

Computer Vision Application

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Introduction

- **Computer Vision** is a branch of computer science concerned with recognizing objects automatically, extraction, analysis and understanding of useful information from a single image or sequence of images

Extract information from images

- Minsky said “*Connect a camera to a computer and do something with it*” to Sussman MIT- Artificial Intelligence Group (**1966**)
- Breakthrough happened in **2012** in particular **Convolutional Neural Networks (CNN)**



Introduction

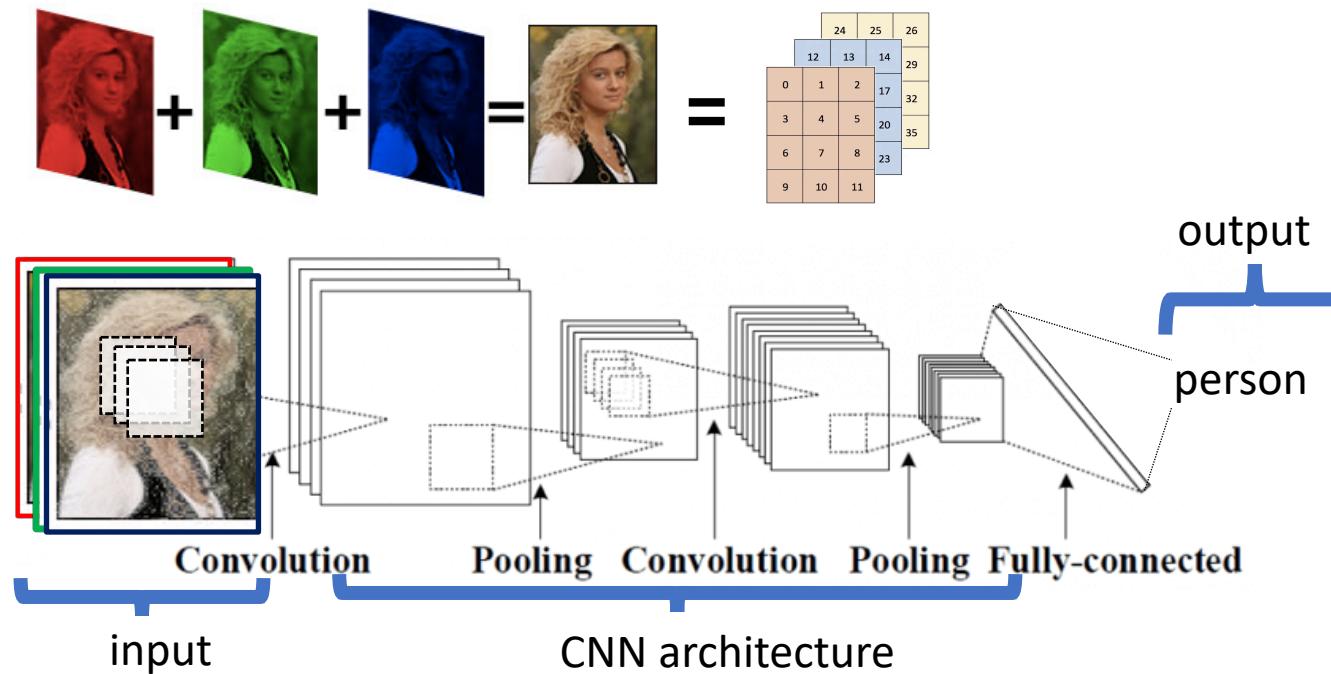
- **CNN** powerful machine learning algorithms for processing images
- Image as data - array of numbers (as seen by computers)



Source: <http://www.adsell.com/scanning101.html>



Introduction



Primary Goal: Enable machines see the visual world and interpret it the way **human would**



Computer vision task

- Image classification
- Image classification with localization
- Object recognition
- Object segmentation
- Image style transfer
- Image colorization
- Image reconstruction
- Image super-resolution
- Image synthesis



Computer vision task

Types

- Image Classification
- Image Classification with localization
- Object recognition
- Object segmentation

Image Style Transfer

Image Colorization

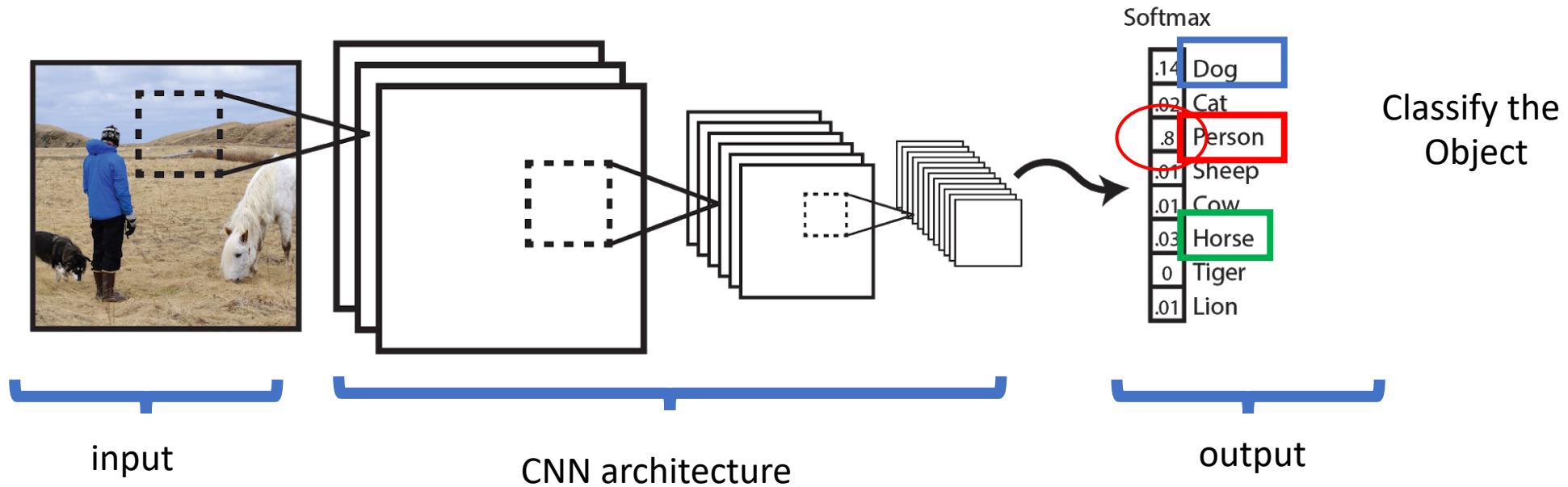
Image Reconstruction

Image Super-Resolution

Image Synthesis

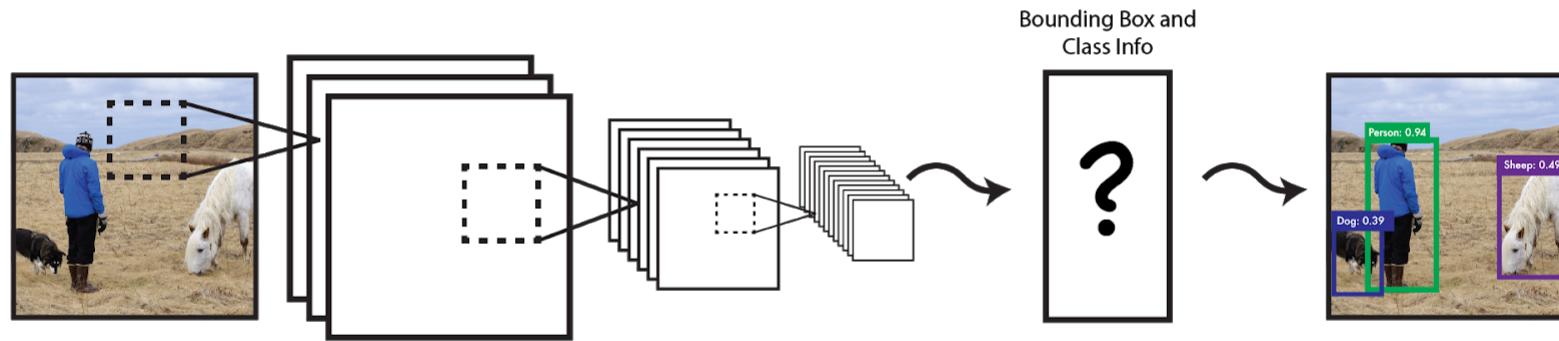


Image Classification



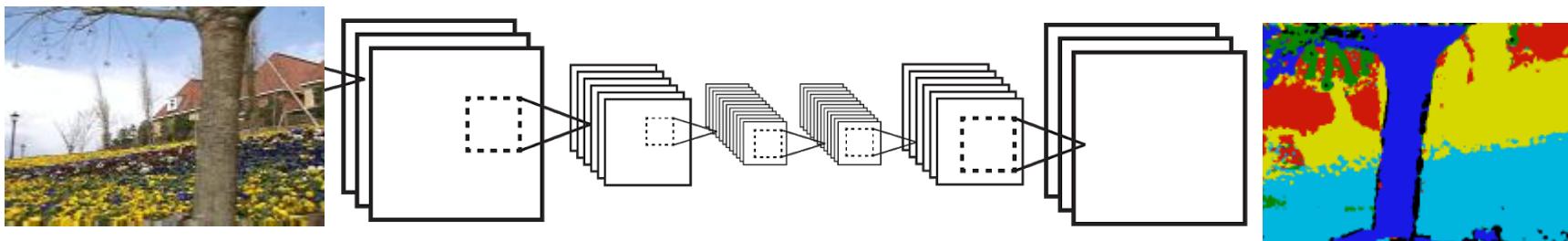
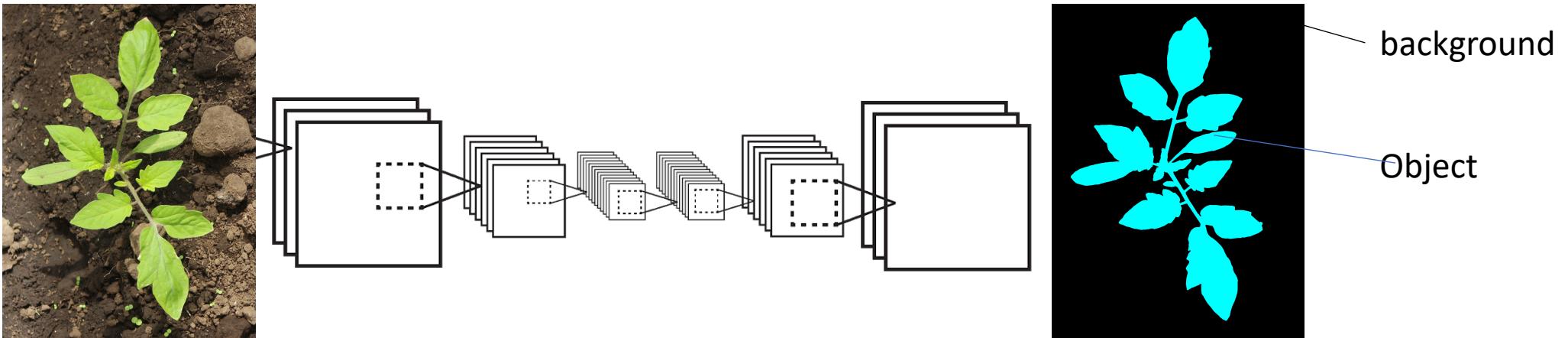


Object recognition



Predict the region of the
image where the
Object(s) is/are present

Semantic segmentation



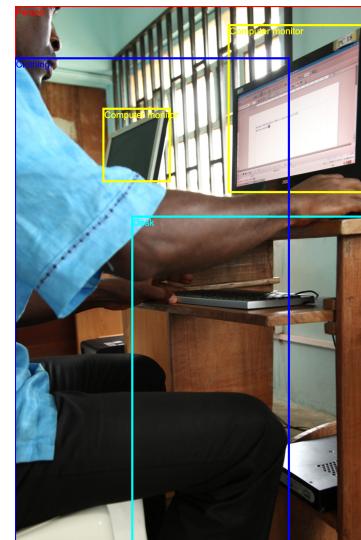
Source: Adelson, MIT

Challenges in CV

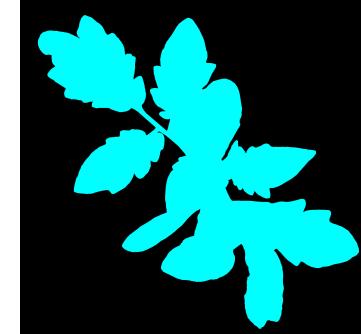
Illumination variation



Occlusion



Other
Deformation
Background clutter
Scale variation
Viewpoint variation





Application

- Autonomous vehicles
- Biometrics
- Character recognition
- Industrial quality inspection
- Face recognition
- Medical image analysis
- Pollution monitoring
- Process control
- Remote sensing
- Security and surveillance

Health

Early Retinal Tissue Damage Detection using Machine Learning -

Daniel Ajisafe – Ladoke Akintola Univ. of Technology

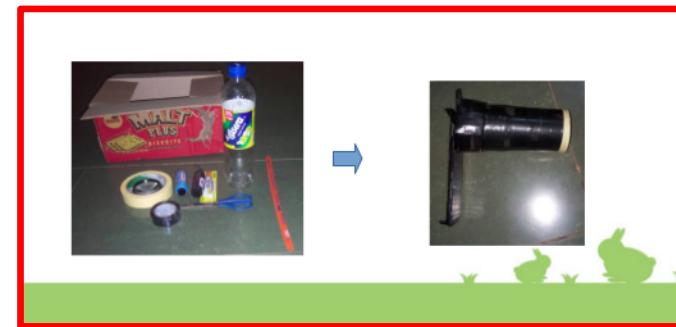
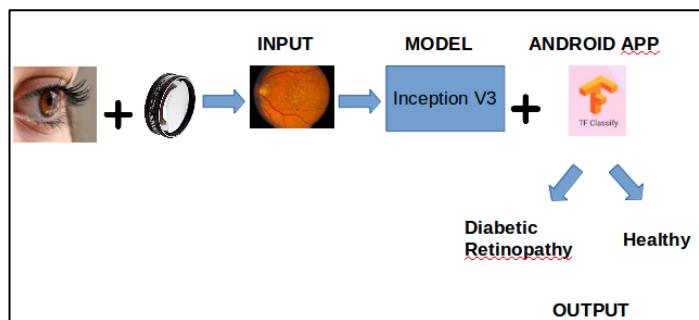
Goal

Classifier for Determine retinal tissue damage

400 fundus images in TIFF format –

Build custom fundus camera using empty bottle,

20D, lens, browncarton, paper cellotape and a black sunglass



Health

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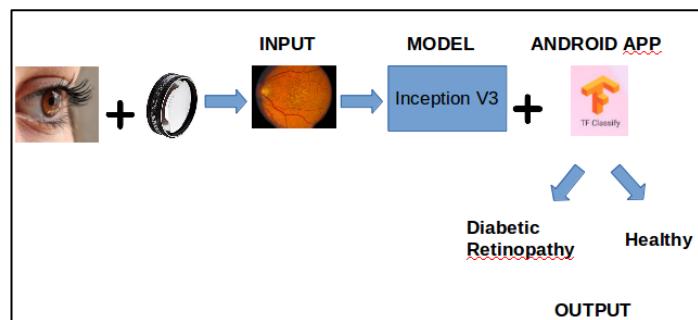
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Disease	Deaths	%
TB	28867	7.74
Influenza	39,020	10.46
HIV/AIDS	35,234	9.44
Coronary Heart Disease	19082	5.11
Diarrheal Diseases	29,645	7.95
Road traffic accidents	17,840	4.78
Cervical cancer	4,670	1.25
Prostate cancer	3,309	0.89
Lung disease	3,995	1.07
Birth Trauma	12,866	3.45

Source: <https://www.worldlifeexpectancy.com/country-health-profile/tanzania>

Transport

A deep Learning Approach For Automatic Traffic Accident Detection – Ahmed Mansour – University of Khartoum

To design a system capable of automatically detecting and reporting traffic accidents in real time from live traffic surveillance videos



Class	Train Frames	Test Frames
Accident	2,498	625
Normal	12,048	3,320
	14,546	3,945
Total	18,491	



Urban/Rural planning

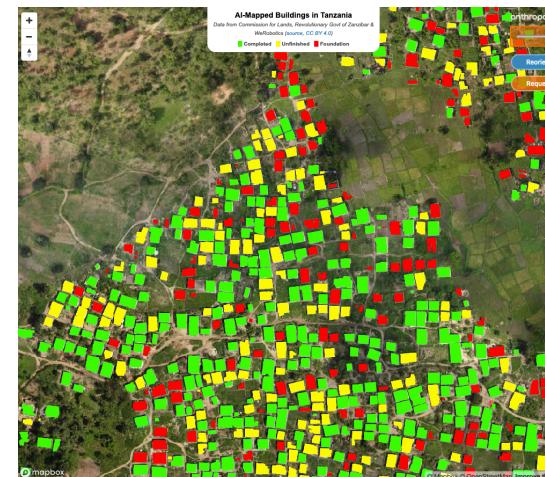
Open AI Challenge Tanzania

Feature detection algorithms that can automatically identify building and building types using high-resolution aerial imagery collected by drone.

-----SUZU, Tanzania Flying Labs, OpenDRI-----



input



output

Object detection
Segmentation

Source: <http://alpha.anthropo.co/znz-demo#>

Current work...

Early detection for early management and control of *T.absoluta*

Low damage



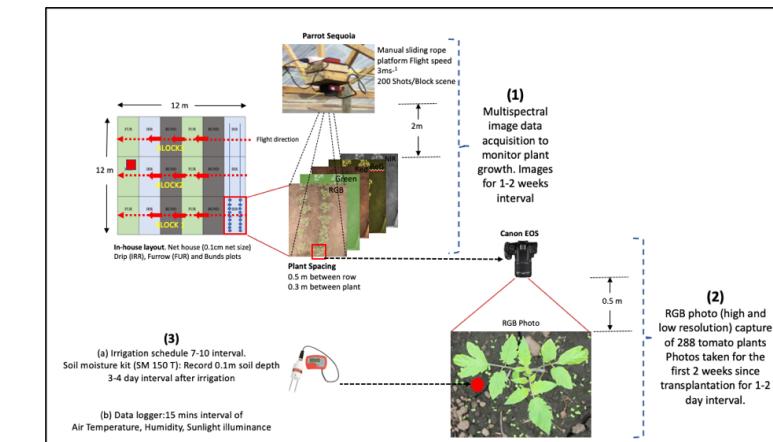
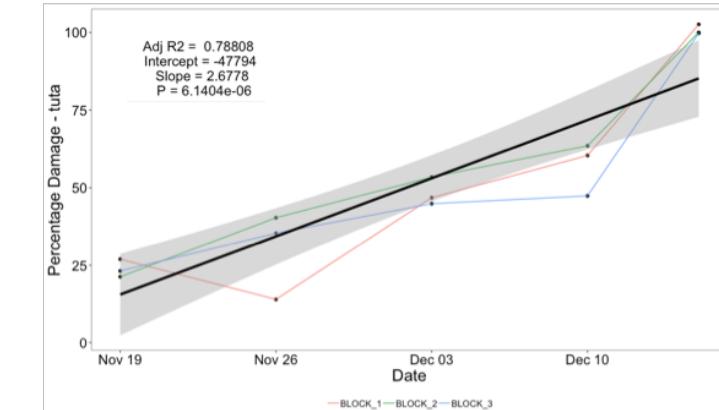
moderate damage



Very severe damage



T.Absoluta damage Trend



Schematic diagram for data collection

“Return man to the Farm”

YOKOI Tokiyoshi (1891)
Advocated



Thank for your attention

<https://denispastory.com/>



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