

Introduction to Deep Learning (2)

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Deep Learning Applications

- Computer Vision
- Voice / Sound / Text
- VR/AR
- Industrial / manufacturing / design
- Commerce
- Finance
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Deep Learning Application Topics (1)

- Self-driving cars
- News aggregation and fraud news detection
- Natural language processing
- Visual assistants
- Entertainment
- Visual Recognition
- Fraud detection
- Healthcare
- Personalization's
- Detecting developmental delay in children

Deep Learning Application Topics (2)

- Colorizations of black and white images
- Adding sounds to silent movies
- Automatic machine translation
- Automatic handwriting generation
- Automatic game playing
- Language translations
- Pixel restoration
- Photo descriptions
- Demographic and election predictions
- Deep dreaming

Deep Learning Application Topics (3)

- Chatbots
- Composing music
- Image coloring
- Robotics
- Image captioning
- Advertising
- Personalized marketing
- Financial fraud detection
- Fake news detection
- Recommendation
- Smart agriculture
- Cybersecurity
- Climate change analysis
- Others

Deep Learning Applications (1)



Deep Learning Applications (2)



Computer Vision Applications

Image-based applications



Object detection/tracking

- A technique for finding and tracking objects and location information of a specified category or class within an image



Image classification

- A technique for classifying an image according to a predetermined class



Semantic object segmentation

- A technique for classifying all pixels of an image into meaningful classes.



Semantic object segmentation (2)



Let's Compare !!

Classification



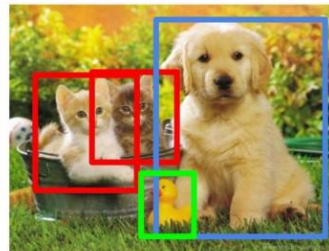
CAT

**Classification
+ Localization**



CAT

Object Detection



CAT, DOG, DUCK

**Instance
Segmentation**



CAT, DOG, DUCK

Single object

Multiple objects

**Semantic
Segmentation**



GRASS, CAT,
TREE, SKY

No objects, just pixels

**Classification
+ Localization**



CAT

Single Object

**Object
Detection**



DOG, DOG, CAT

Multiple Object

**Instance
Segmentation**



DOG, DOG, CAT

This image is CC0 public domain

Image generation (1)

- A technique for automatically creating, combining, and transforming images



Image generation (2)

GLIGEN

Grounded language-to-image generation

Project [Github repository](#)
Demo [video](#)



From image prompts, GLIGEN generates

high-quality images with high fidelity

Image generation (3)

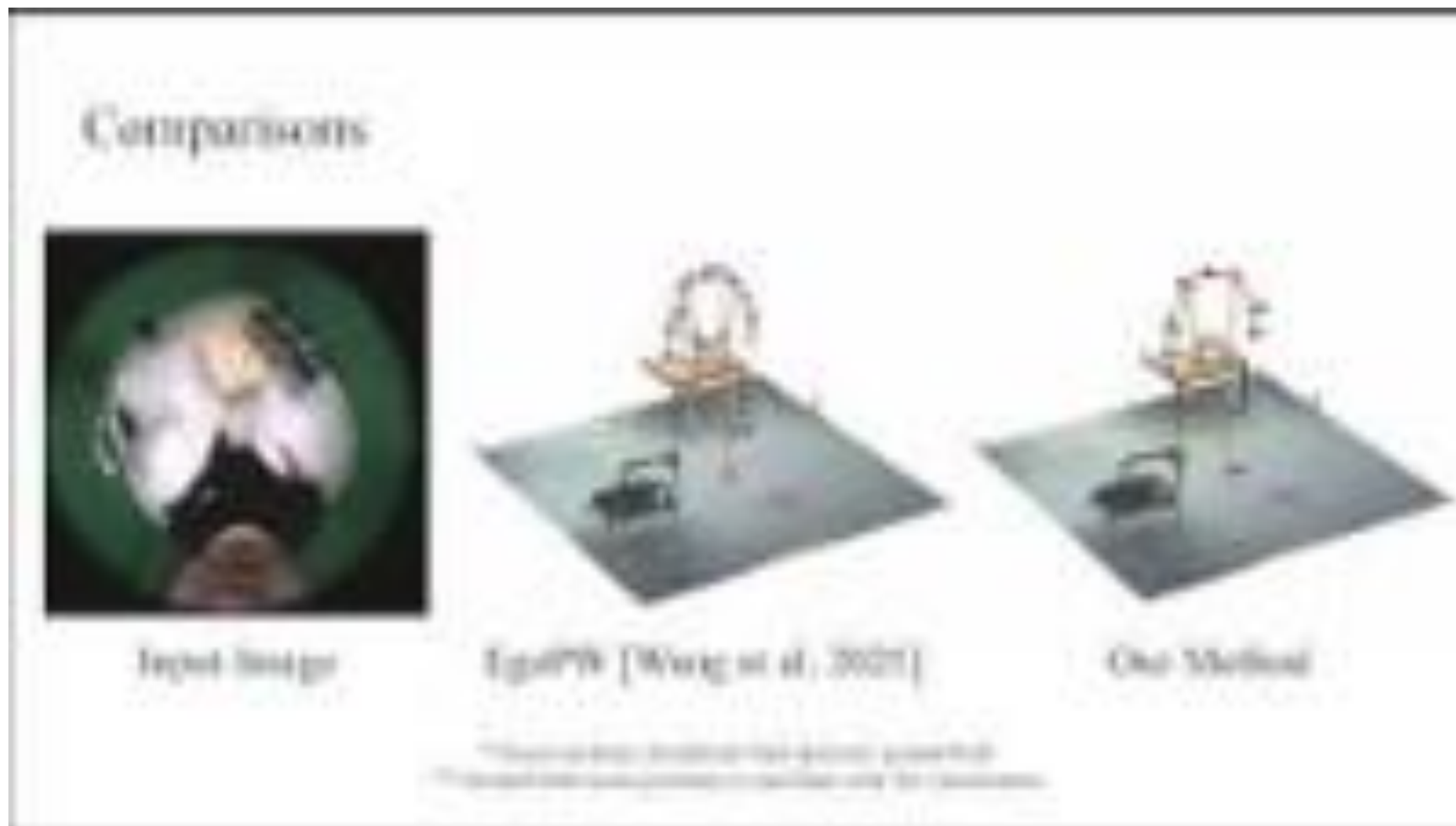


Action recognition (1)

- A technique for recognizing the intention of human behavior in the image



Action recognition (2)



Action recognition (3)



Facial motion capture



Facial appearance capture



High-Res Facial Appearance Capture From Polarized Smartphone Images

David Anderson¹, Oliver Matus², Christopher Hart¹,
Michael Hoffmann¹, Jochen Tierb¹

¹Technical University of Munich
²Max-Planck-Gesellschaft für Kognitionswissenschaften

Q & A
