NUS-ISS

Problem Solving Using Pattern Recognition

Deep learning: Identify

by Nicholas Ho

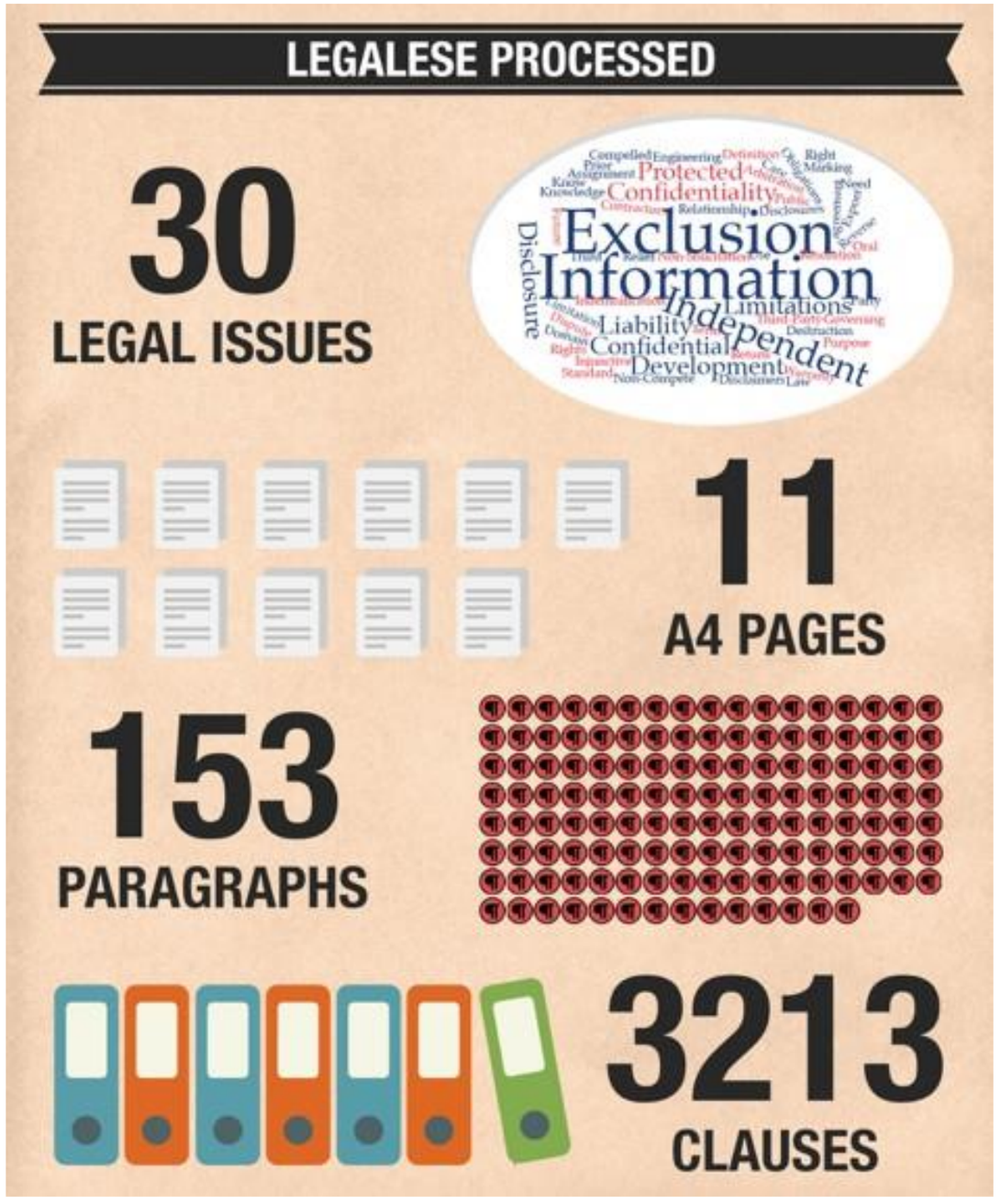
How deep learning is used to identify: Use cases

Lawyers vs AI

Spotting the risk in NDA

4 HOURS

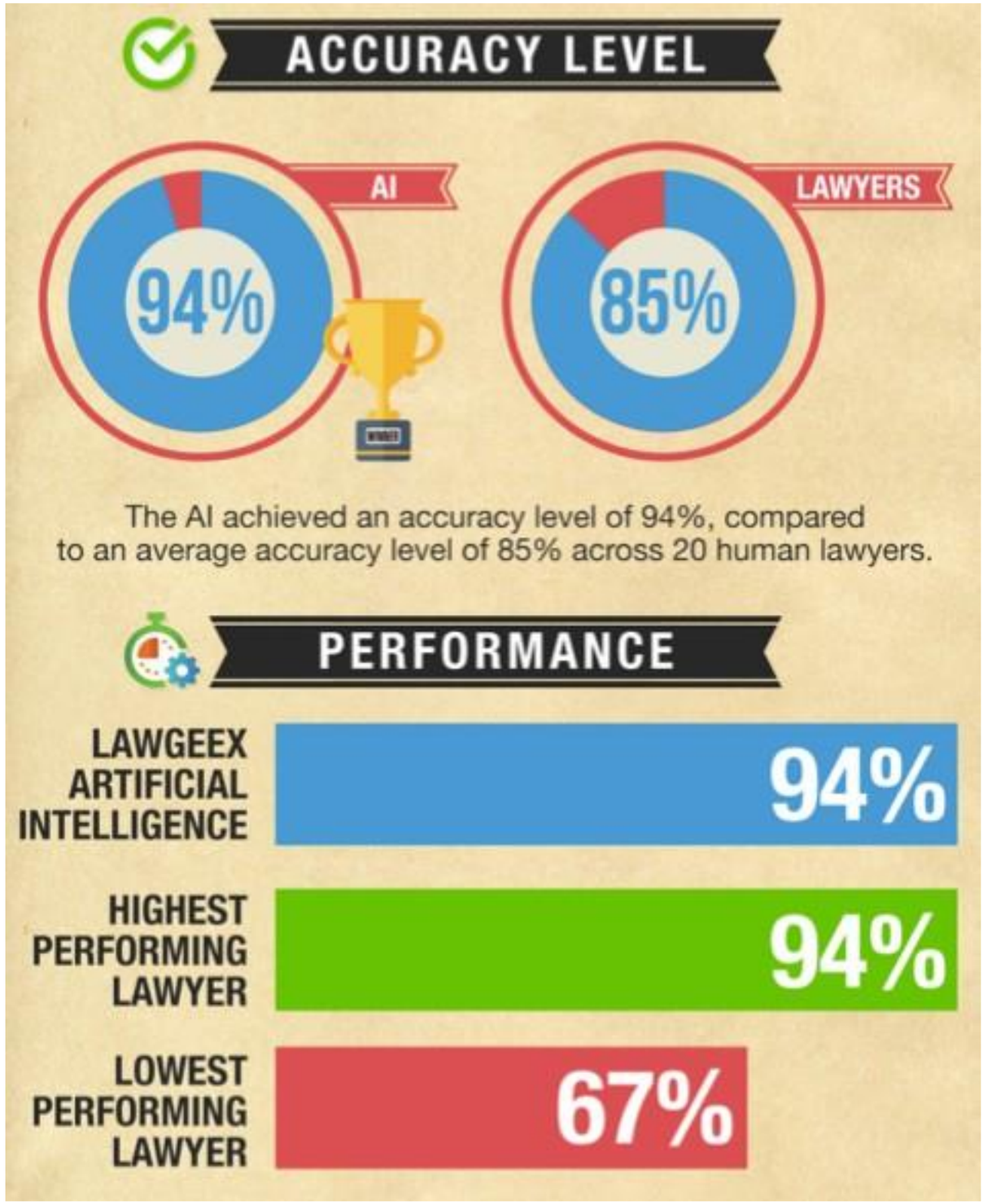
20 lawyers with experience reviewing contracts at compaines including Goldman Sachs, Cisco and etc.



Source: https://www.lawgeex.com/resources/AIvsLawyer/

Lawyers vs AI

Spotting the risk in NDA



It took an average of **92 minutes** for the lawyers to review all 5 NDAs. In contrast, it took the AI a total time of **26 seconds** to review all 5 NDAs

Source: https://www.lawgeex.com/resources/AIvsLawyer/

To spot unfair clauses?

Claudette comes to rescue

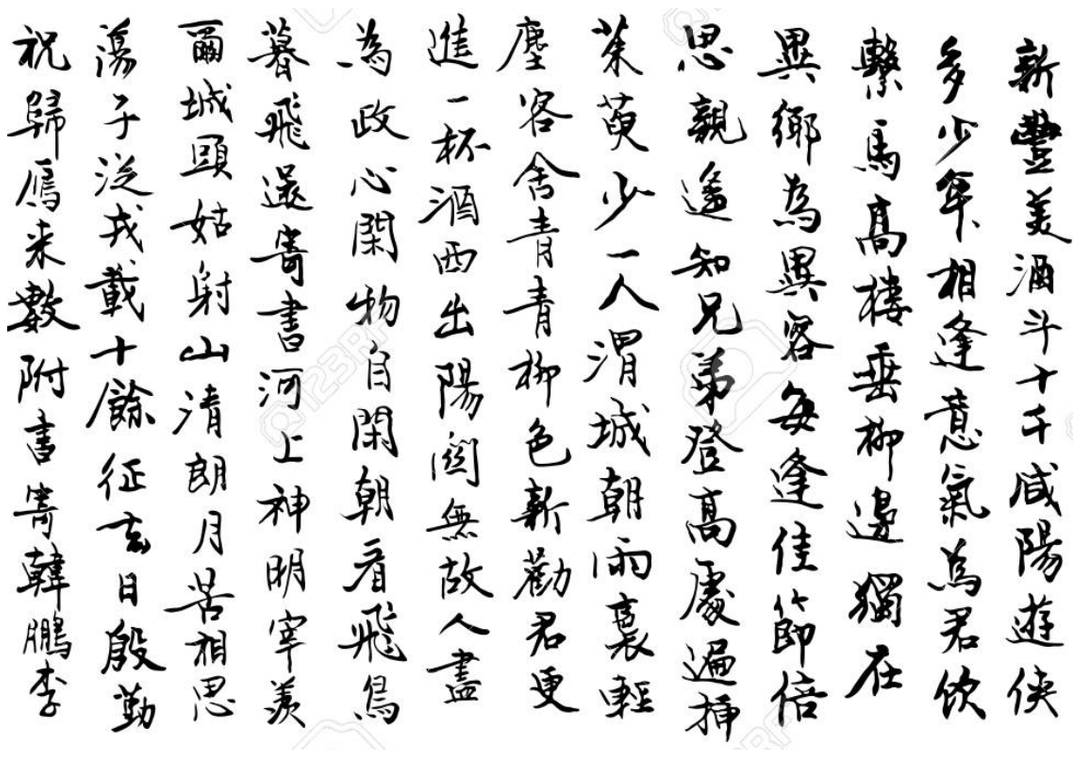
- Visit http://claudette.eui.eu/use-our-tools/index.html

Source: https://arxiv.org/pdf/1805.01217.pdf

Character recognition

The challenge at Apple

- The number of symbols for alphabet-based writing: on the order of 100 symbols
- Chinese characters: at least 27,533 entries



Source: https://en.wikipedia.org/wiki/MNIST_database#/media/File:MnistExamples.png

Source: https://www.123rf.com/photo_106486597_stock-vector-vector-background-with-handwritten-chinese-characters-asian-calligraphy-illustration-traditional-bla.html

Character recognition

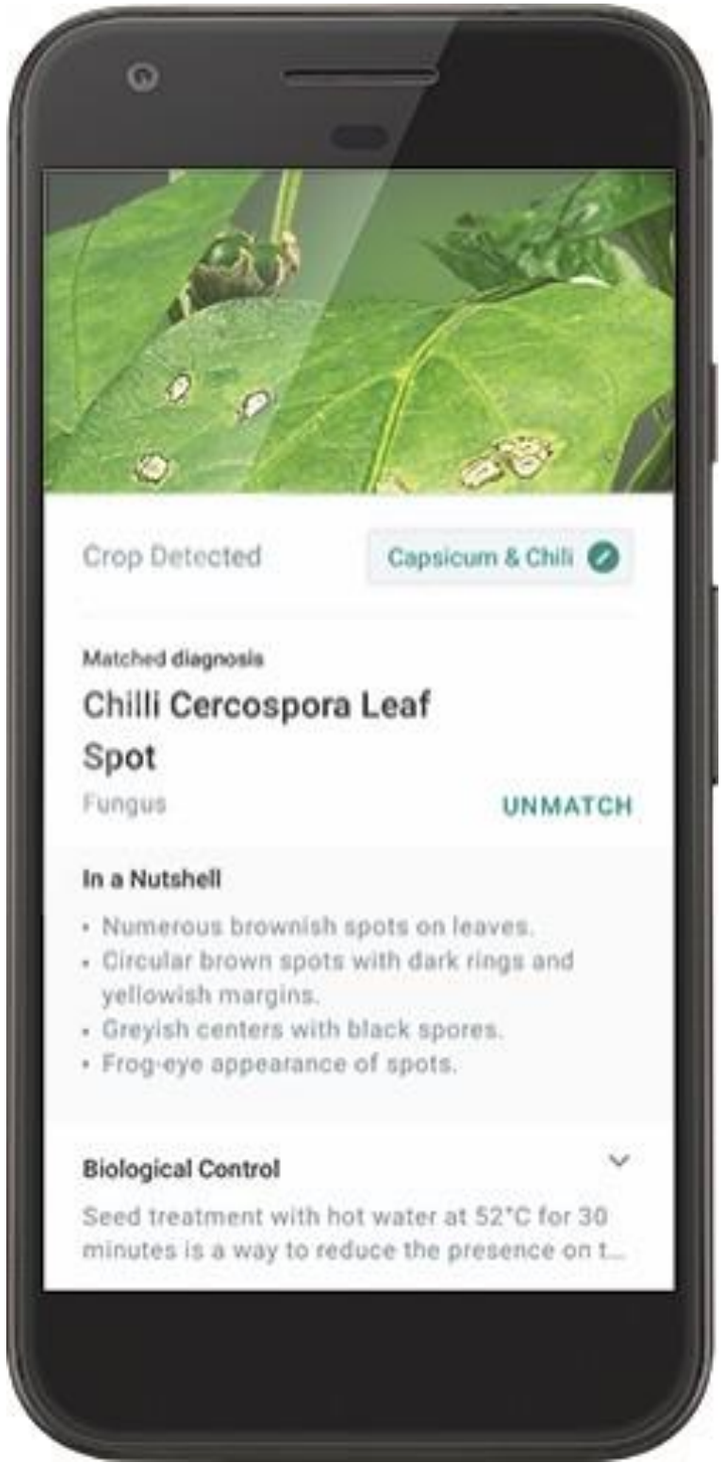
The challenge at Apple

- Requirements: recognize 30,000 handwritten characters in real-time
- Constraint: small memory / processing footpring
- No lag in response yet with good accuracy

Source: https://machinelearning.apple.com/2017/09/12/handwriting.html

Plants' disease

Better detection



Source: https://plantix.net/en

Product search

For shopping

Source: https://twitter.com/mbrennanchina/status/1183717500803932160?s=20

Custom sorter

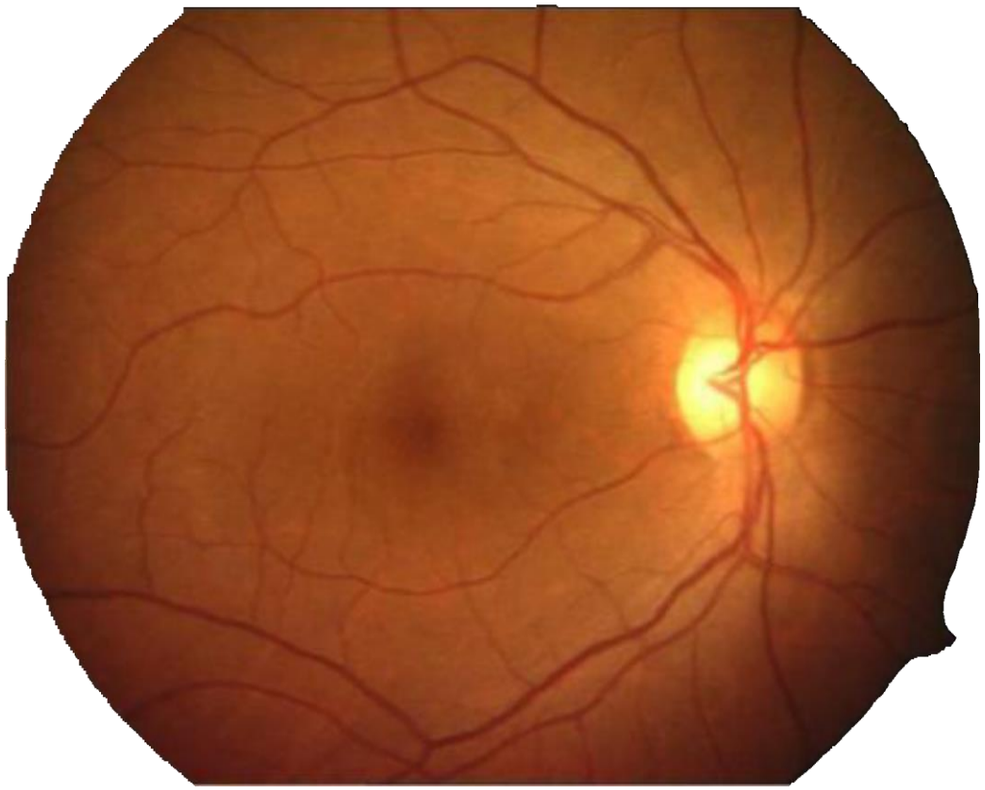
Sort your own items

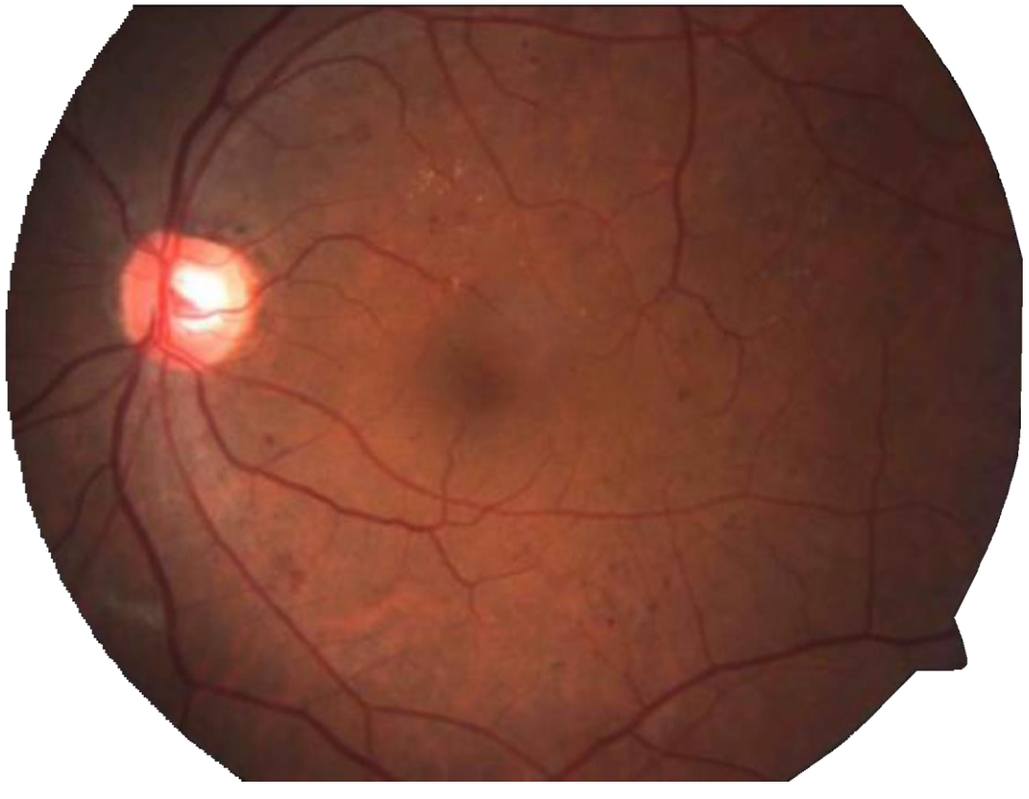
- Allow custom sorting using your own labelled images

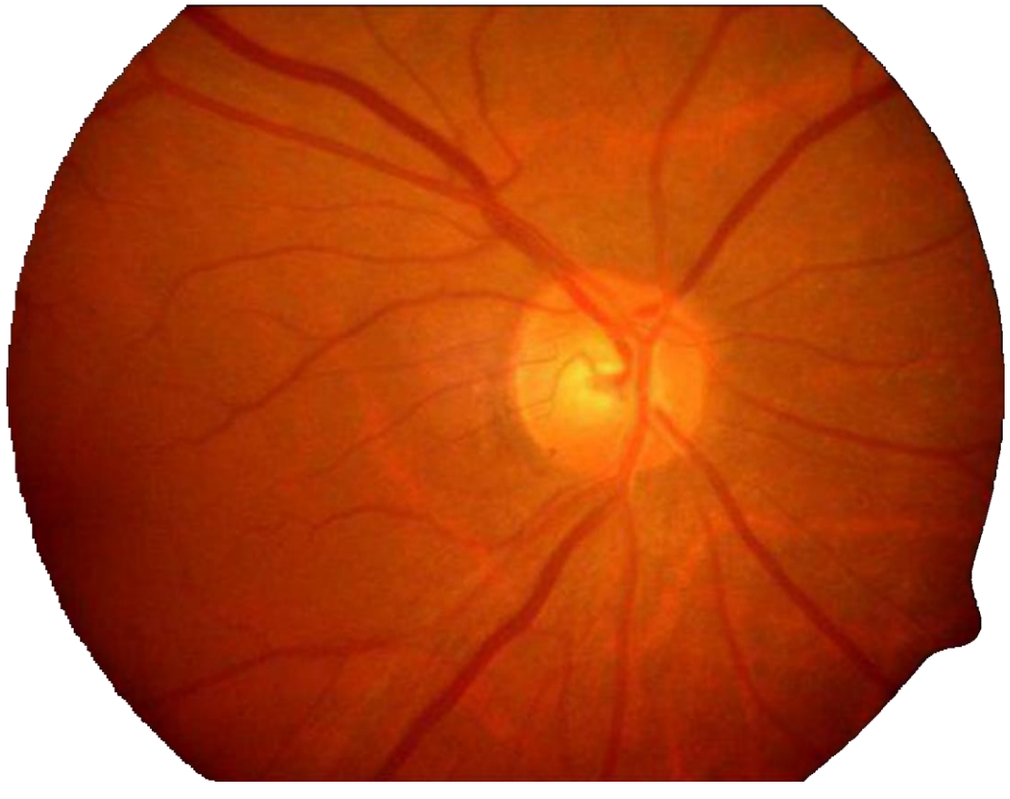
Source: https://www.refind.se/refind-sorter

Automated diagnosis

On our eyes







Automated diagnosis

On our eyes

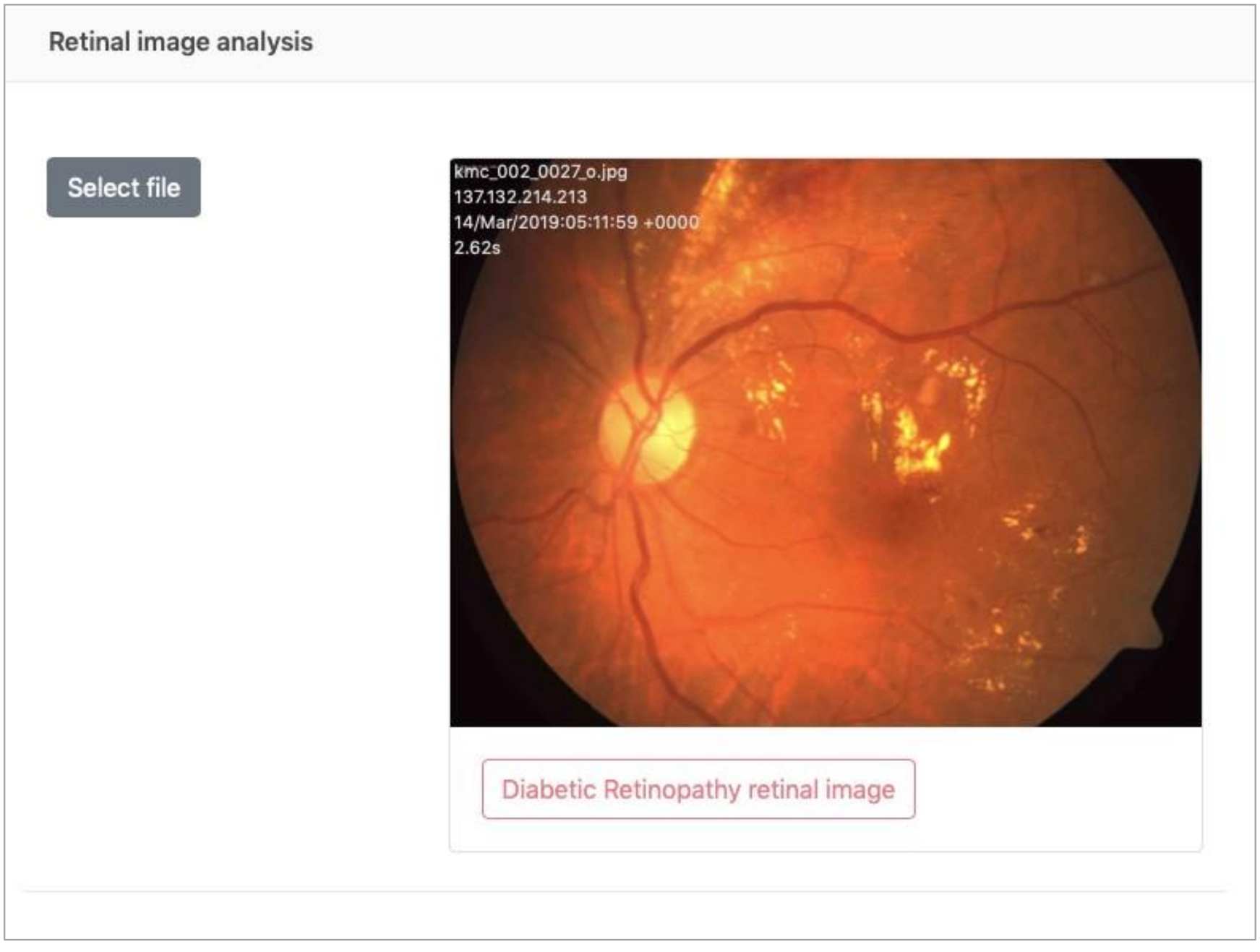
- Key objective: not to replace doctors, but to improve early discovery
- Intended to place such system in family clinic or polyclinic
- Such system does first-line check-up, makes referal, reduce hospital / specialist load

- In third world countries, improve medical care in rural areas (lack of doctors)

Source: https://www.eyefficient.com/product/hand-held-fundus-camera/

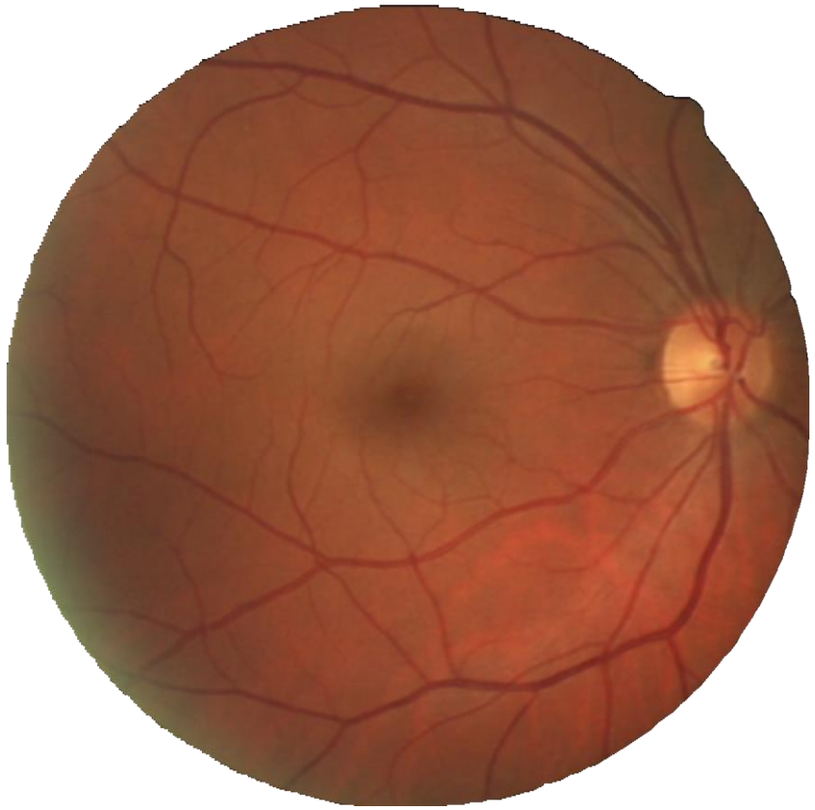
Automated diagnosis

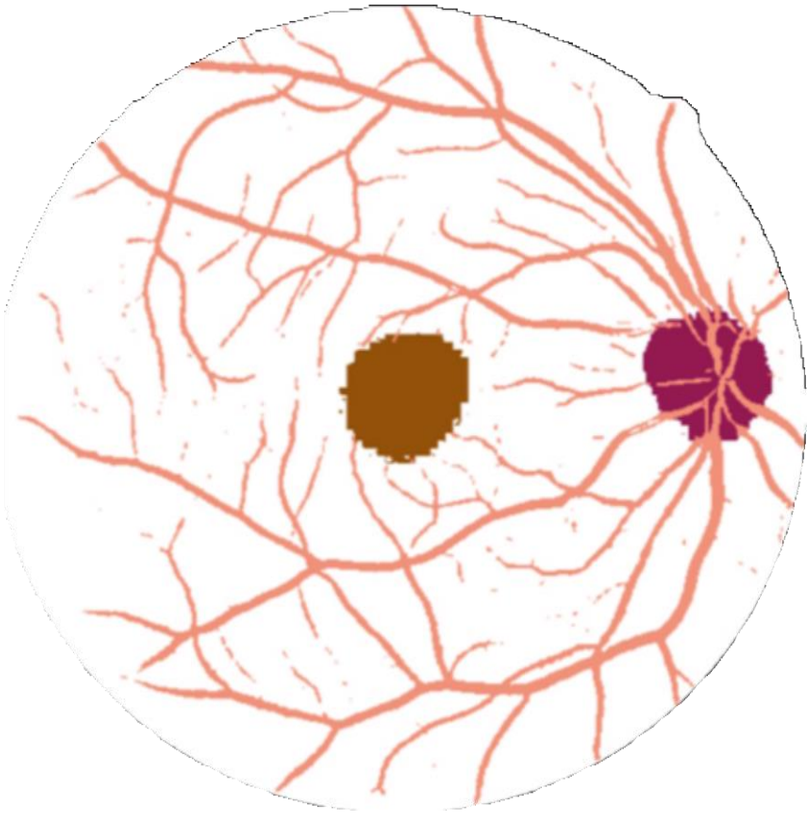
On our eyes

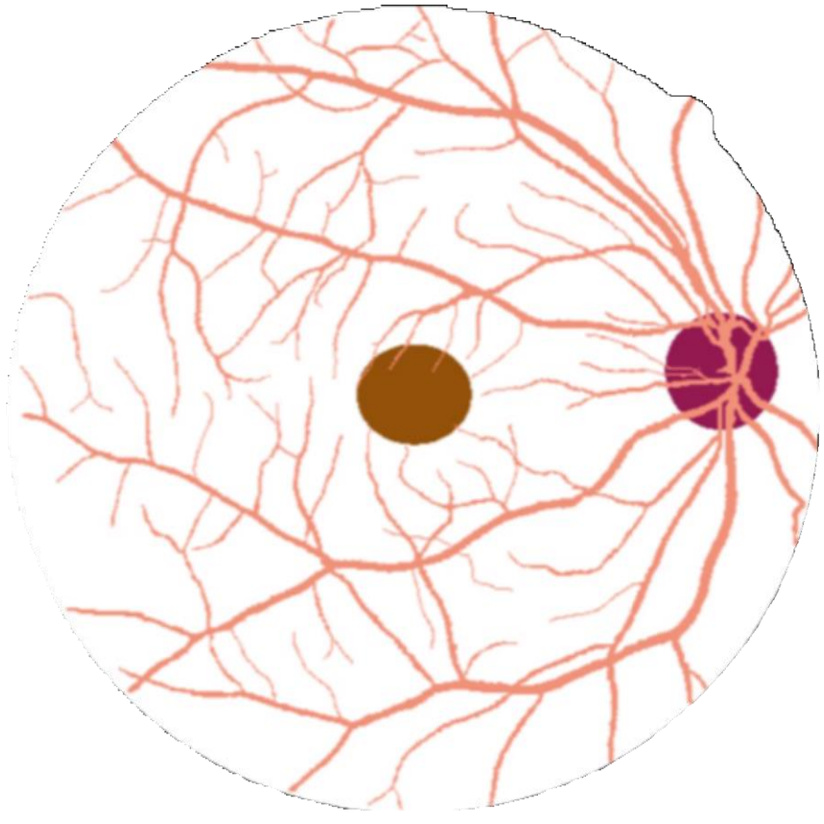


Automated segmentation

On our eyes



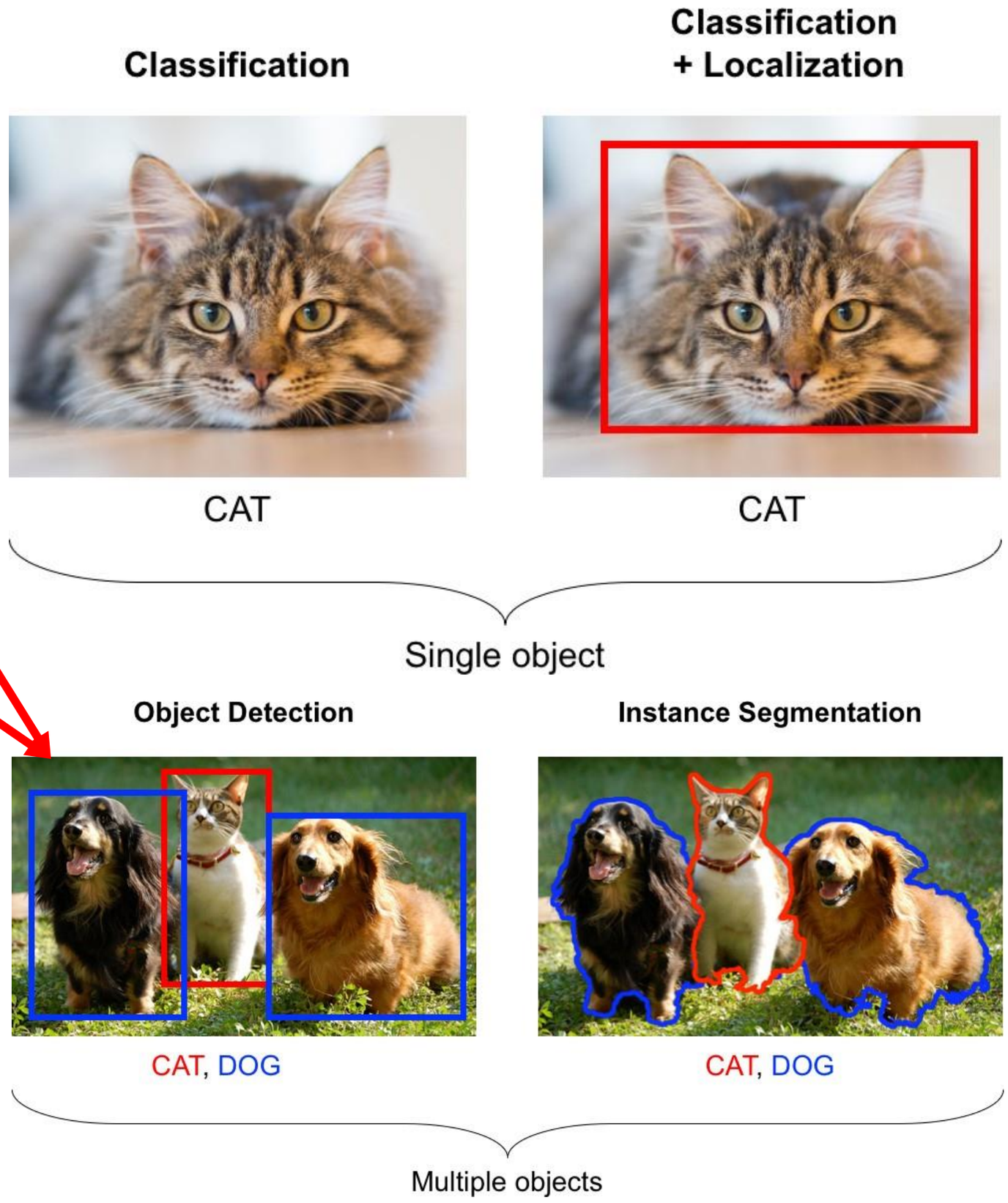




When it comes to vision ...

A few things to note

- **Classification by itself will get confused if there are other objects inside the image**
- **Hence, we require localization to draw a bounding box (or bbox) to separate the target object and other objects**

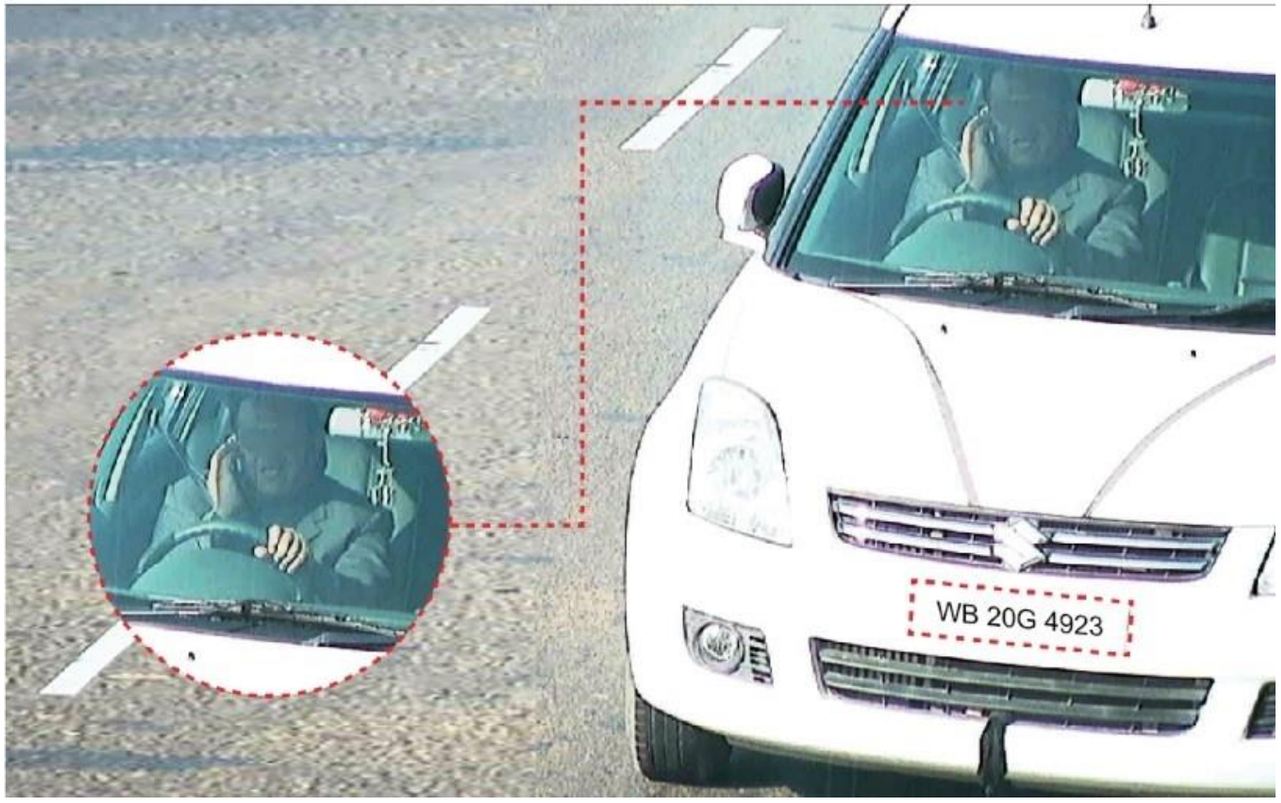


Source: Deep Learning for Computer Vision by Rajalingappaa Shanmugamani

Object detection

Identify traffic offences

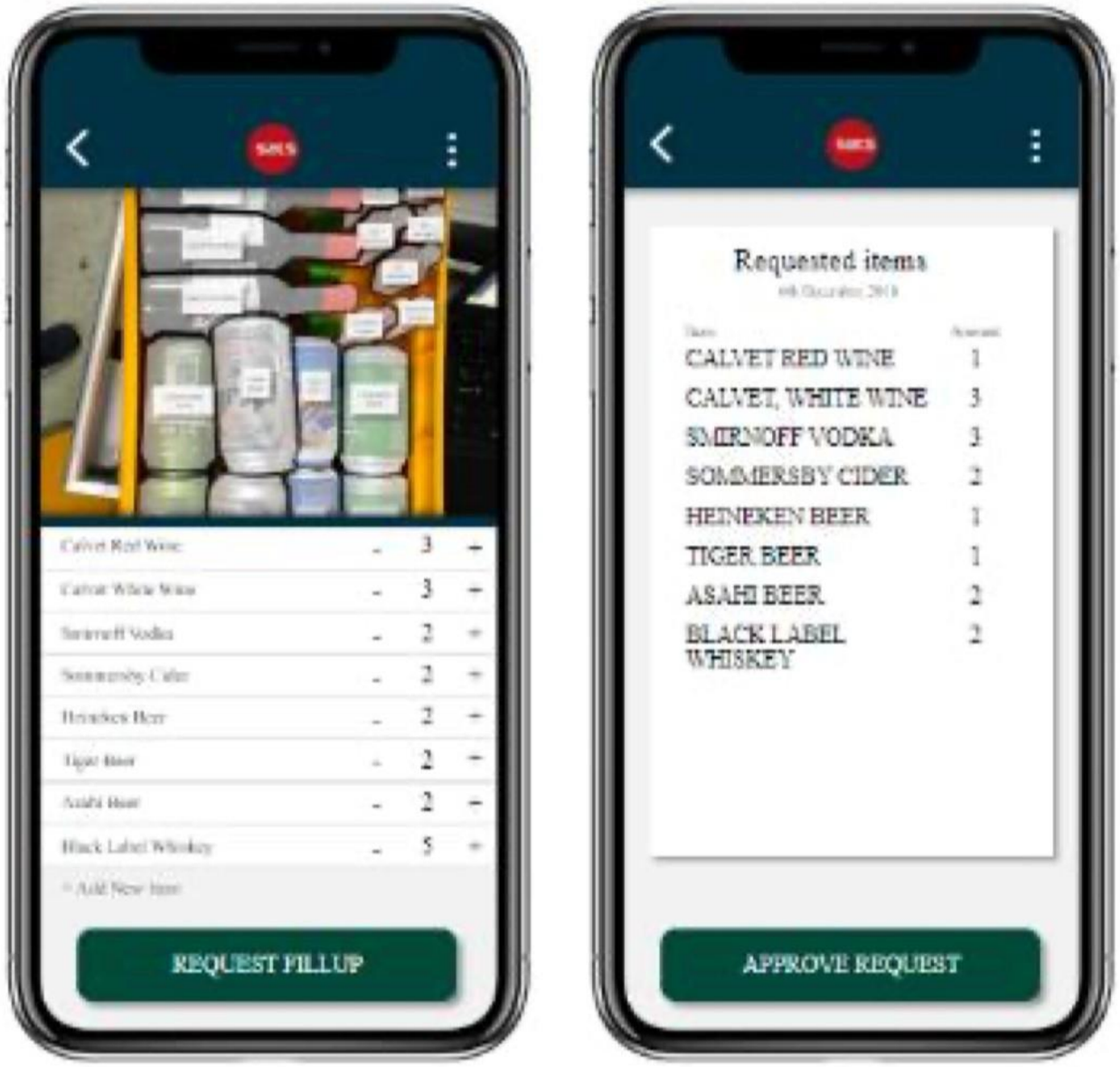
- NO seat belt detection
- Using-phone-while-driving detection



Source: https://www.sourcesecurity.com/news/videonetics-artificial-intelligence-deep-learning-no-seat-belt-detection-co-4403-ga-npr.1551018780.html

Airline catering

Check the correct items



Source: SATS

Object detection

For autonomous vehicle

Source: https://www.pond5.com/stock-footage/83053263/autonomous-or-driverless-car-computer-vision-object-detectio.html

Volvo in-car cameras

Combat distraction and drunk driving

- 'Pro-active' driver monitoring system

Source: https://www.caranddriver.com/news/a26893035/volvo-interior-cameras-distraction-drunk-driving/

Aircraft

Monitoring check-in

_Learn more

Source: https://assaia.com/tmc/

Tracking hands

in real time

▶ Play Video

Source: https://victordibia.github.io/handtrack.js/#/

Behaviour identification

by Aipoly

Source: https://www.aipoly.com;
https://www.youtube.com/watch?v=t33G77R7FJQ

Object detection

Auto referee?

- Track ball and players
- Report score based on the events in scene

Source: https://arxiv.org/abs/2004.09927;
https://www.youtube.com/watch?v=5P3k5ZCDcq8