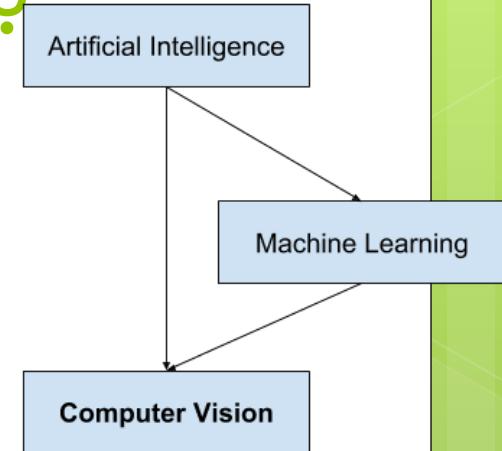


Introduction to Computer Vision

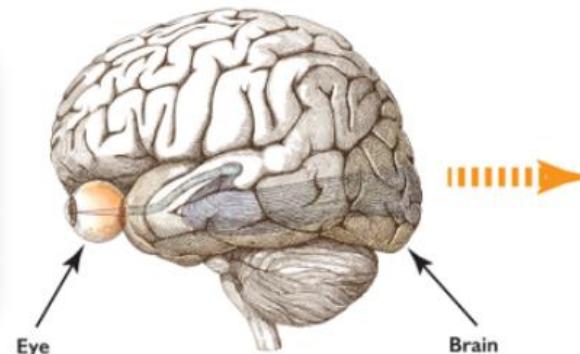
Tara Qadr
2024-2025
3rd Stage
Computer department
College of science
University of sulaimani

What is Computer Vision?

- Computer Vision is a field of Artificial Intelligence and Computer Science that aims at giving computers a visual understanding of the world.
- The goal of Computer Vision is to emulate human vision using digital images through three main processing components,
Xeell
Image acquisition, Image processing, Image analysis and understanding, in another word is about what we see and what a computer sees.
- It is not an image processing or photography



Human Vision System



Eye
(sensing device responsible for capturing images of the environment)

Brain
(interpreting device responsible for understanding the image content)

bowl, oranges,
bananas, lemons,
peaches

Computer Vision System



Input



Sensing device

Interpreting device

Output

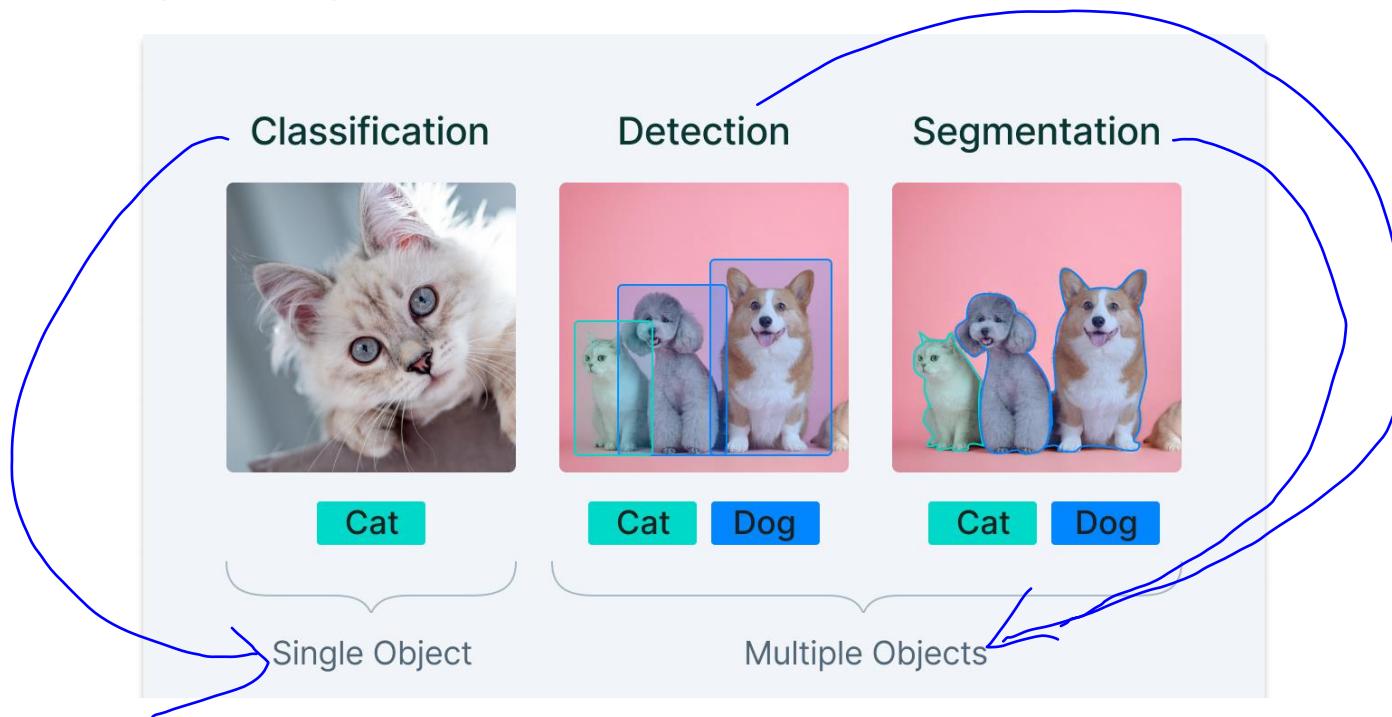
bowl, oranges,
bananas, lemons,
peaches

Why study Computer Vision?

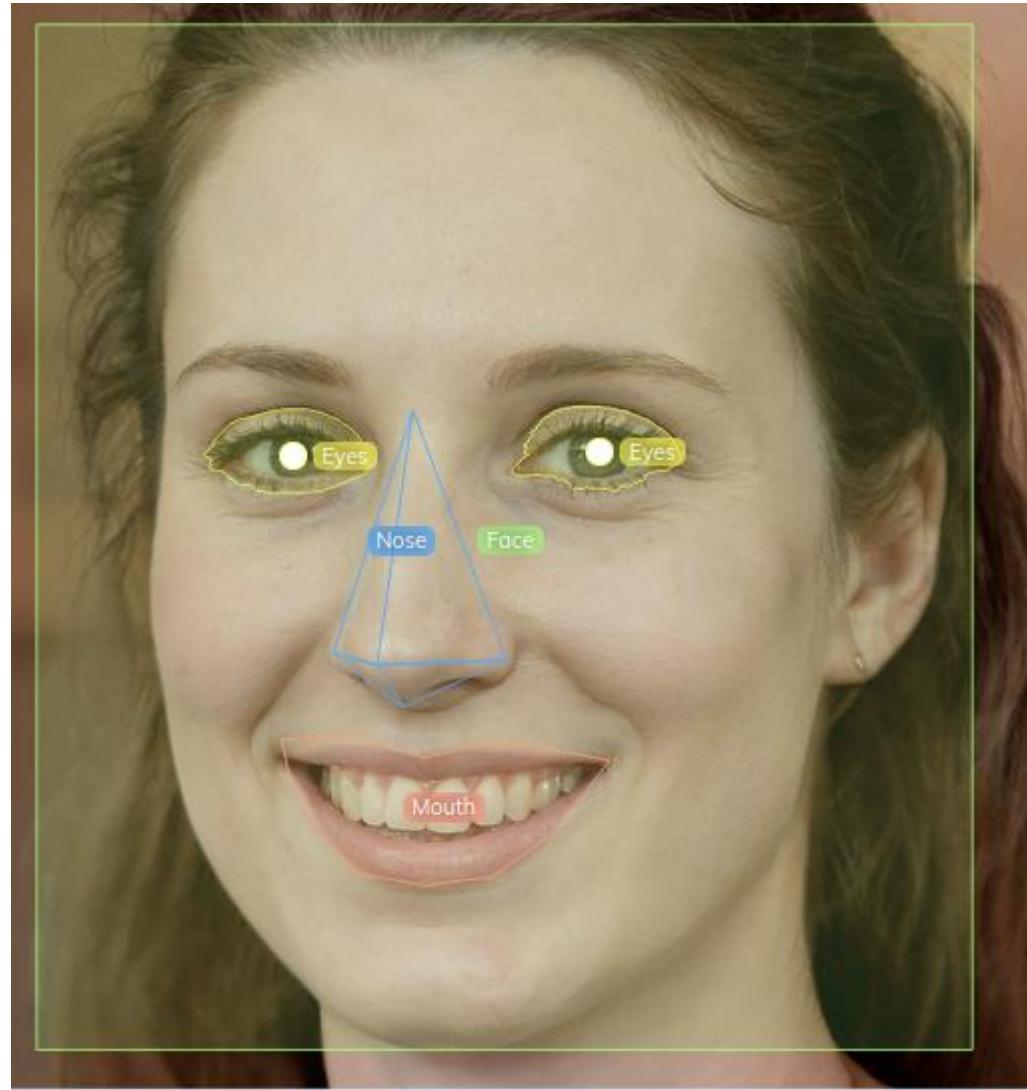
- **Images and movies are everywhere**
- **Fast-growing collection of useful applications**
 - building representations of the 3D world from pictures
 - automated surveillance (who's doing what)
 - movie post-processing
 - face finding
- **Various deep and attractive scientific mysteries**
- **Greater understanding of human vision**

common computer vision tasks.

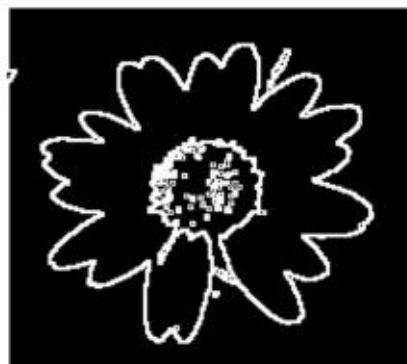
1. Image classification
2. Object detection
3. Image segmentation



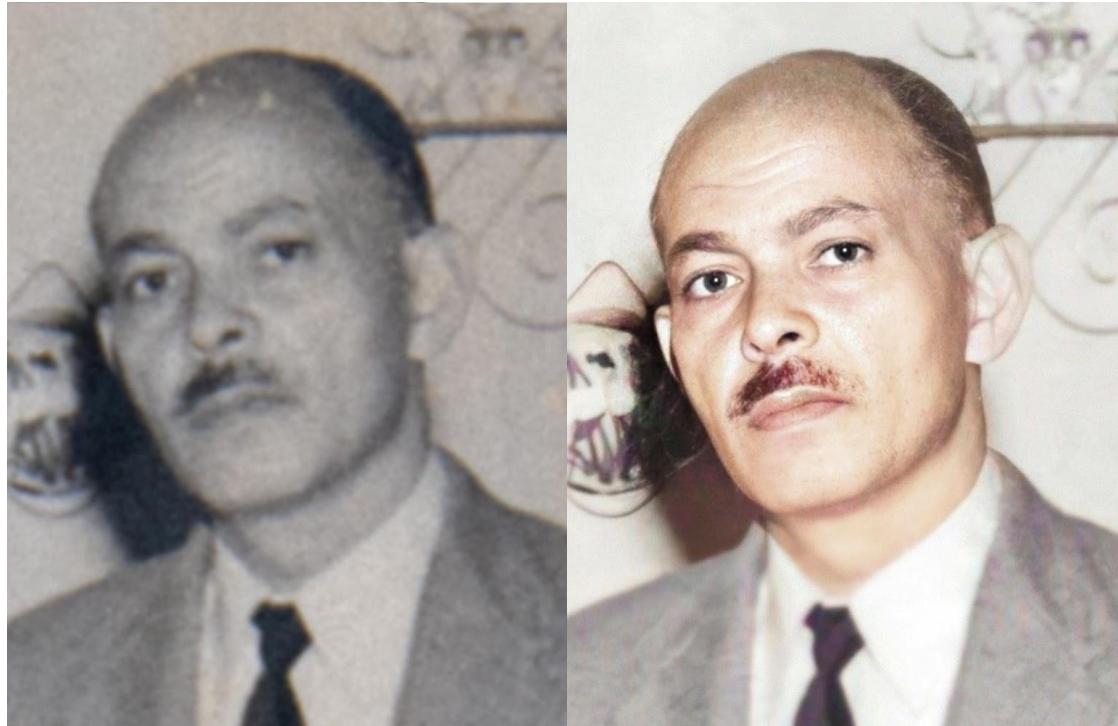
4. Face and person recognition



5. Edge detection



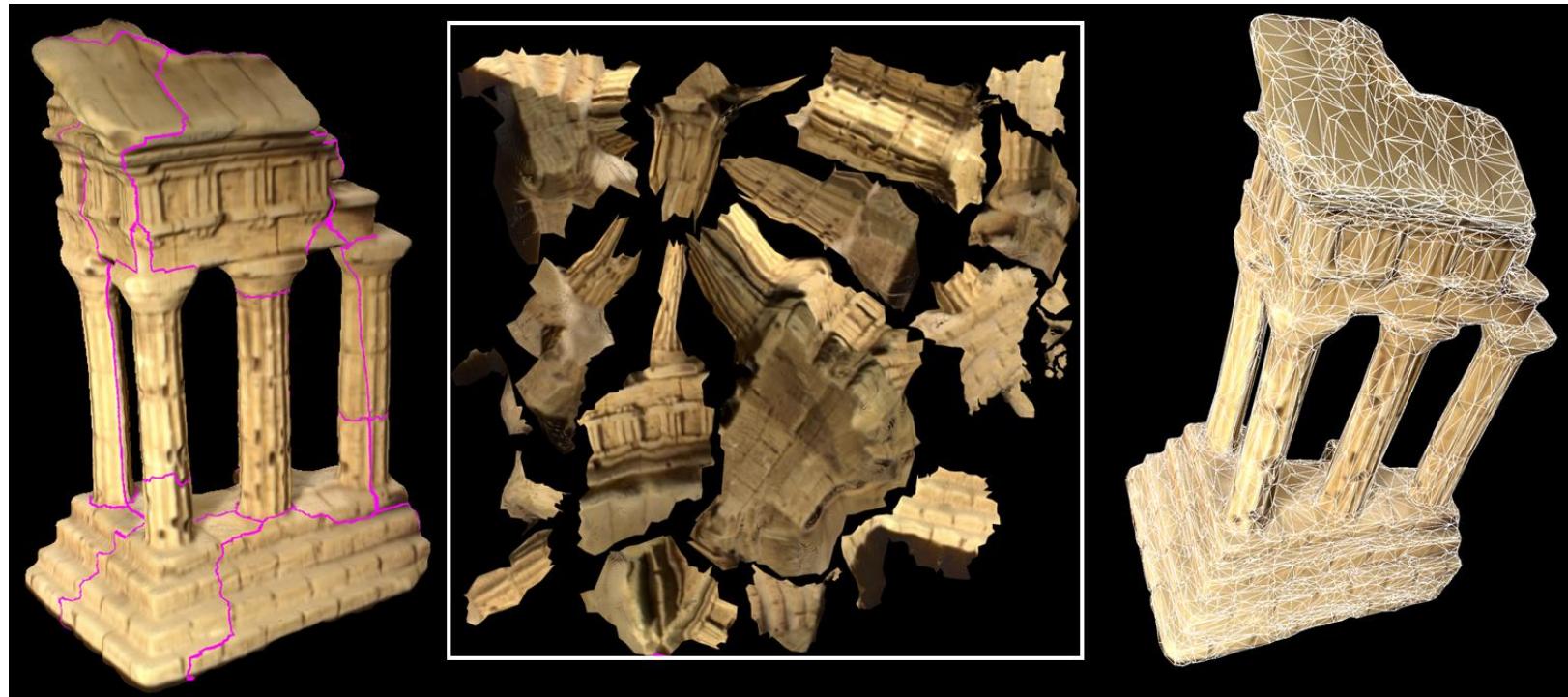
6. Image restoration



7. Feature matching



8. Scene reconstruction



9. Video motion analysis



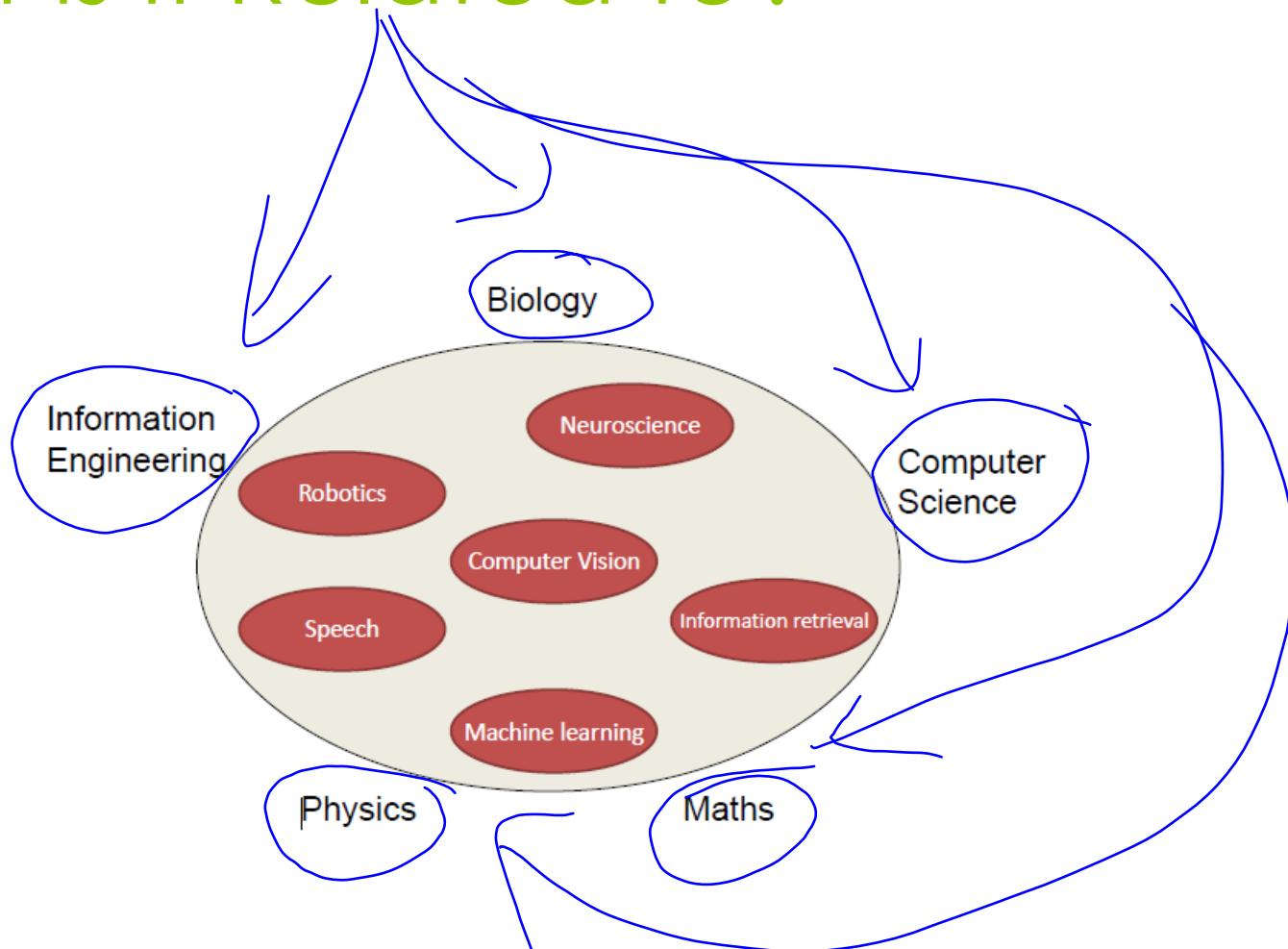
A brief history of computer vision

- **1960s - started as a student summer project at MIT.**
- **1970s and 80s – part of AI – understanding human vision and emulating human perception.**
- **1990s – depart from AI , geometric approach.**
- **Today – various mathematical methods (statistics, differential equations, optimization), applications (security, robotics, graphics).**

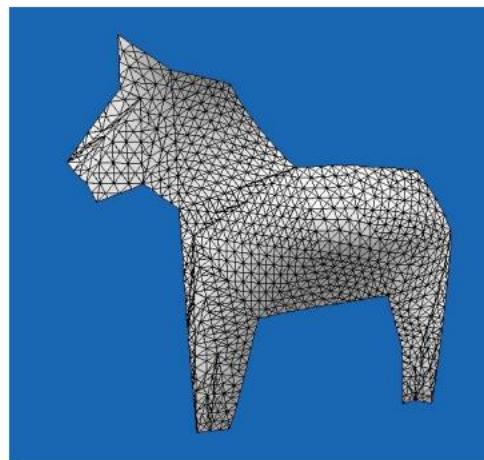
Our Time

- **It is a good time to do computer vision now, because:**
 - **Powerful computers**
 - **Inexpensive cameras**
 - **Algorithm improvements**
 - **Understanding of vision systems**

What is it Related to?



Applications: 3D Reconstruction



Applications: Augmented



Applications: Panoramic Mosaics



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+ ... +



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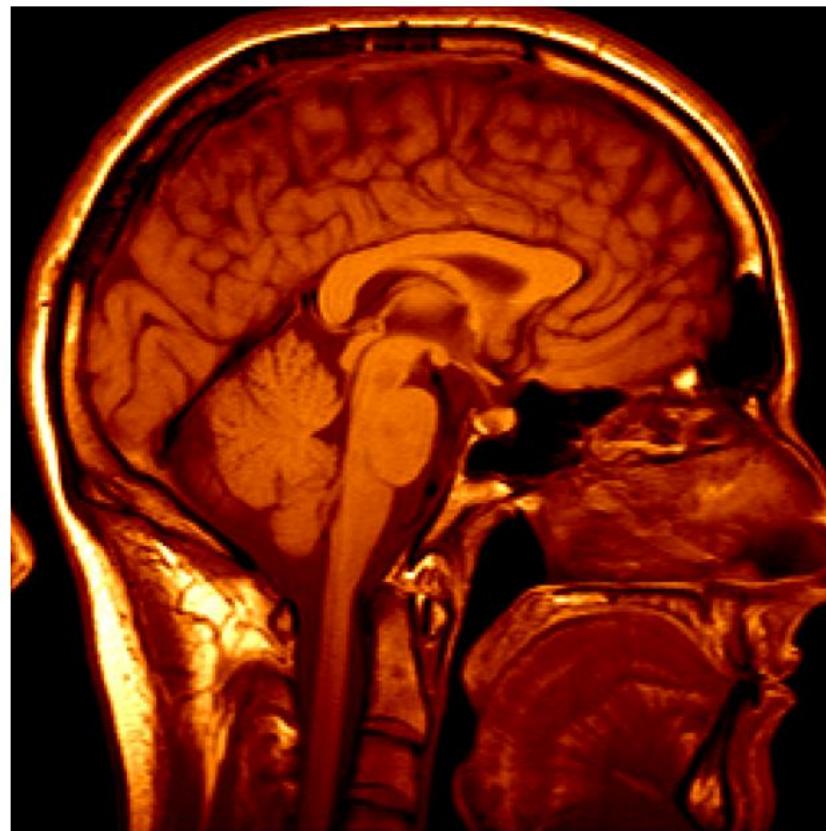
Applications: Recognition



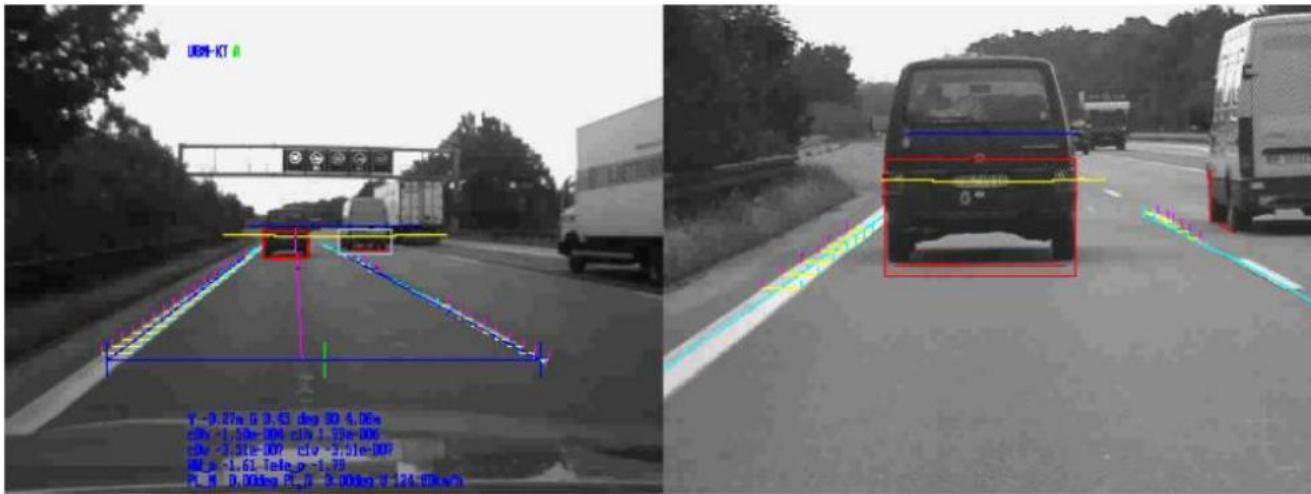
Applications: Special Effects



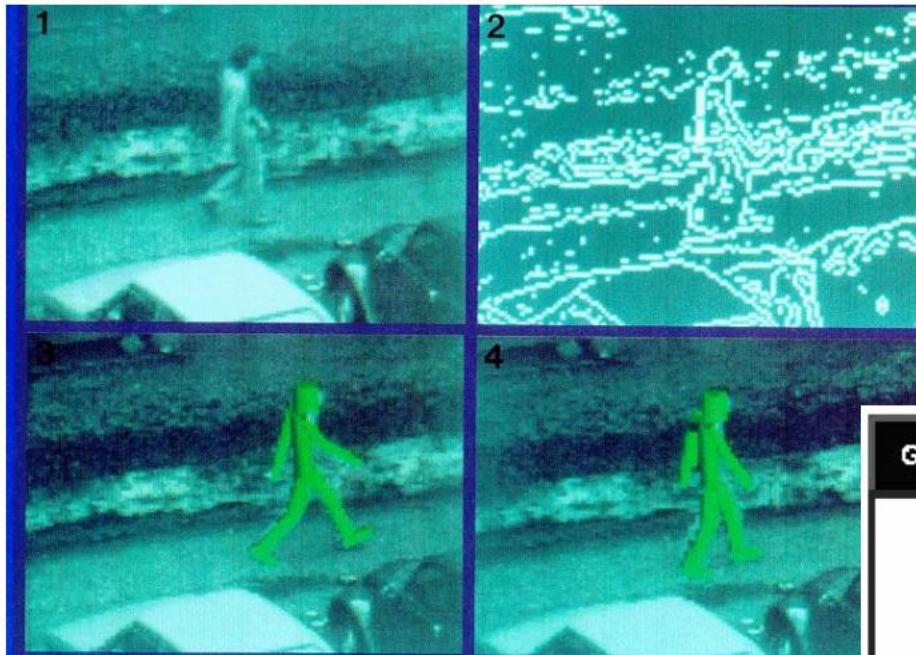
Applications: Medical Imaging



Applications: Autonomous Vehicle



Applications: Surveillance



Geodesic Active Regions for Tracking

