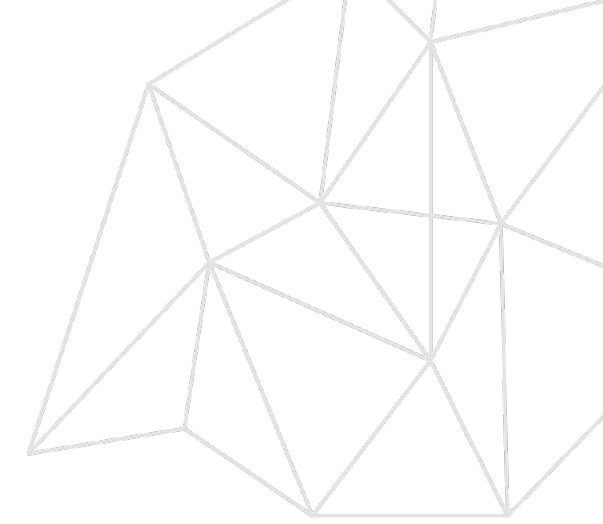


Dr. Ivan Reznikov

How do computers see? (mini-version)

Successes and challenges of computer vision





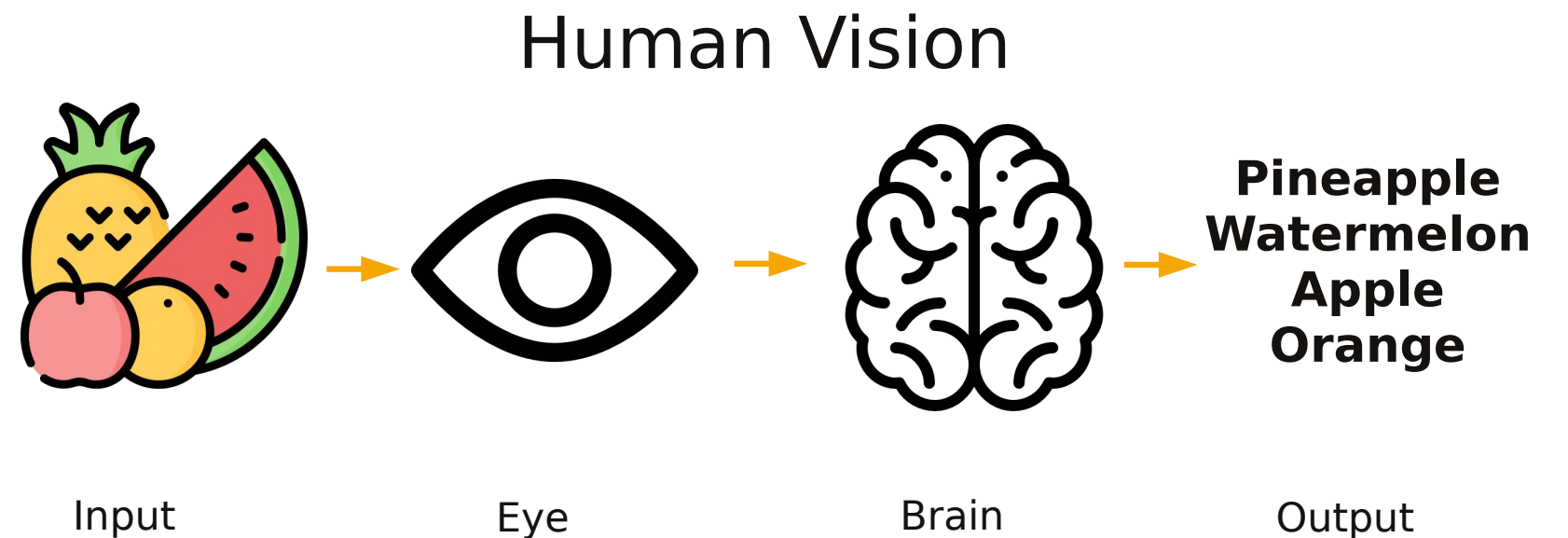
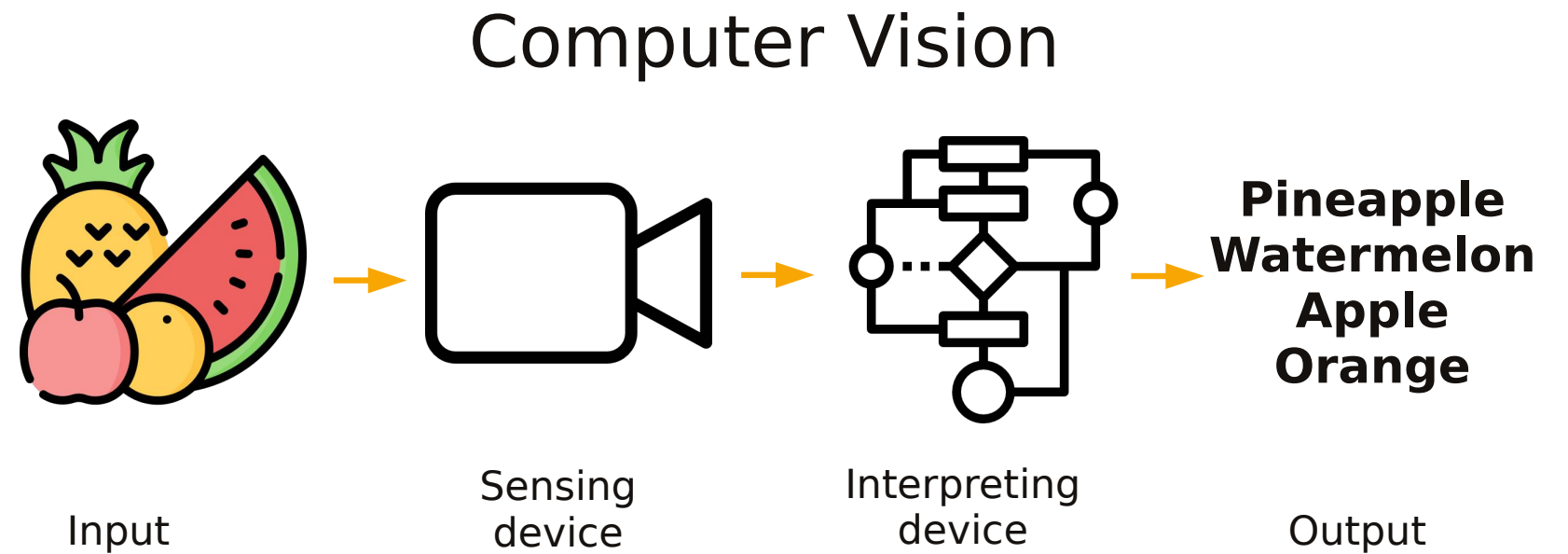
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Ph.D., 10+ years experience in Data Science and Software Development.
Kaggle Expert.
Speaker @ TEDx, PyCon.
Lecturer @ Belarusian state university, Middlesex University Dubai.



01 What is Computer Vision?





02

Successes and Challenges

Brief history of Compute Vision



1960-1980

First steps in understanding concepts of Artificial Intelligence

1963 – Computers were able to interpret the tridimensionality of a scene from a picture

1974 – Optical character recognition (OCR) was introduced



1980-2000

Machine Learning begins to flourish

1980 – hierarchical multilayered neural network capable of robust visual pattern recognition was created [Neocognitron]

2000 – Studies on object recognition increased leading to first real-time face recognition application.



2000-...

2009 – ImageNet data containing millions of tagged images across various object classes was made available.

2012 – CNN showed great promise, as Deep Learning models reduced the computer vision error significantly

2014 – generative adversarial network were introduced for the first time, leading to “Deep Fake” applications in computer vision.

2019 - Optimized, lightweight AI computer vision models realized on low-cost hardware and mobile devices



03

How do computer see?

There are several main tasks of computer vision that are constantly solved

Semantic Segmentation



CAT GRASS
TREE

No object
Just pixels

Classification



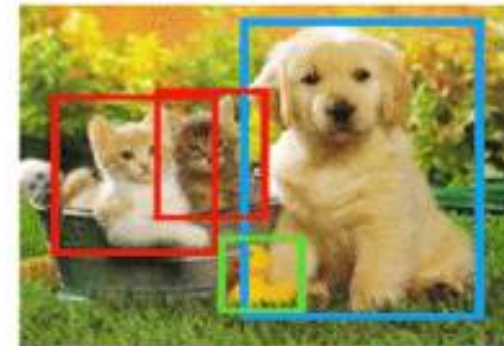
CAT

**Classification
+ localization**



CAT

Object detection



CAT DOG DUCK

Instance segmentation



CAT CAT DOG DUCK

Single object

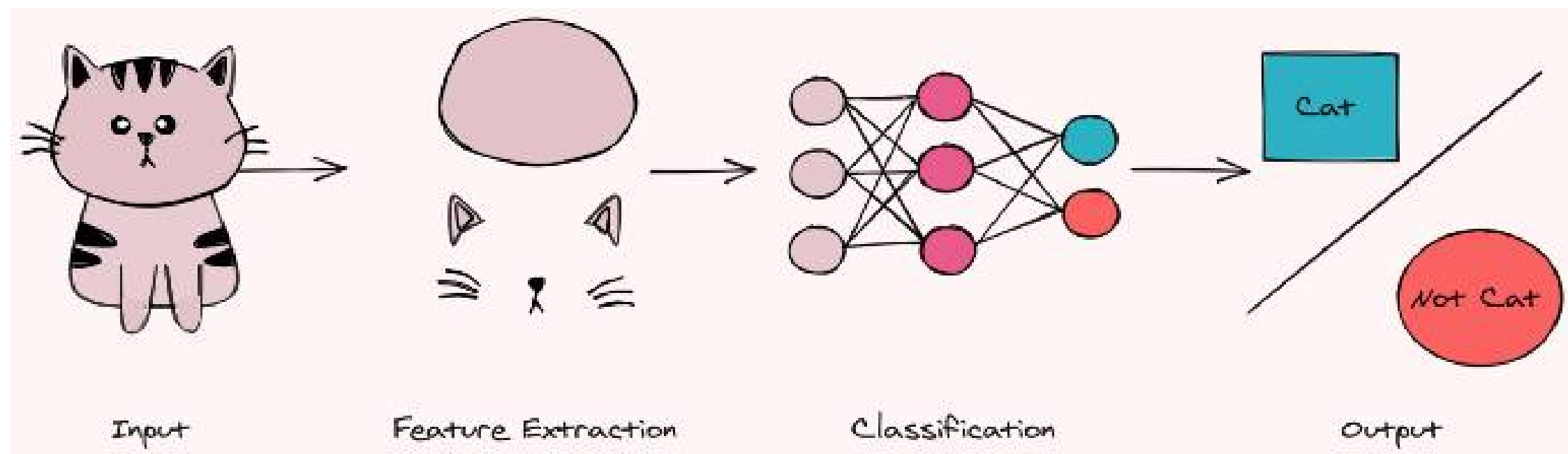
Multiple objects



03 How do computer see?

Summing up:

Our CNN first extracts features from an image and classifies the image based on the features extracted.





04 What's next?

Pre-COVID19



COVID19



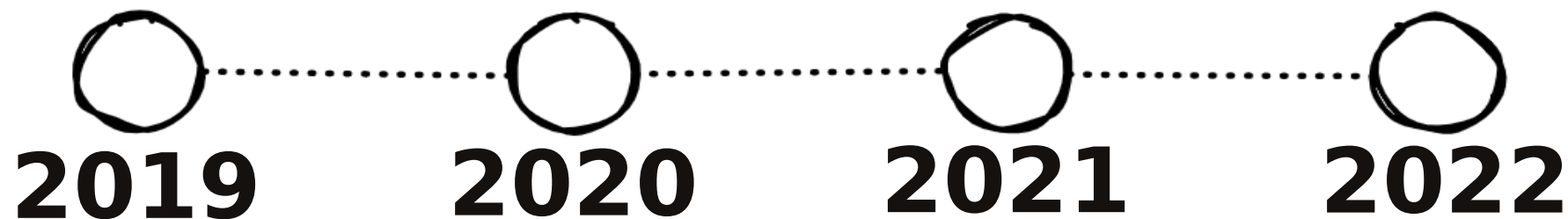
Use Face ID with a Mask

Face ID is most accurate when it's set up for full face recognition only. To use Face ID while wearing a mask, iPhone can recognise the unique features around the eye area to authenticate.

[About Face ID & Privacy...](#)



Use Face ID with a Mask
You won't need to wear a mask during setup. >





04

What's next: Generative Adversarial Networks



A clock in the style of a pikachu



05 Bonus: Shar-pei or not shar-pei?

