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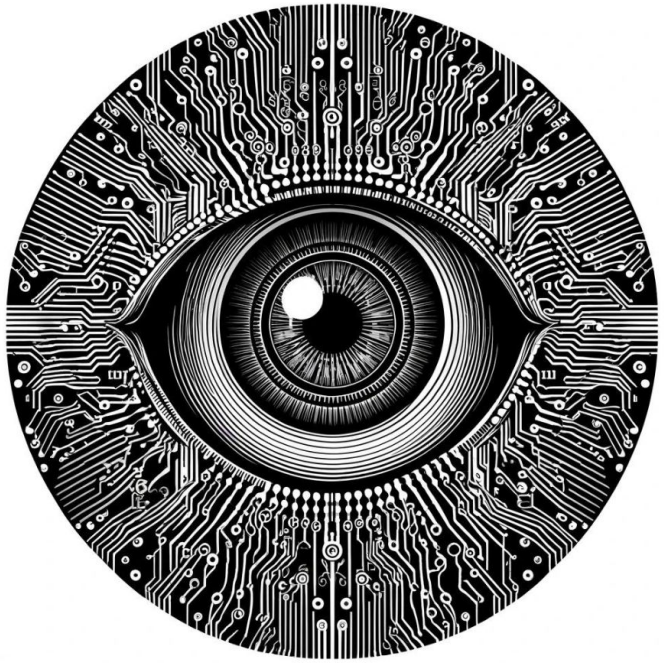
Common Tasks in Computer Vision



Antonio Rueda-Toicen

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Learning goals

- Understand what computer vision is
- Differentiate between discriminative and generative tasks

What is computer vision?

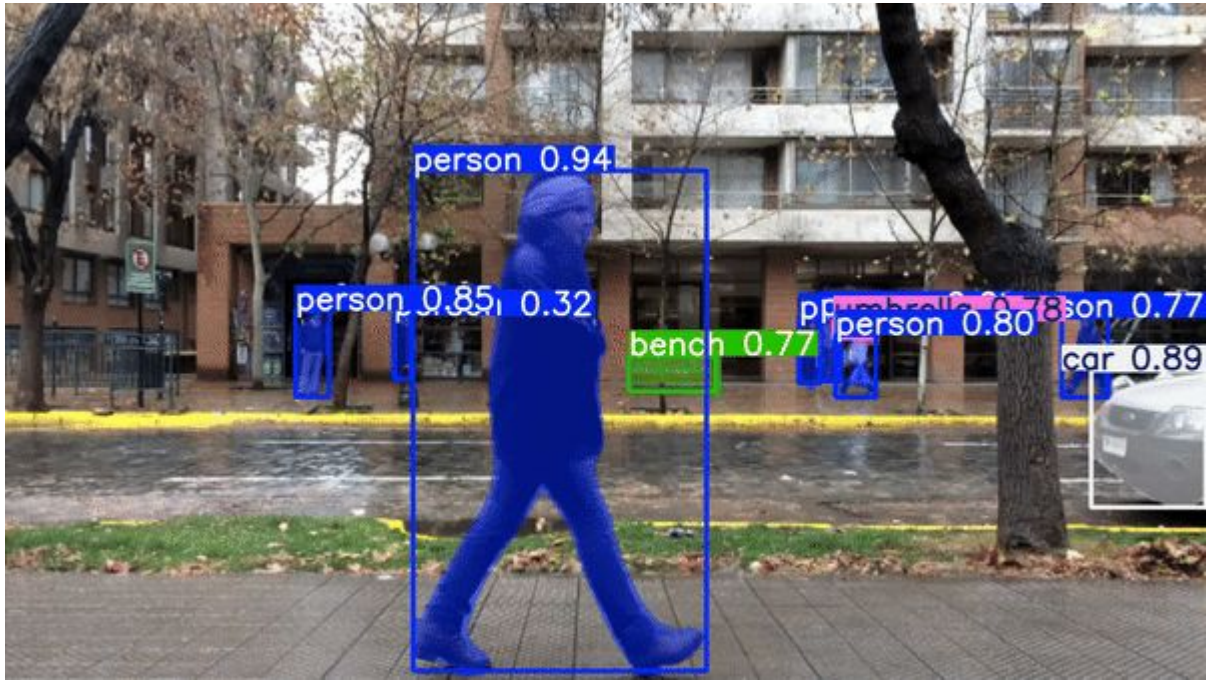


Image from https://learnopencv.com/yolo11/

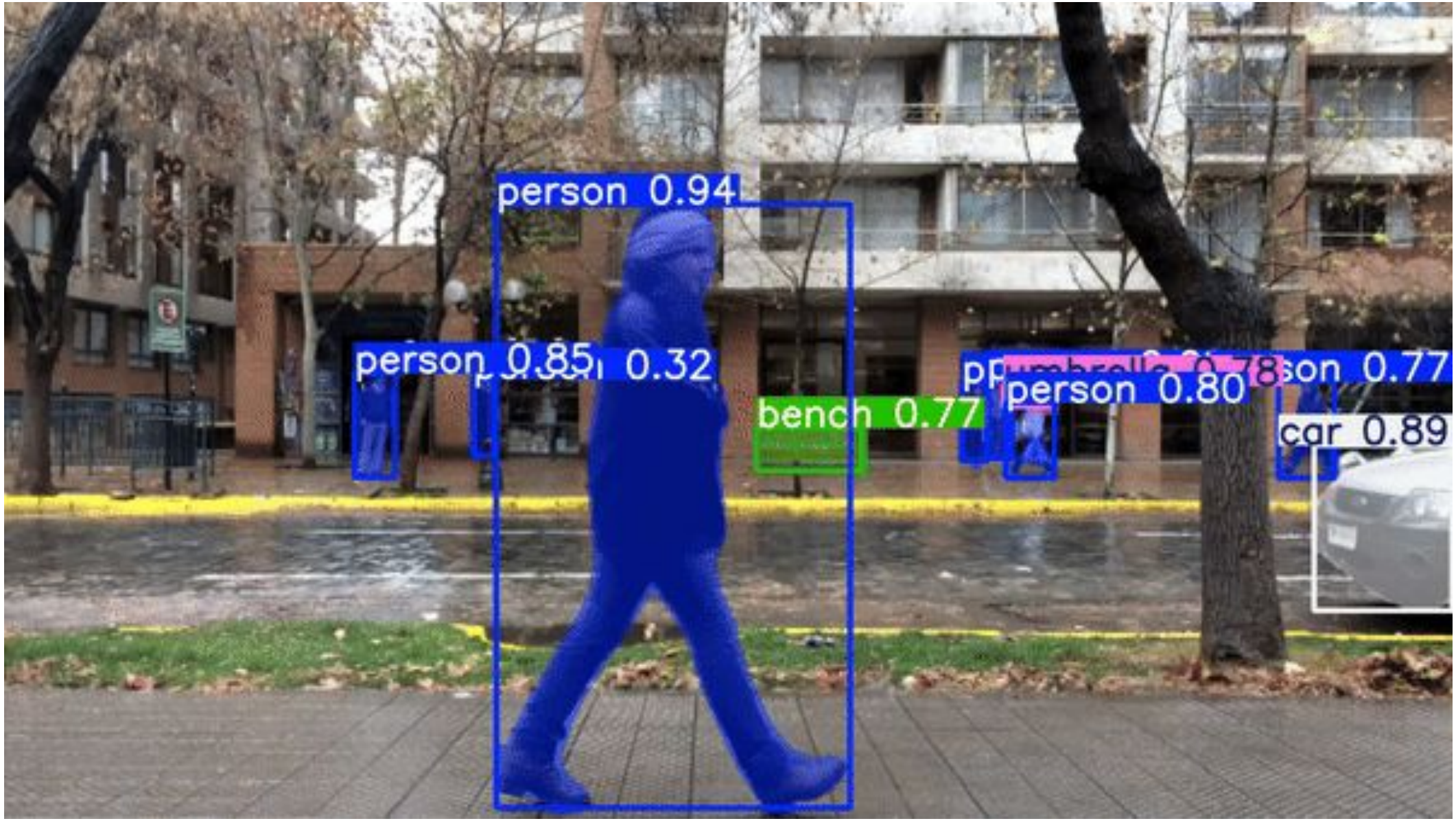


Image from https://learnopencv.com/yolo11/

Human vs machine perspective

Image source

What a human sees

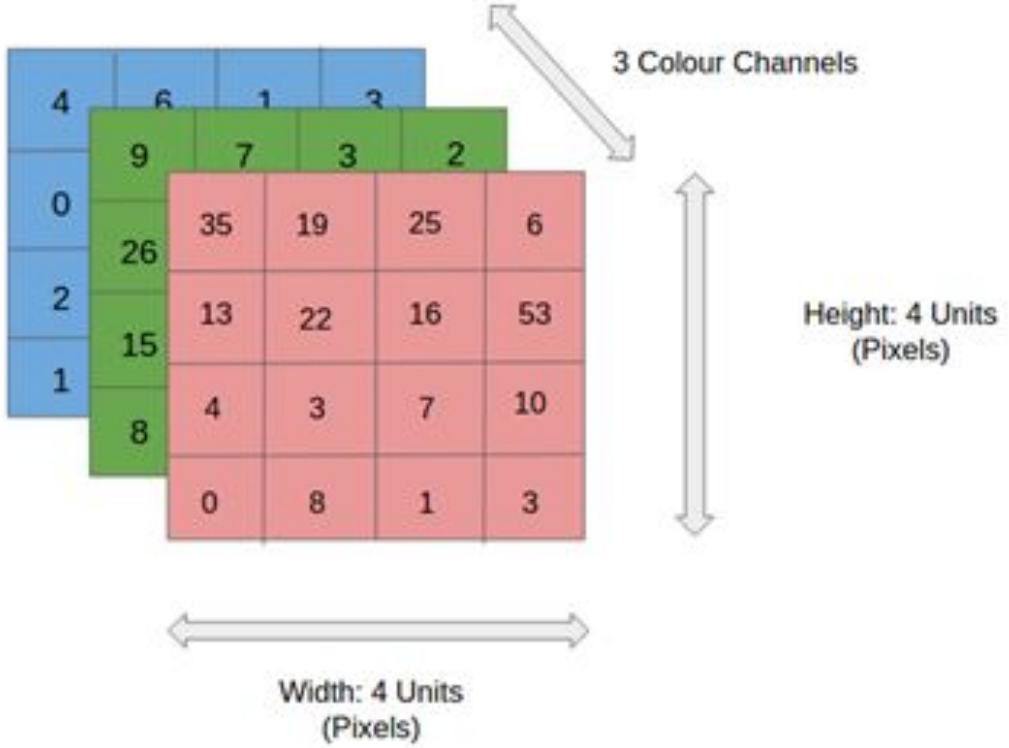


Image source

What the computer ‘sees’

Algorithms for computer vision

- Giving computers the ability to ‘understand’ the content of images

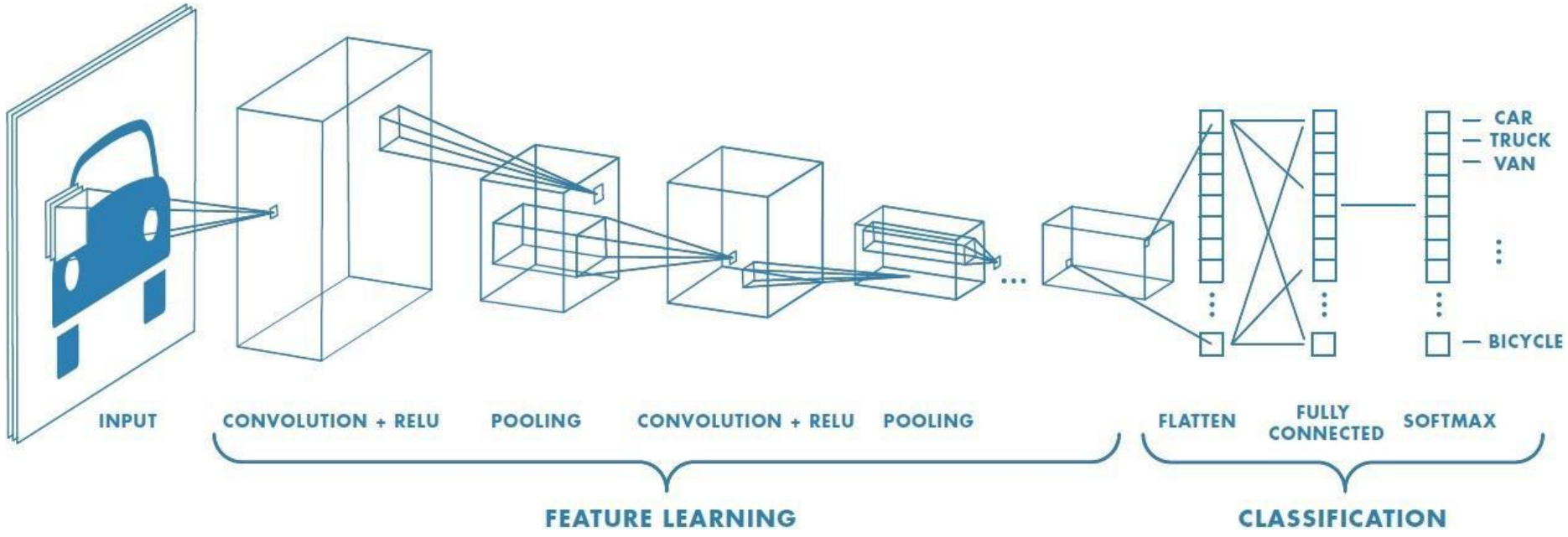
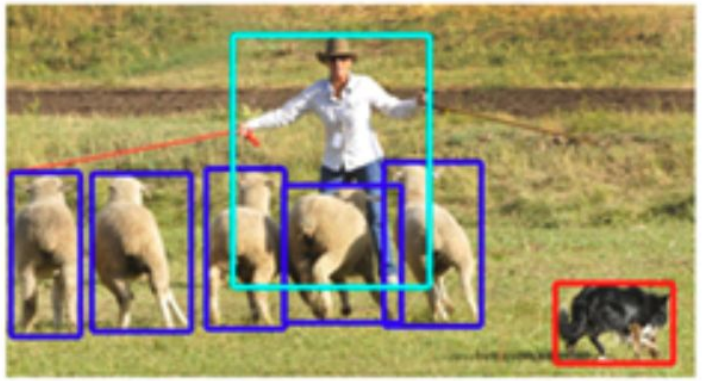


Image source

Discriminative computer vision

- “Which label or value can I assign to this image?”

Classification



Object Detection

Instance Segmentation

Image from “Learning to Segment” by Piotr Dollar, 2017

Discriminative computer vision

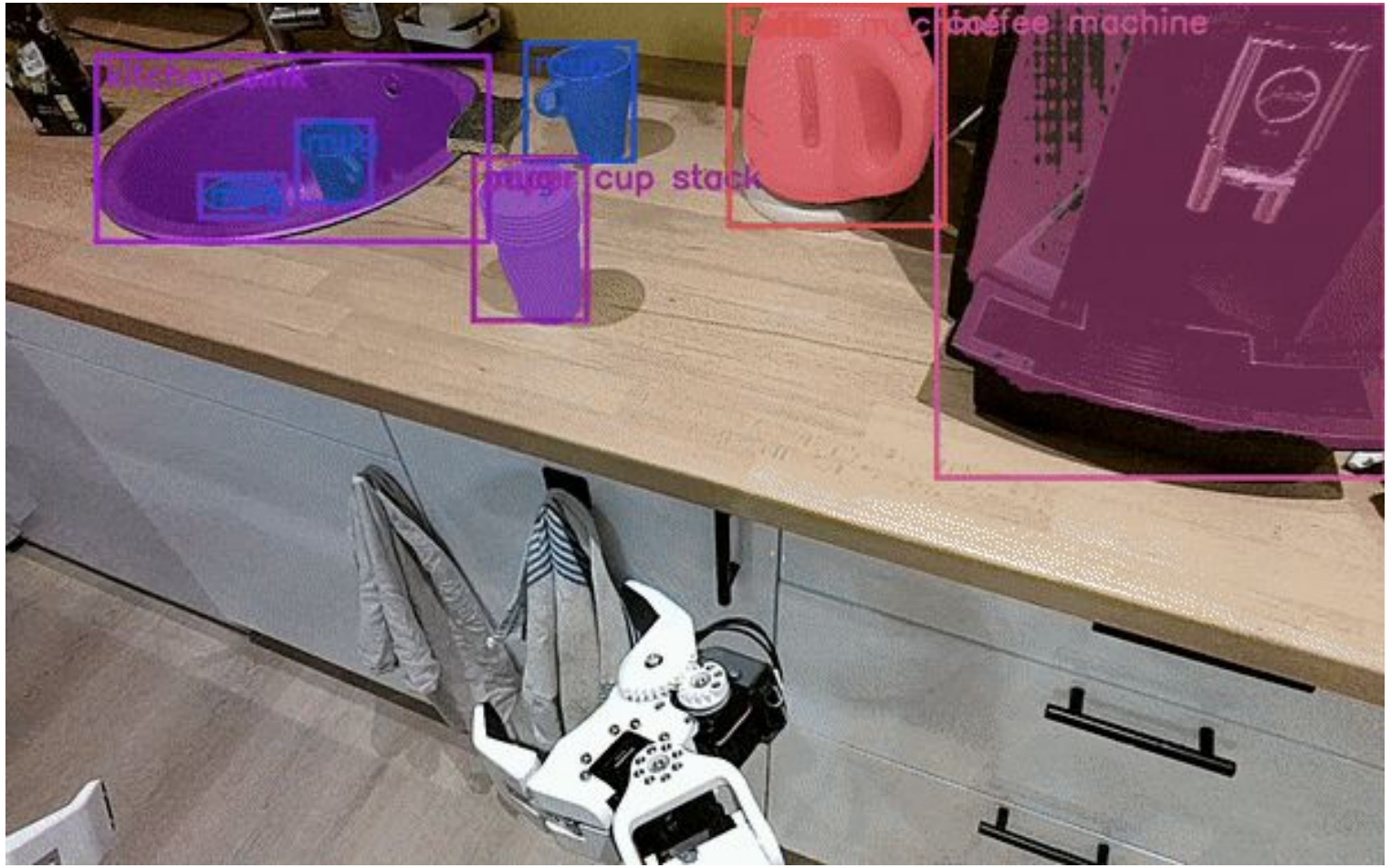


Image from https://github.com/pollen-robotics/pollen-vision

Generative computer vision

Prompt:

"Create an image of an astronaut riding a horse in pencil drawing style"

Image by OpenAI's Dall-E 3

Generative computer vision

Image from thispersondoesnotexist.com

Image from thiscitydoesnotexist.com

Integrating generative and discriminative computer vision

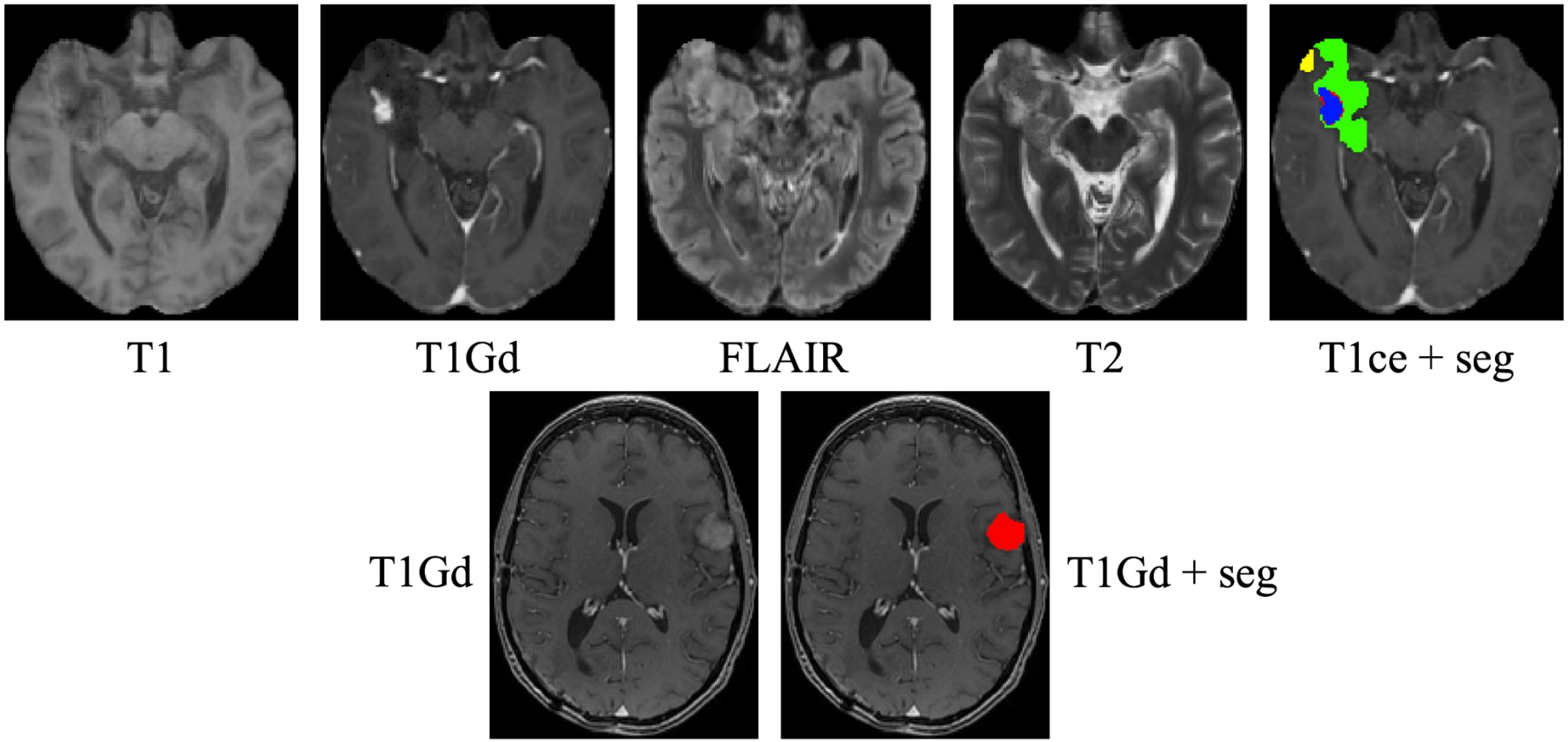


Image from [Improved Multi-Task Brain Tumour Segmentation with Synthetic Data Augmentation]

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Summary

What is Computer Vision?

- Enabling machines to interpret visual data

Discriminative Tasks

- Assigning scores or labels to images

Generative Tasks

- Creating images from prompts (text or other images)

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References

Why Computer Vision is a Hard Problem for AI

- https://www.youtube.com/watch?v=YOKPo-I6cgs

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