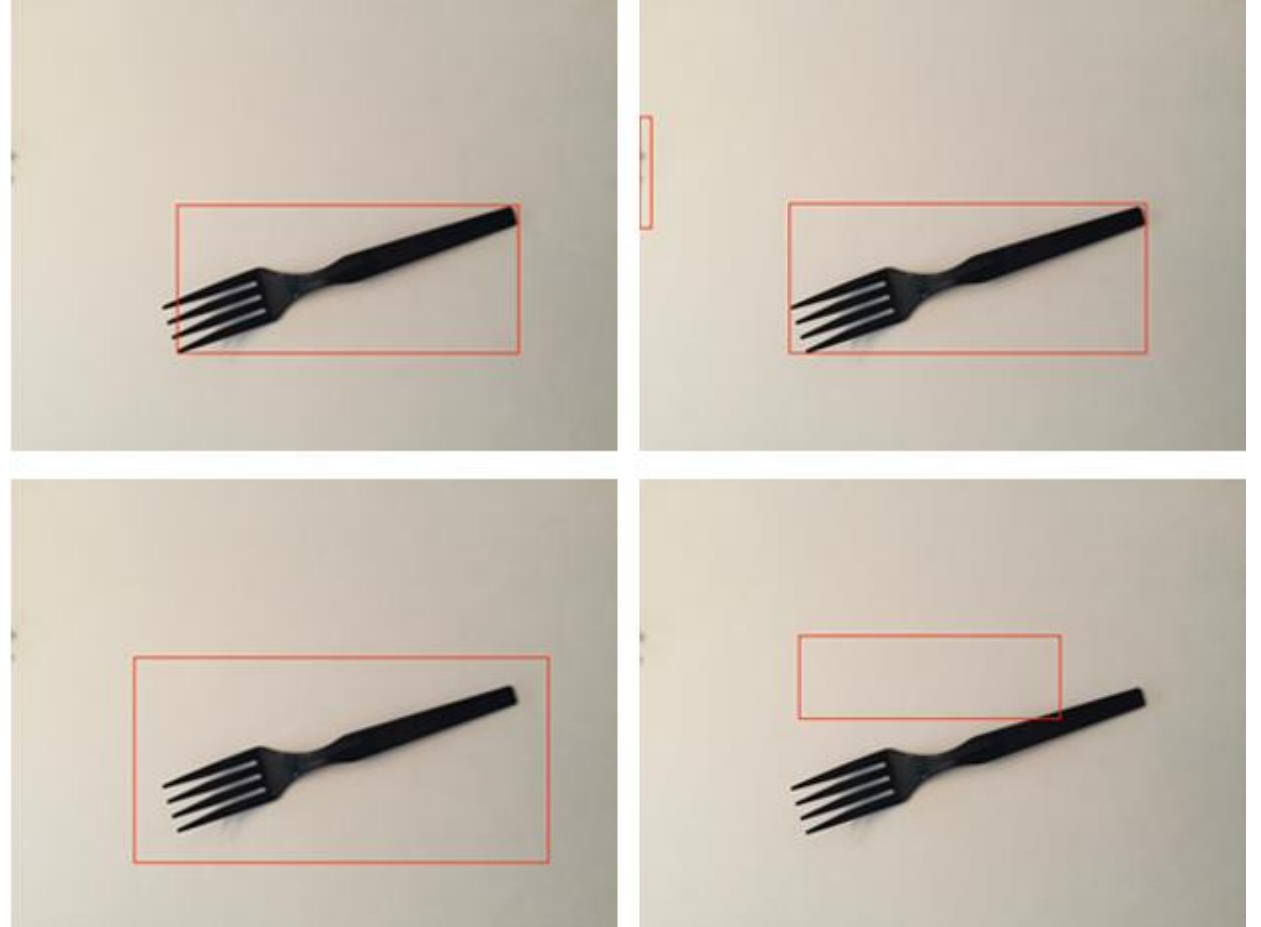
Result is based on probabilities

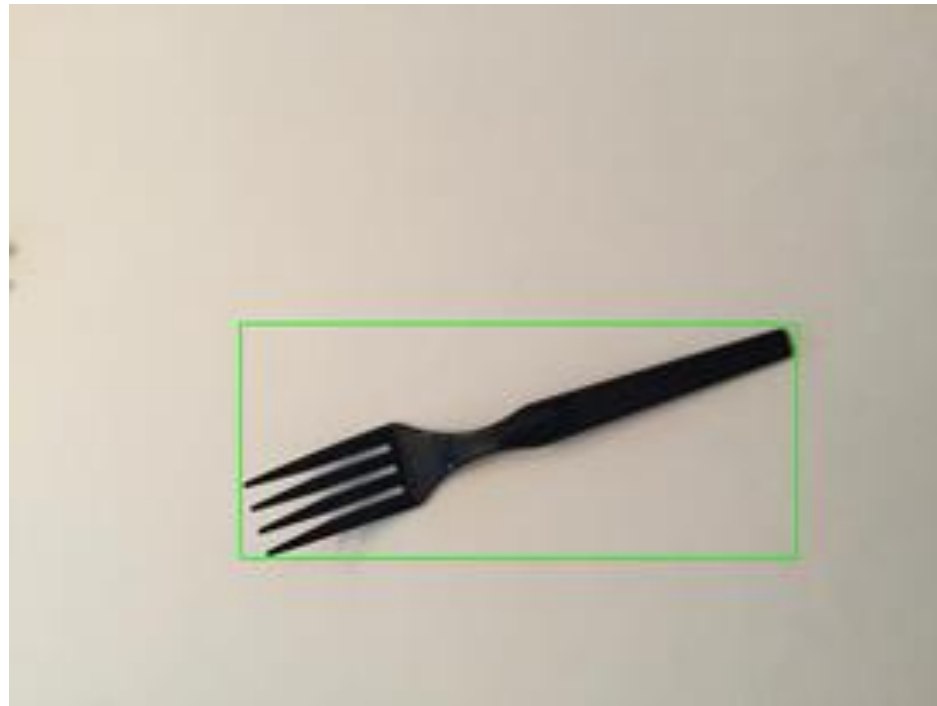
- Impossible to foresee exact output
- Different results each time we test



Impossible to have 100% accuracy

- Dependency on used model
- Our choice which model to use





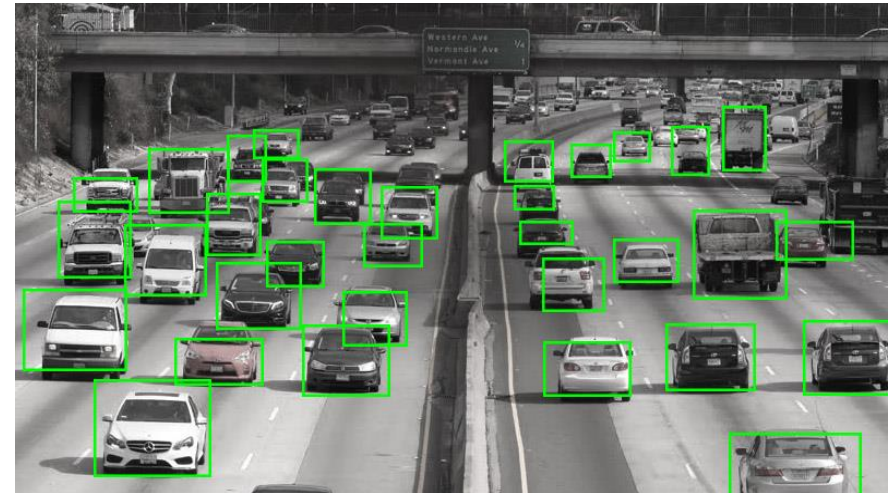
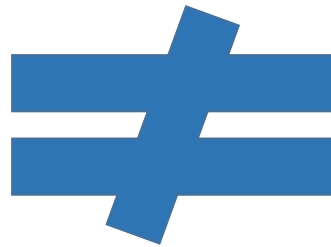
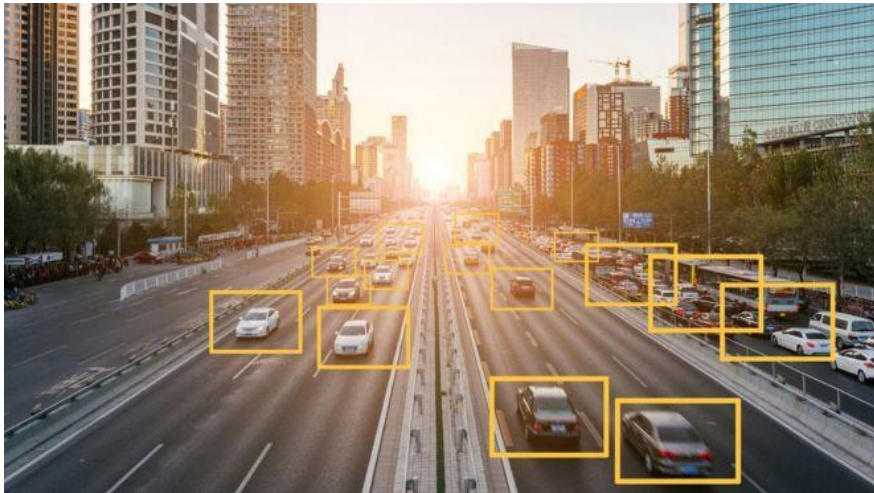
Model depending accuracy selection

- Problem with too low or too high accuracy settings
- Need to find the most optimal values



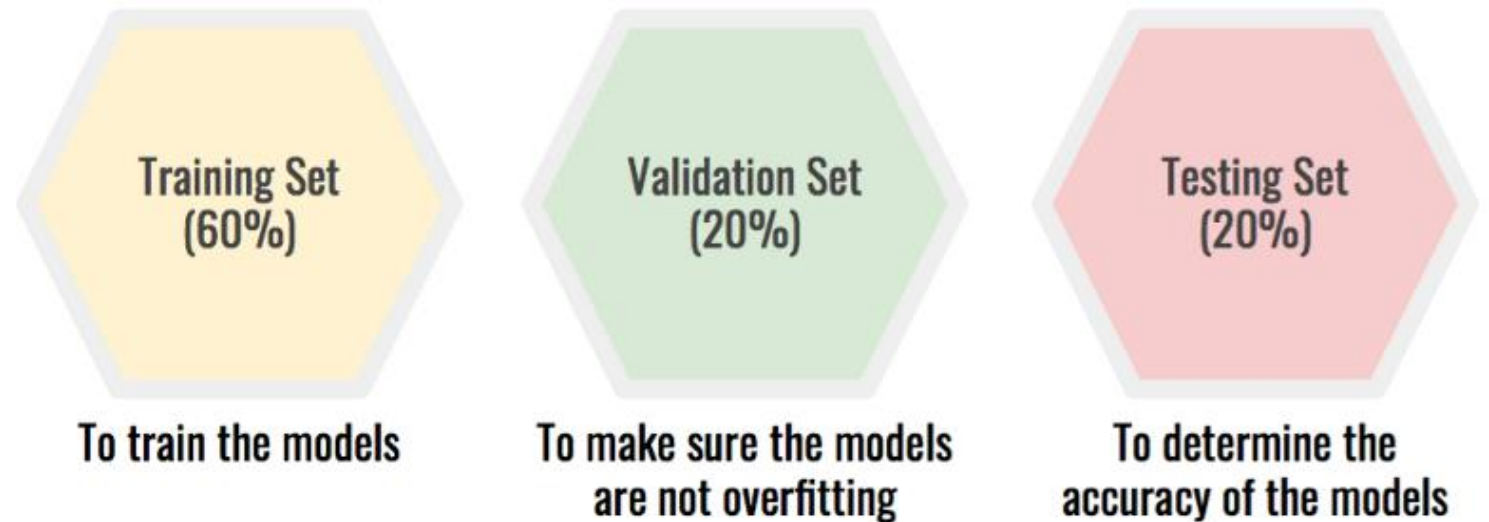
Issues (non)reproducibility

- Impossible to reproduce issues 100% accurately
- Impossible to have same surrounding as client's



- Testing is always carried out in same environment
- Limited abilities to create various conditions
- Colleagues have to deal with strange activities happening in work place 😊

- Training data
- Validation data
- Testing data
- Never too much





- Test cases for object detection
- Test cases for model accuracy evaluation
- Huge amount of important parameters
 - System parameters
 - Physical parameters
- Hard to group parameters in most optimal way

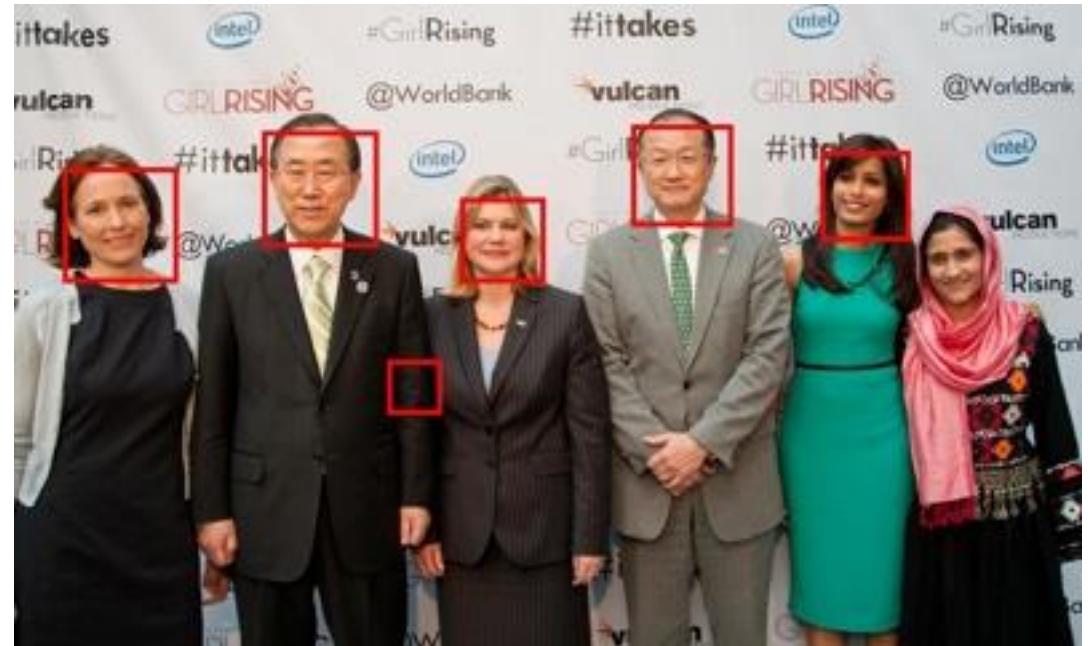
When is detection accuracy good enough?

- Exit criteria cannot be exactly defined
- Human factor based decisions



- Number of objects
- Distance to object
- Angle to object
- Position of object
- Variations of same type objects
- Light intensity
- Camera height
- Font color
- Movement destination
- Movement speed

- True positive – correct detection of object
- False positive (false detection) – detection of an object when there is none
- False negative – case when AI misses to detect an object



- Impossible to avoid 100%
- Cause precision issues

- Nothing detected after changing camera height
- Nothing detected after moving into new office



Use as many different conditions as possible



Thank you!!!