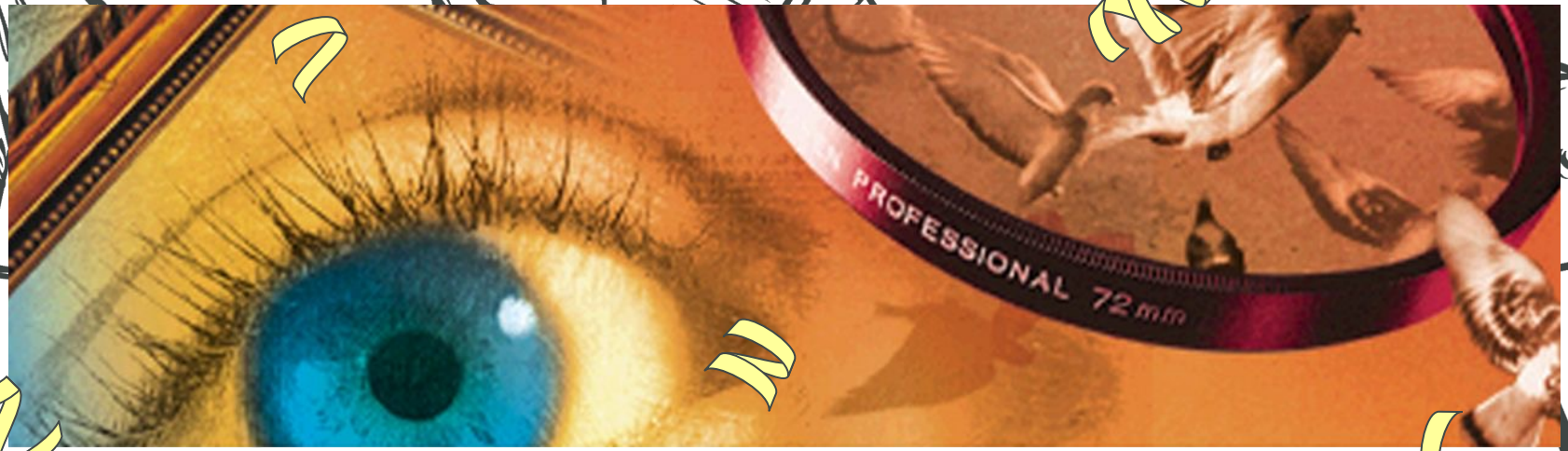

The World of Computer Vision

By Turki Alsaedi for Misk DSI 2022

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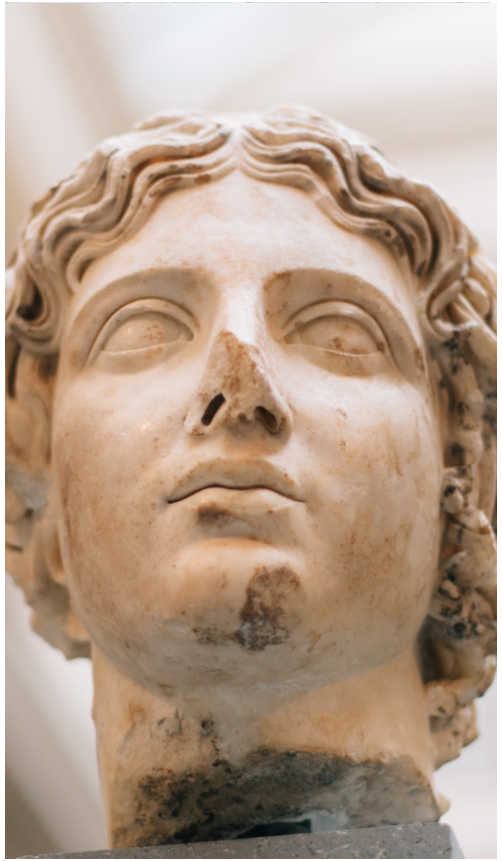
What is Computer Vision?

Computer vision is an interdisciplinary scientific field that deals with how computers can gain high-level understanding from digital images or videos.

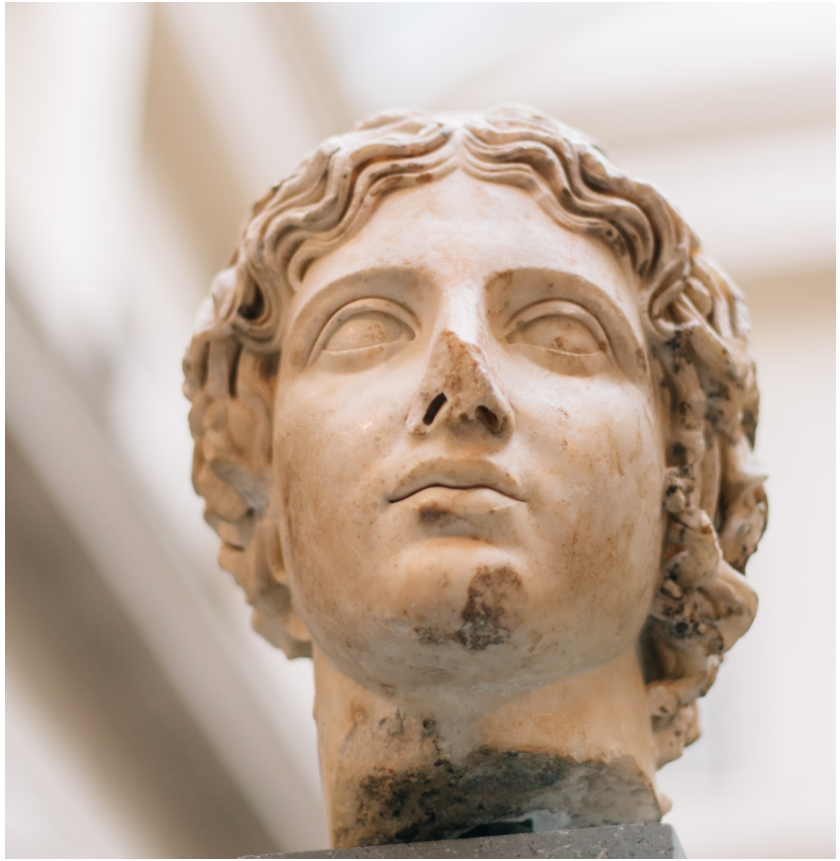
Computer vision aims to solve:

- Processing images and extracting information using context
- Making decisions using extracted information



[1][2]

How do machines see visuals?



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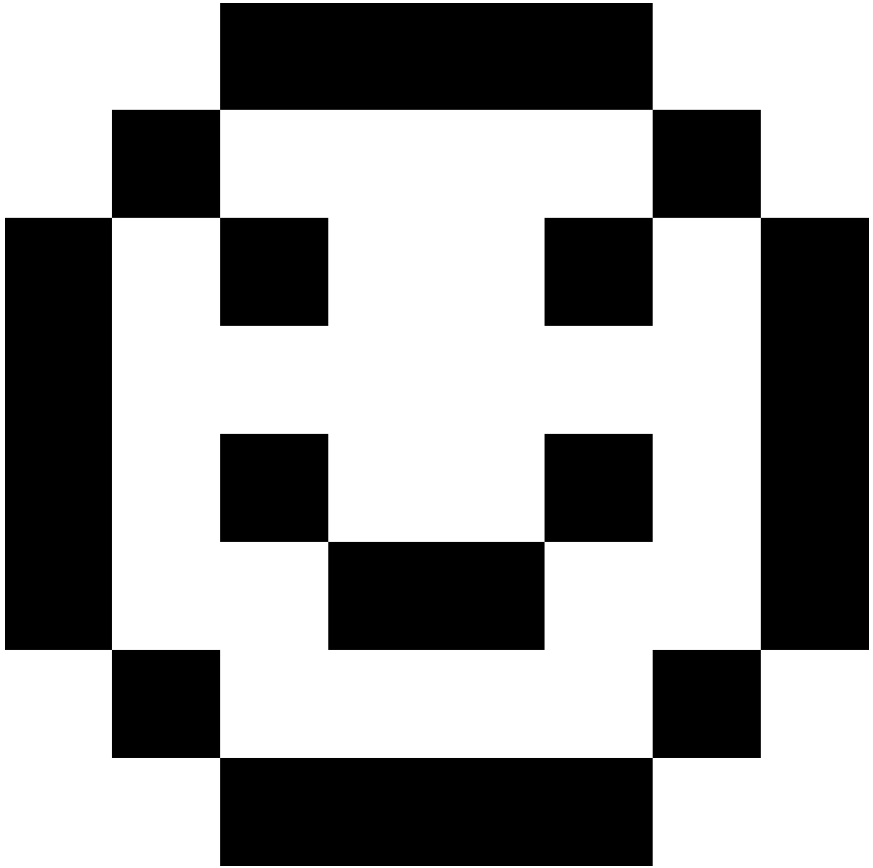

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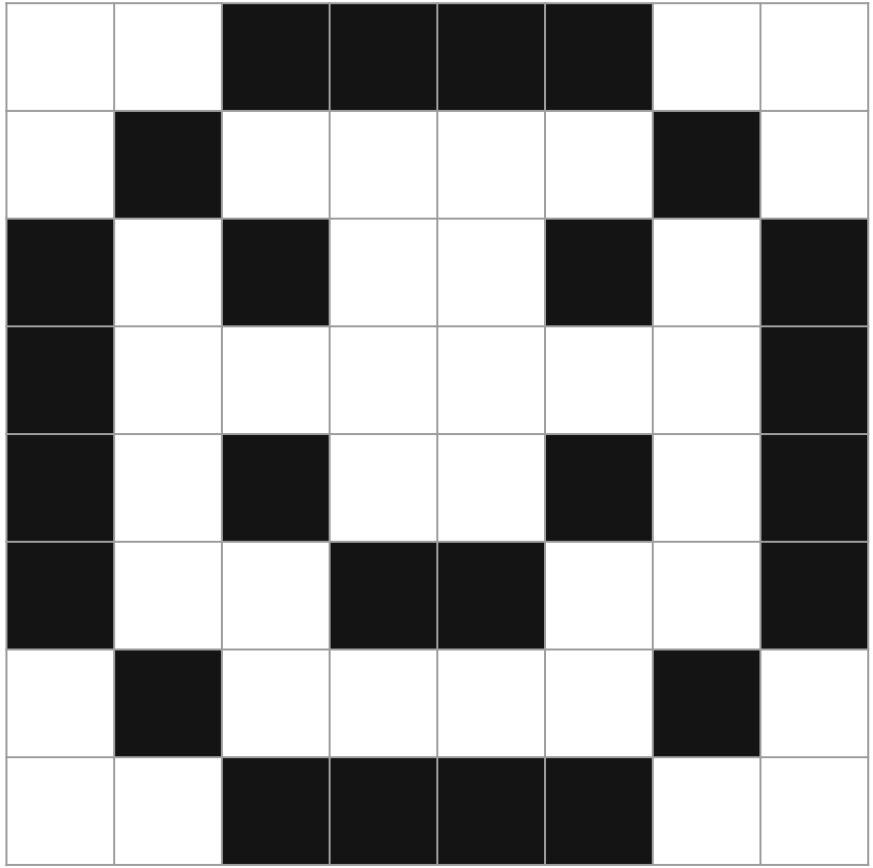

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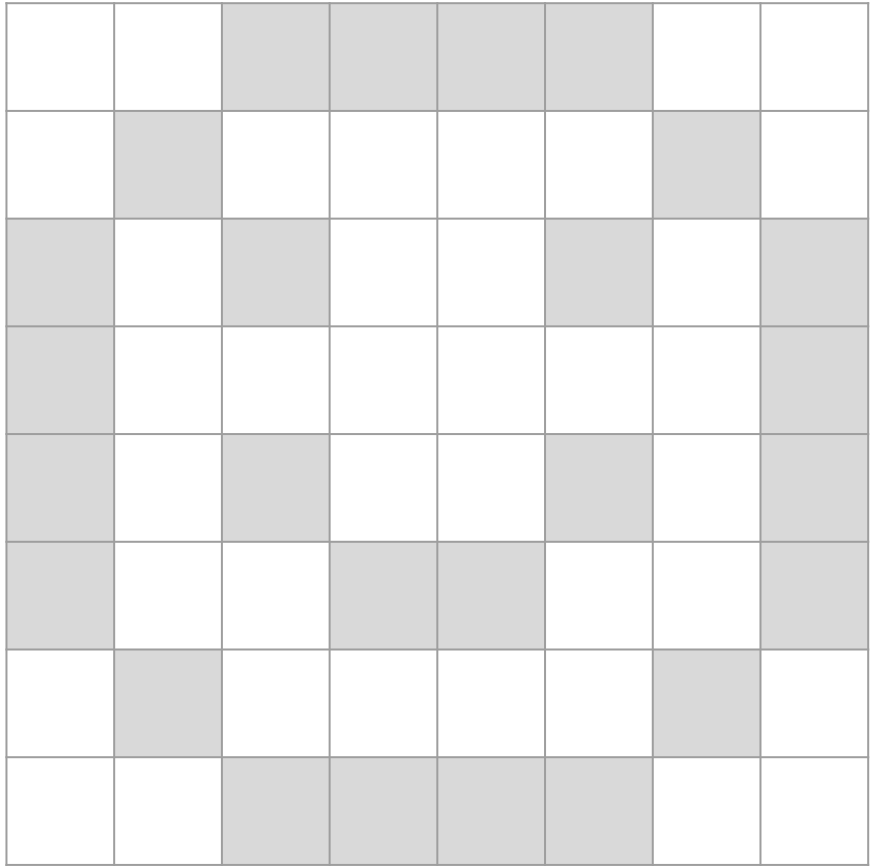

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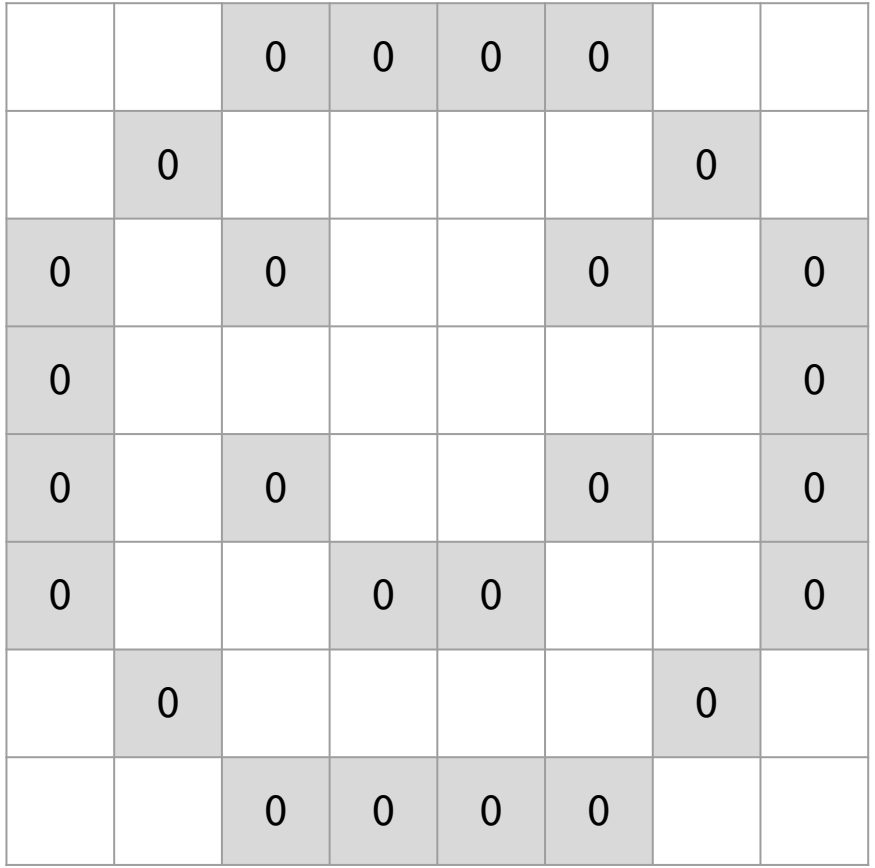

How do machines see visuals?

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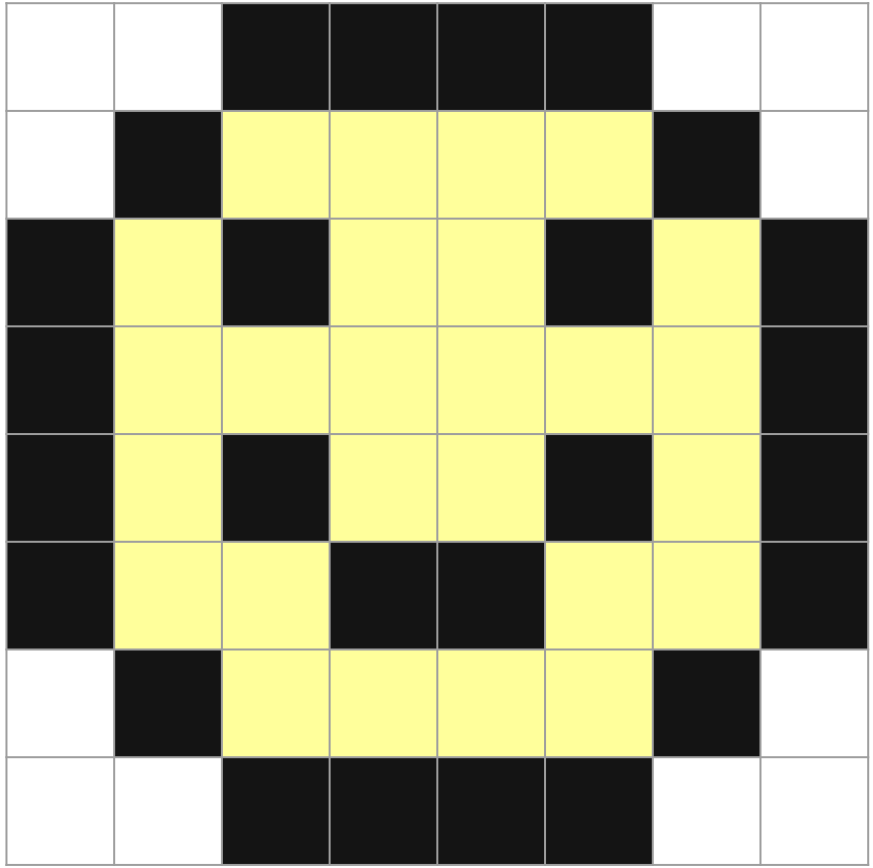
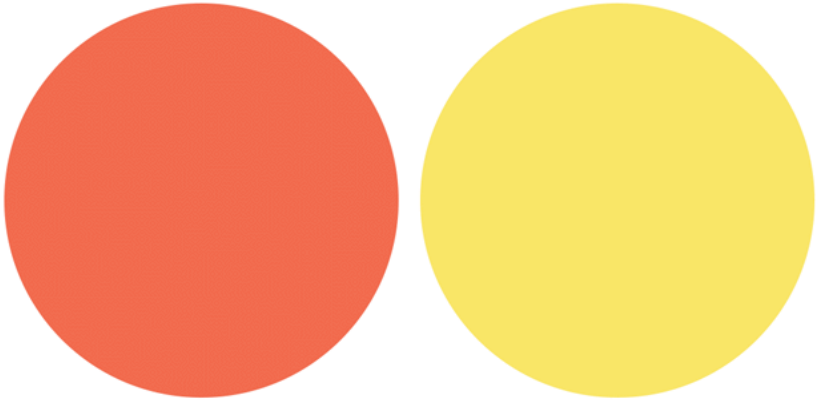
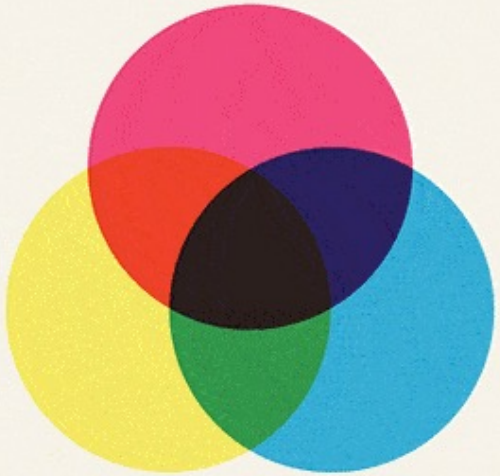
How do machines see visuals?







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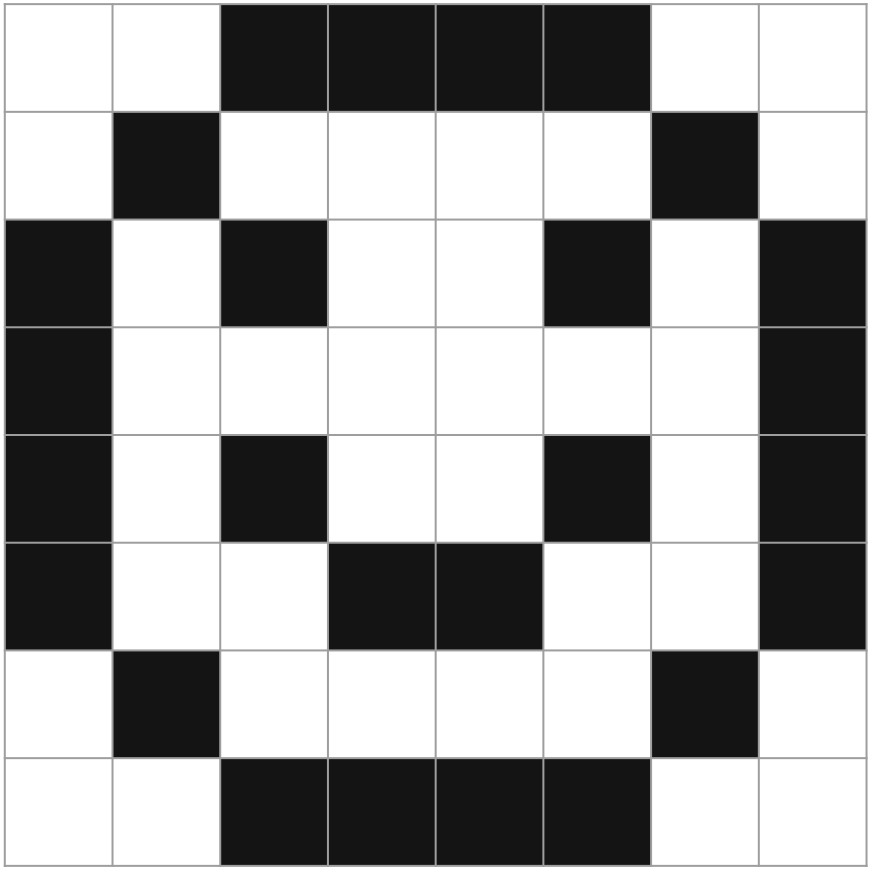

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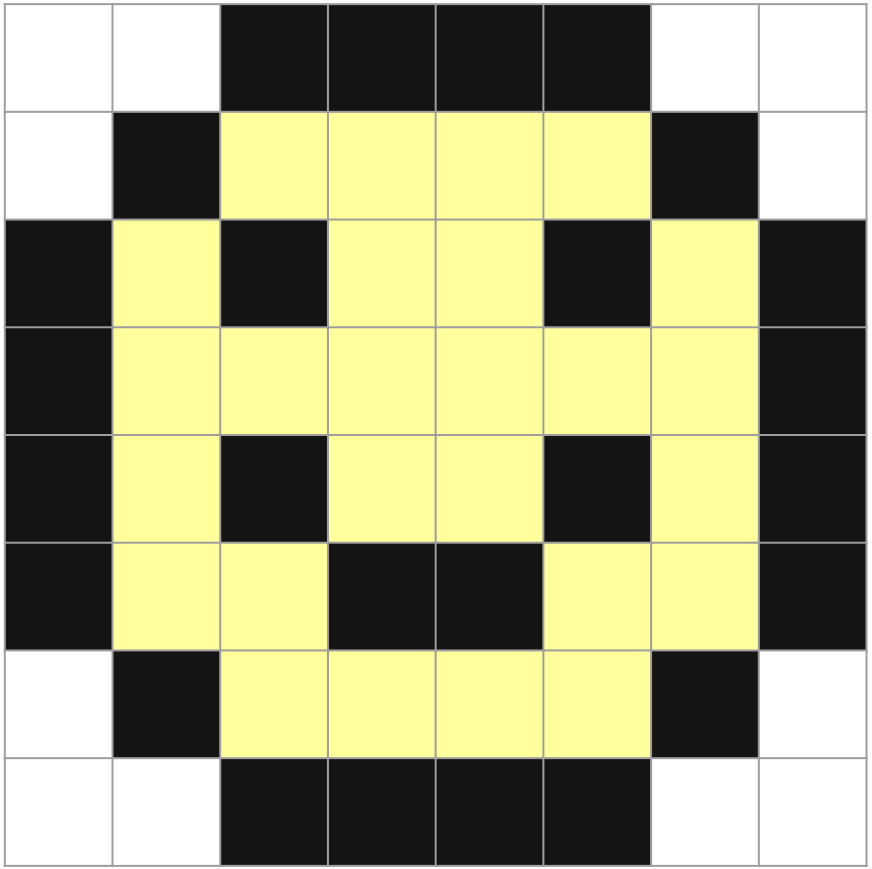

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How to Detect Faces?

Computer Vision problems can be solved either via

01

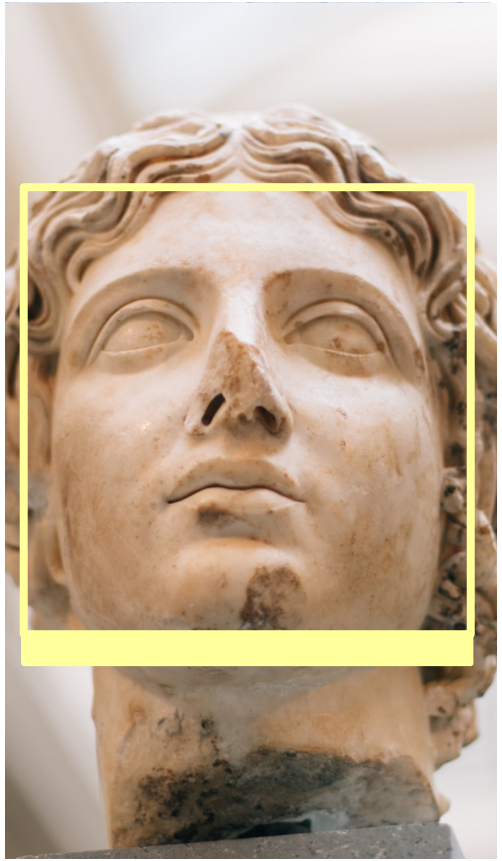
Machine Learning

e.g. Viola–Jones object detection framework

02

Deep Learning

Convolutional Neural Network (CNN)



Libraries and Packages for Computer Vision

01

Machine Learning

Python-supported

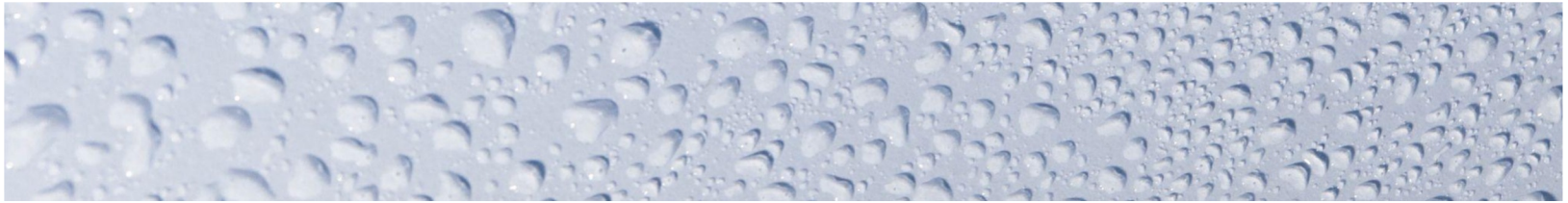
- OpenCV
- scikit learn
- Matplotlib

02

Deep Learning

All ML libraries plus:

- TensorFlow
- Keras
- Pytorch

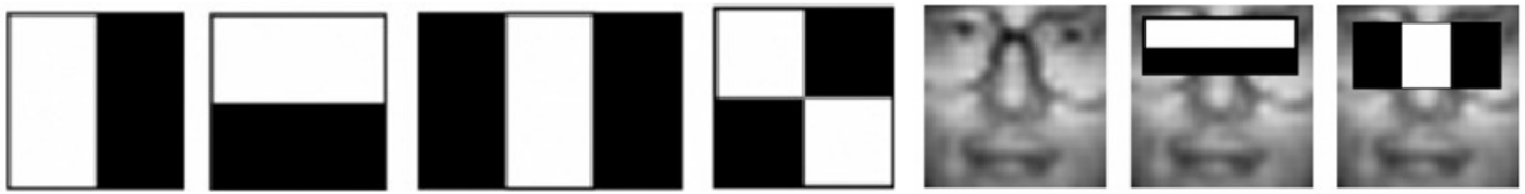


Traditional Machine Learning Approach

01

Viola–Jones Framework

1. Haar feature selection
2. Integral image
3. Adaptive boosting
4. Cascading classifier



[6][7][8]

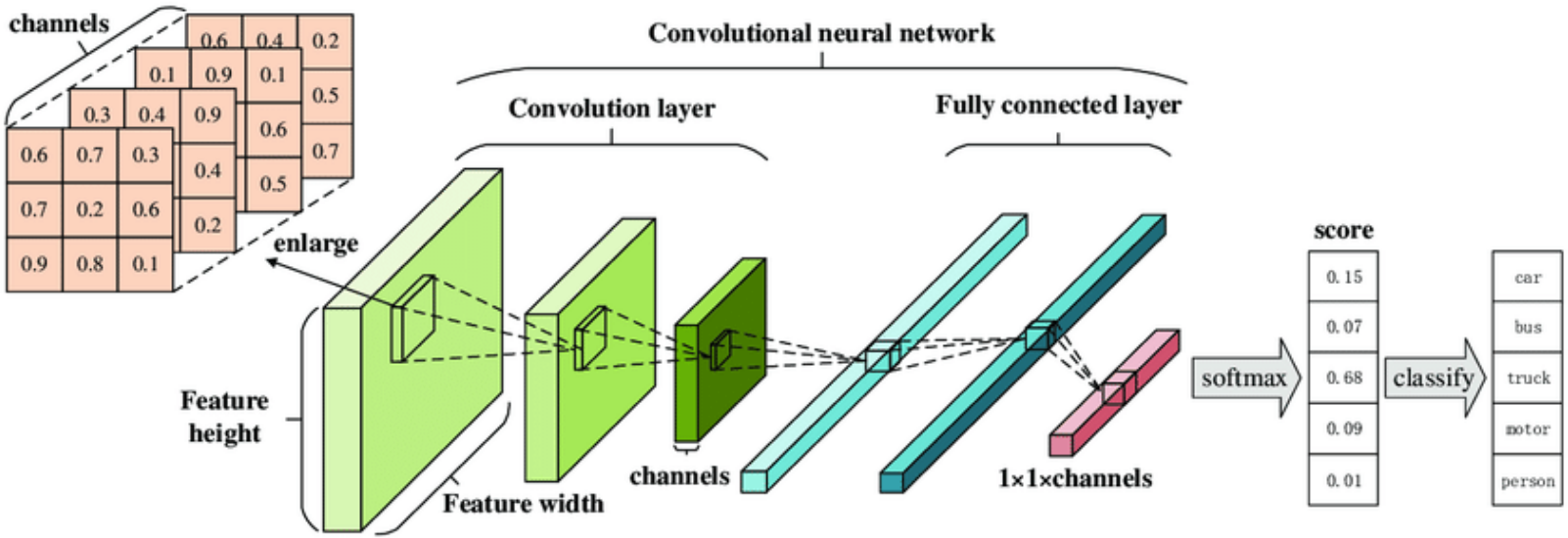
Deep Learning Approach

02

Convolutional Neural Network (CNN)

- Input layer: matrix shape
- Hidden layers: two types of layers
- Output layer

Deep Learning Approach



[9]

Demo

[10][11]

When to use ML or DL?

01

Machine Learning

Advantages
- Simpler
- faster

Disadvantages
- Harder to use

02

Deep Learning

Advantages
- Greater accuracy
- Easier to use
- More flexibie

Disadvantages
- Sometimes an overkill

Where to begin?

Computer Vision problems can be solved either via

01

MSI Lectures

Next Sunday!

02

Awesome Computer Vision

GitHub

Resources

1. https://courses.cs.washington.edu/courses/cse576/20sp/
2. https://en.wikipedia.org/wiki/Computer_vision
3. https://dribbble.com/shots/4605938-Color-mix
4. http://www.dbfix.it/cdead1-the-best-places-to-buy-jewelry_maritsapatrinos/can-you-dissect-these-color-combinations
5. https://www.youtube.com/watch?v=WSG0MnmUsEY
6. https://www.youtube.com/watch?v=eE30rknr7Mo
7. https://www.youtube.com/watch?v=p9vq90NYHMs
8. https://www.researchgate.net/publication/268348020
9. https://www.researchgate.net/publication/330106889
10. https://github.com/Ali-Jakhar/Face-detection-using-MTCNN
11. https://towardsdatascience.com/face-detection-in-2-minutes-using-opencv-python-90f89d7c0f81
12. https://arxiv.org/pdf/1910.13796.pdf
13. https://github.com/jbhuang0604/awesome-computer-vision

Thanks!

Do you have any questions?