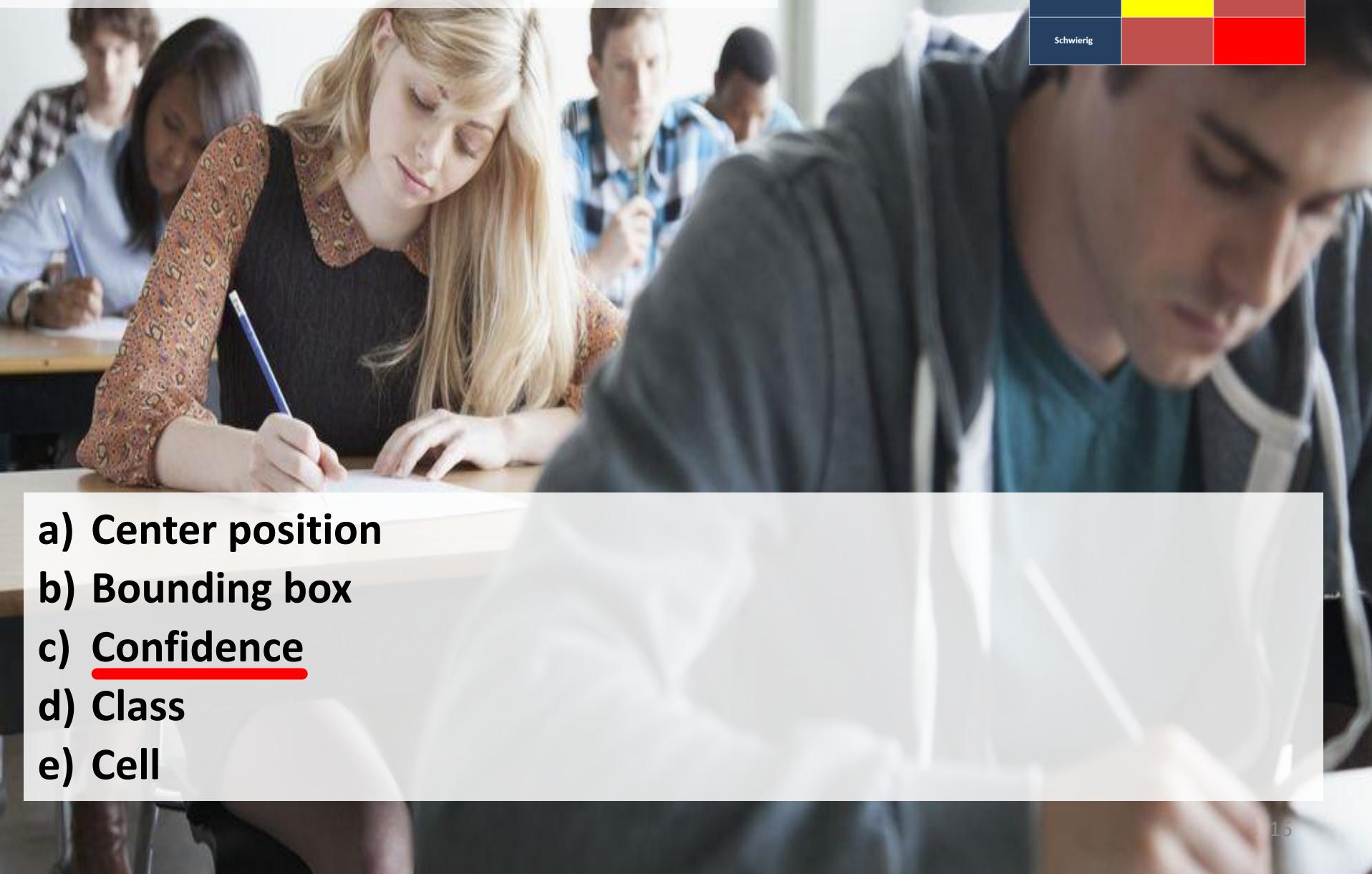


In YOLO, _____ represents if the box contains any objects.



Schwierigkeitsgrad	Art des Wissens	Abfragewissen (Vorlesung)	Anwendungswissen (Literatur)
Einfach			
Mittel			
Schwierig			

- a) Center position
- b) Bounding box
- c) Confidence
- d) Class
- e) Cell

8 Machine Learning III

- Specialized Areas in Machine Learning

Content:

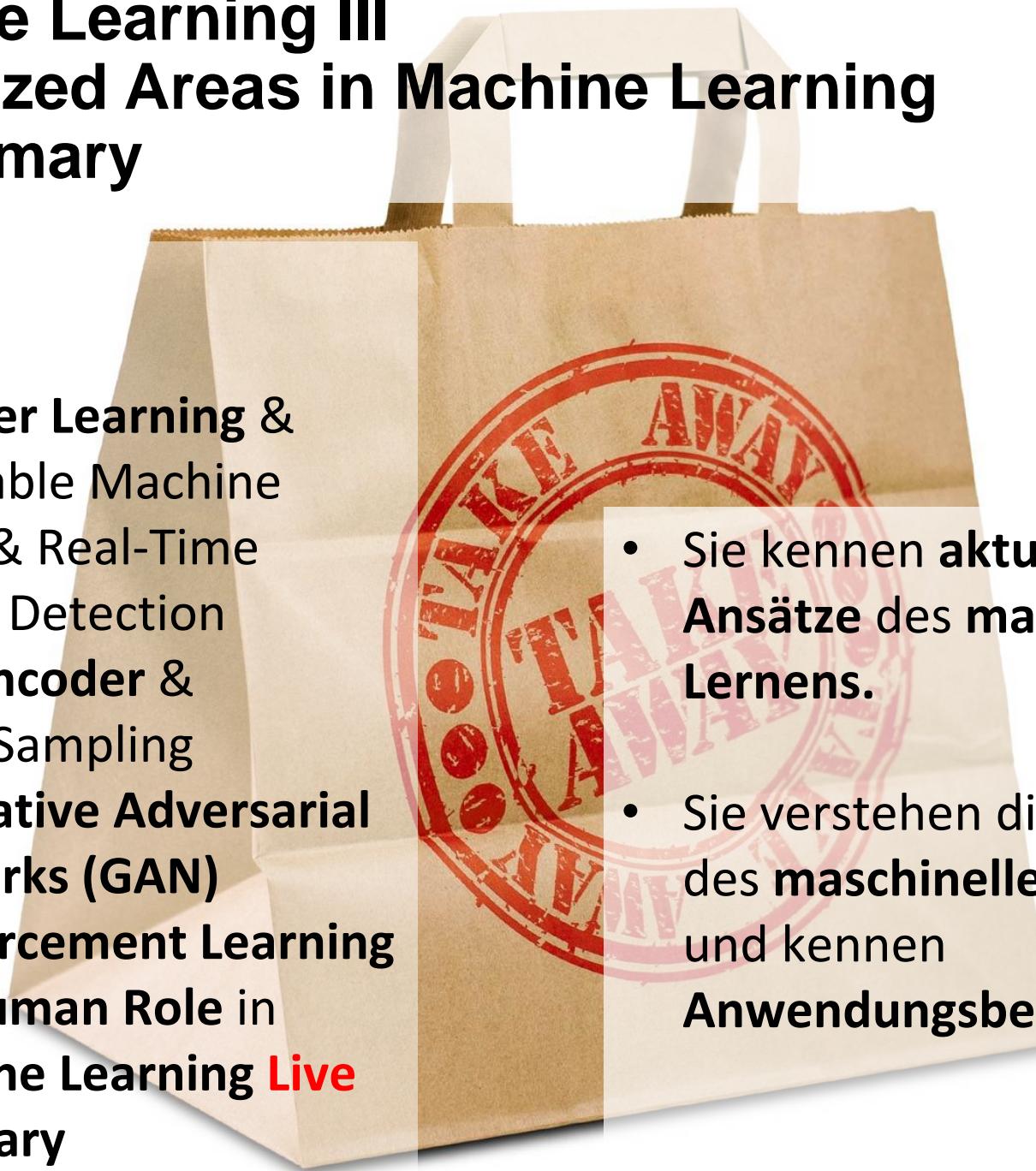
1. Transfer Learning & Teachable Machine
2. YOLO & Real-Time Object Detection
3. Autoencoder & Super Sampling
4. Generative Adversarial Networks (GAN)
5. Reinforcement Learning
6. The Human Role in Machine Learning **Live**
7. Summary



8 Machine Learning III

- Specialized Areas in Machine Learning (7) Summary

Content:

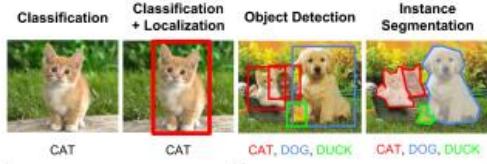
- 
1. Transfer Learning & Teachable Machine
 2. YOLO & Real-Time Object Detection
 3. Autoencoder & Super Sampling
 4. Generative Adversarial Networks (GAN)
 5. Reinforcement Learning
 6. The Human Role in Machine Learning **Live**
 7. Summary
- Sie kennen **aktuelle Ansätze des maschinellen Lernens.**
 - Sie verstehen die **Ansätze des maschinellen Lernens** und kennen **Anwendungsbeispiele.**

8 Machine Learning III

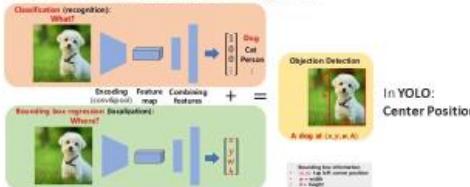
- Specialized Areas in Machine Learning

(2) YOLO & Object Detection in Real-Time

Object Detection with CNNs: Motivation



Object Detection: Classification + Regression

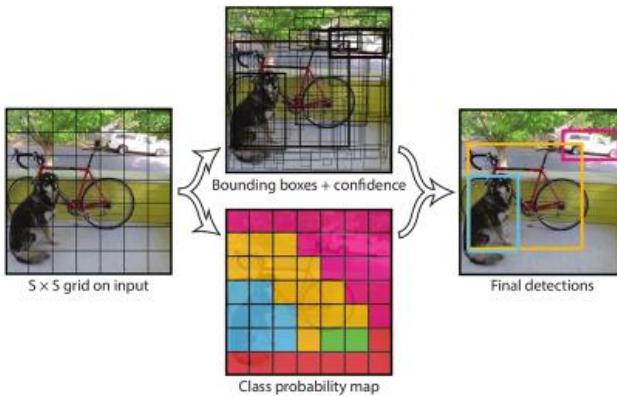


YOLO Algorithm and YOLO Object Detection: An Introduction, 2020

appslon.com/object-detection-yolo-algorithm/

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Paper YOLO (You Only Look Once): Kernidee



Allen Institute: You Only Look Once: Unified, Real-Time Object Detection, 2016

<https://arxiv.org/pdf/1506.02640.pdf>

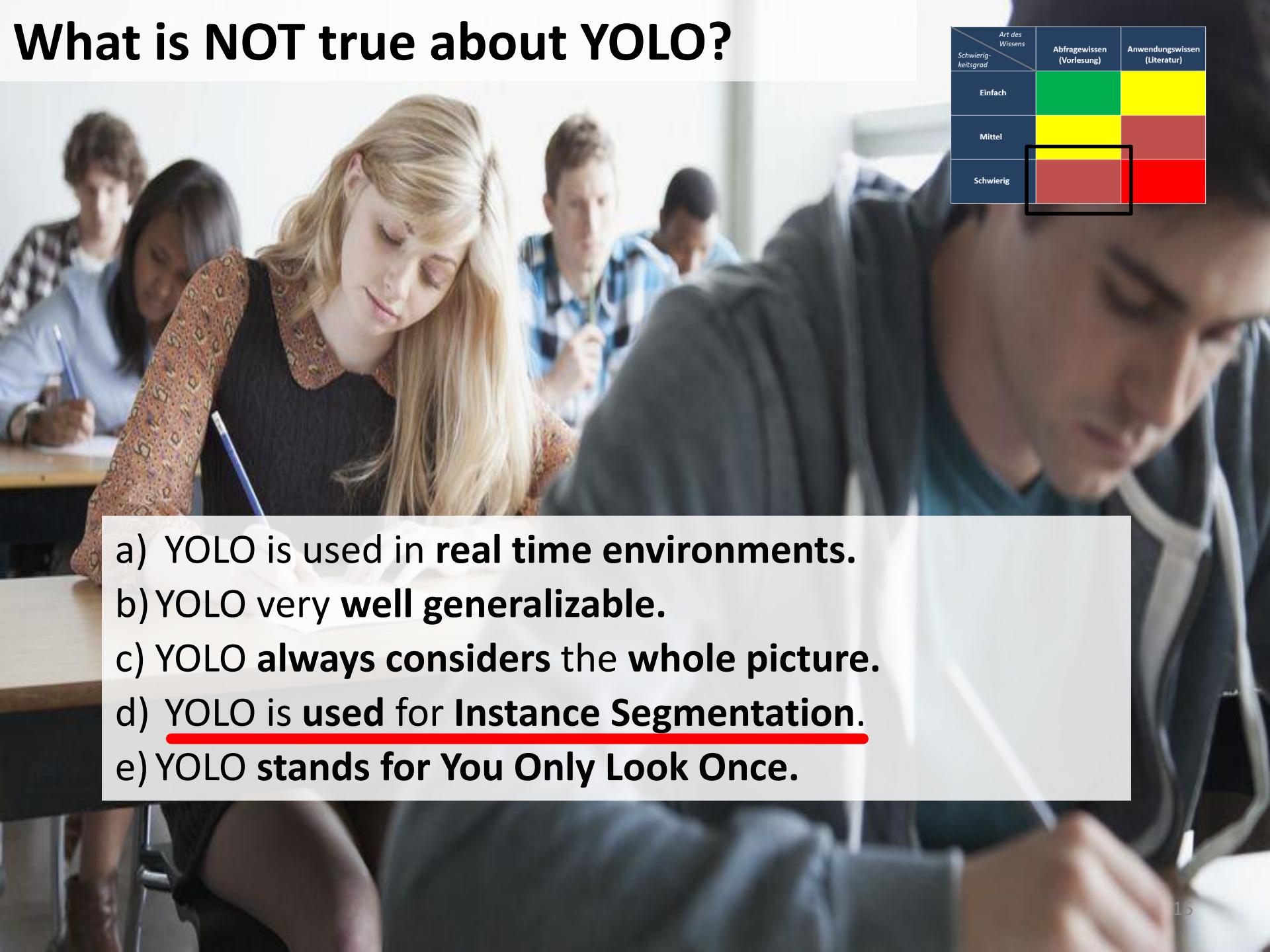
27



14

What is NOT true about YOLO?

Schwierigkeitsgrad	Art des Wissens	Abfragewissen (Vorlesung)	Anwendungswissen (Literatur)
Einfach		Green	Yellow
Mittel		Yellow	Red
Schwierig		Red	Red

- 
- A photograph of several students in a classroom setting, focused on a task at their desks. In the foreground, a student with long blonde hair is looking down at their work. Behind her, other students are also working. The background is slightly blurred.
- a) YOLO is used in **real time environments**.
 - b) YOLO very **well generalizable**.
 - c) YOLO **always considers the whole picture**.
 - d) YOLO is **used for Instance Segmentation**.
 - e) YOLO stands for **You Only Look Once**.

Michael Amberg

Todays Content:

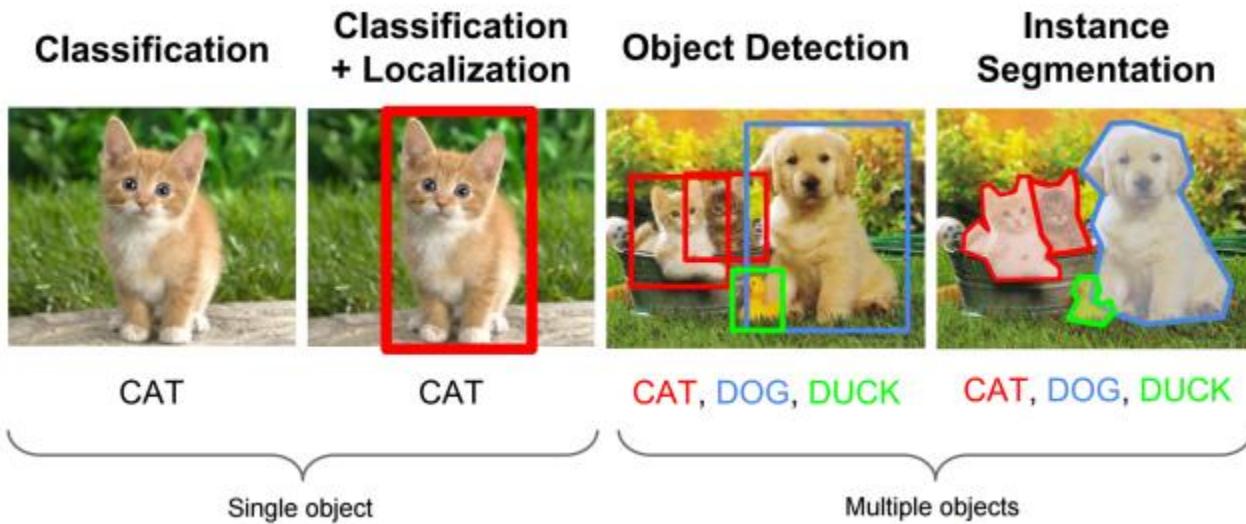
1. Transfer Learning & Teachable Machine
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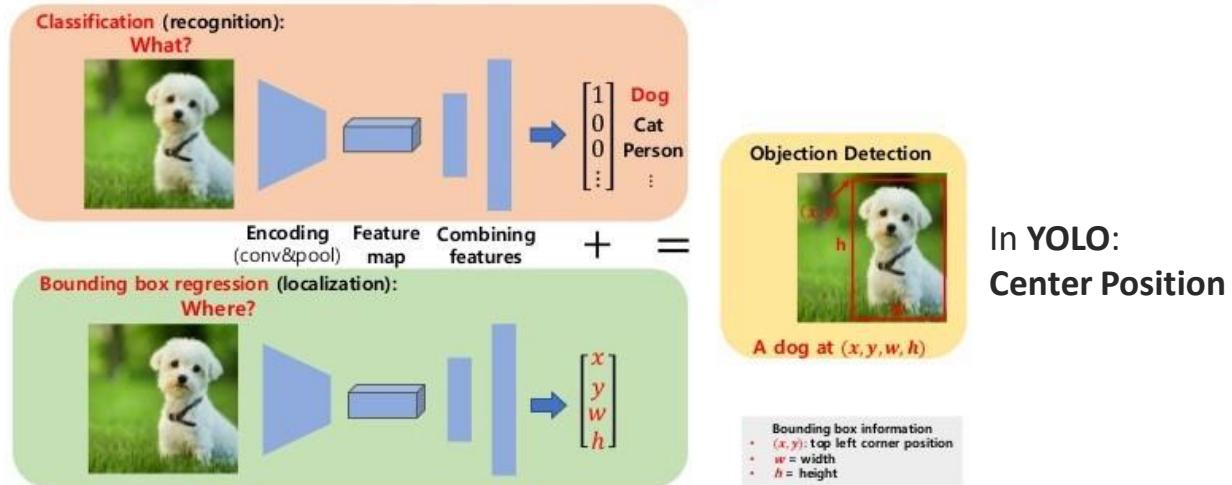
2. YOLO & Object Detection in Real-Time



Object Detection with CNNs: Motivation



Object Detection: Classification + Regression



Paper YOLO (You Only Look Once)

You Only Look Once: Unified, Real-Time Object Detection

Joseph Redmon*, Santosh Divvala*†, Ross Girshick†, Ali Farhadi*†

University of Washington*, Allen Institute for AI†, Facebook AI Research†

<http://pjreddie.com/yolo/>

Abstract

We present YOLO, a new approach to object detection. Prior work on object detection repurposes classifiers to perform detection. Instead, we frame object detection as a regression problem to spatially separated bounding boxes and associated class probabilities. A single neural network predicts bounding boxes and class probabilities directly from full images in one evaluation. Since the whole detection pipeline is a single network, it can be optimized end-to-end directly on detection performance.

Our unified architecture is extremely fast. Our base YOLO model processes images in real-time at 45 frames per second. A smaller version of the network, Fast YOLO, processes an astounding 155 frames per second while still achieving double the mAP of other real-time detectors. Compared to state-of-the-art detection systems, YOLO makes more localization errors but is less likely to predict false positives on background. Finally, YOLO learns very general representations of objects. It outperforms other detection methods, including DPM and R-CNN, when generalizing from natural images to other domains like artwork.

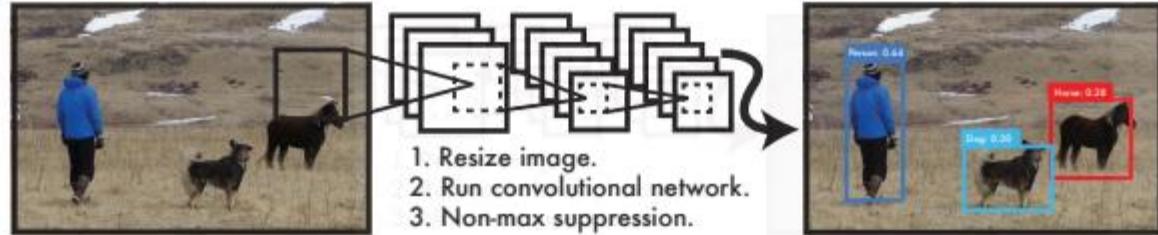


Figure 1: The YOLO Detection System. Processing images with YOLO is simple and straightforward. Our system (1) resizes the input image to 448×448 , (2) runs a single convolutional network on the image, and (3) thresholds the resulting detections by the model’s confidence.

present and where they are.

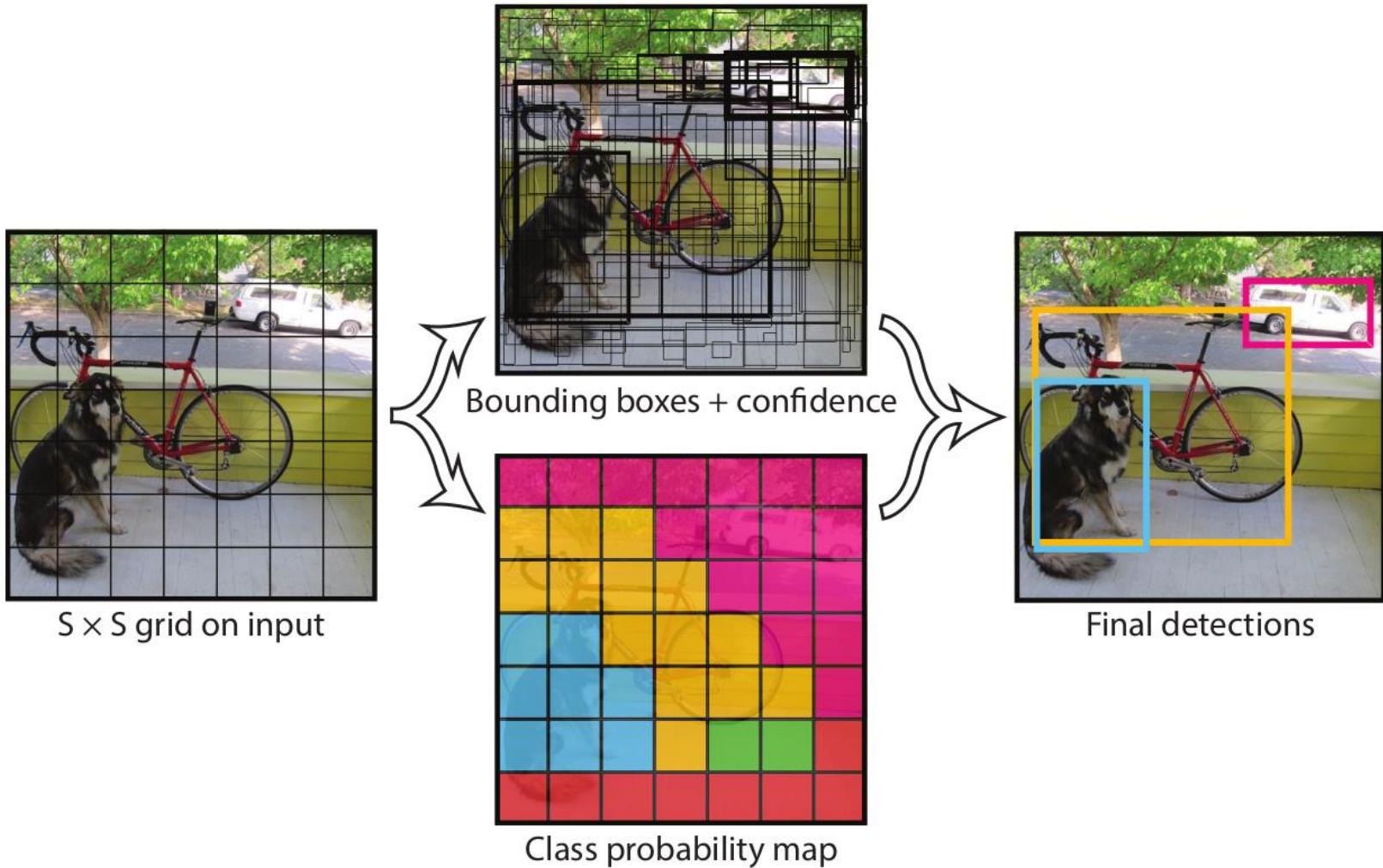
YOLO zur Objekterkennung in Bildern (Videos):

- **Extrem schnell** (im Vergleich zu alternativen Ansätzen).
- **Betrachtet immer das ganze Bild. Ein Durchlauf durch das CNN.**
- **Sehr gut generalisierbar.**

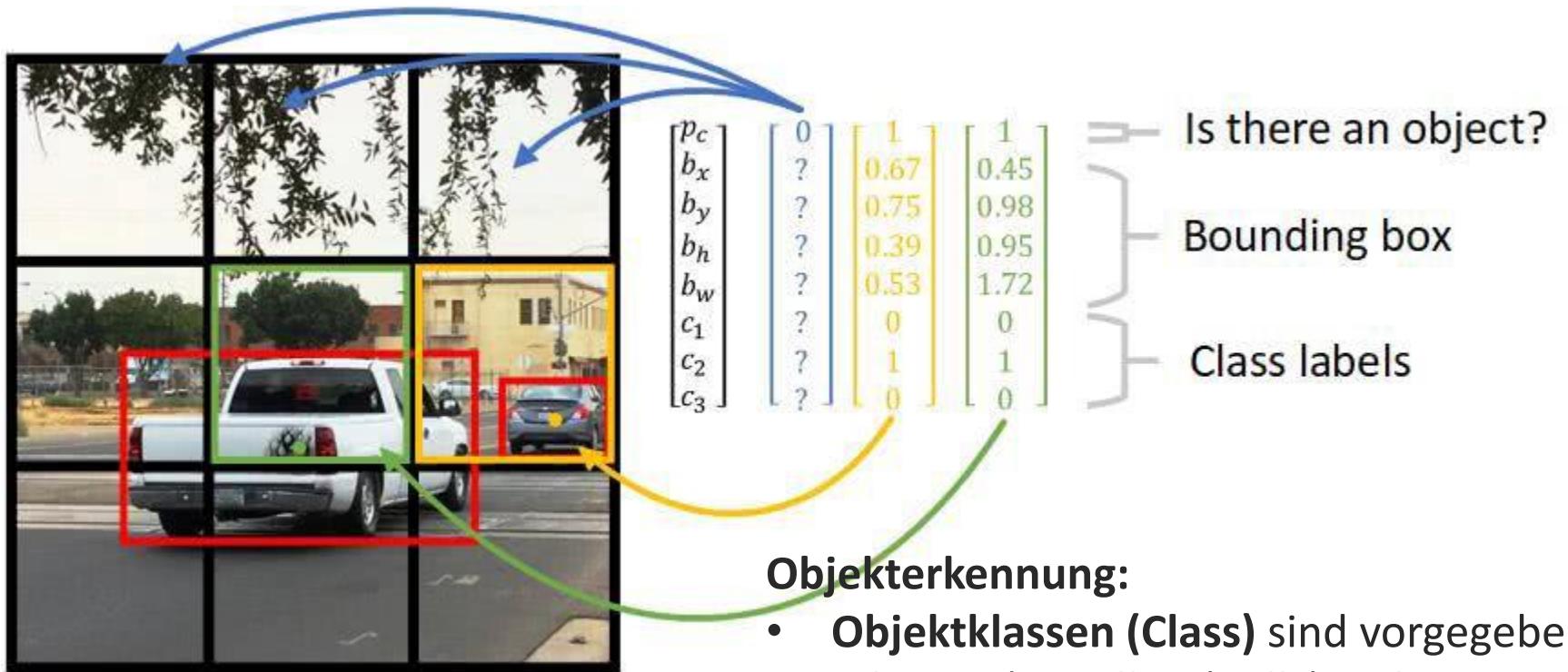
Allen Institute, 2016: You Only Look Once: Unified, Real-Time Object Detection

<https://arxiv.org/pdf/1506.02640.pdf>

Paper YOLO (You Only Look Once): Kernidee



Objekterkennung mit YOLO



Objekterkennung:

- **Objektklassen (Class)** sind vorgegeben
- **Bild in $S * S$ Zellen (Cells) zerlegen**
- **Mehrere B Bounding Boxes** pro Zelle erlernen (erraten)
- **Wahrscheinlichkeit (Confidence)**, dass ein **Objekt** in einer **Zelle** enthalten ist

Objekterkennung mit PP YOLO

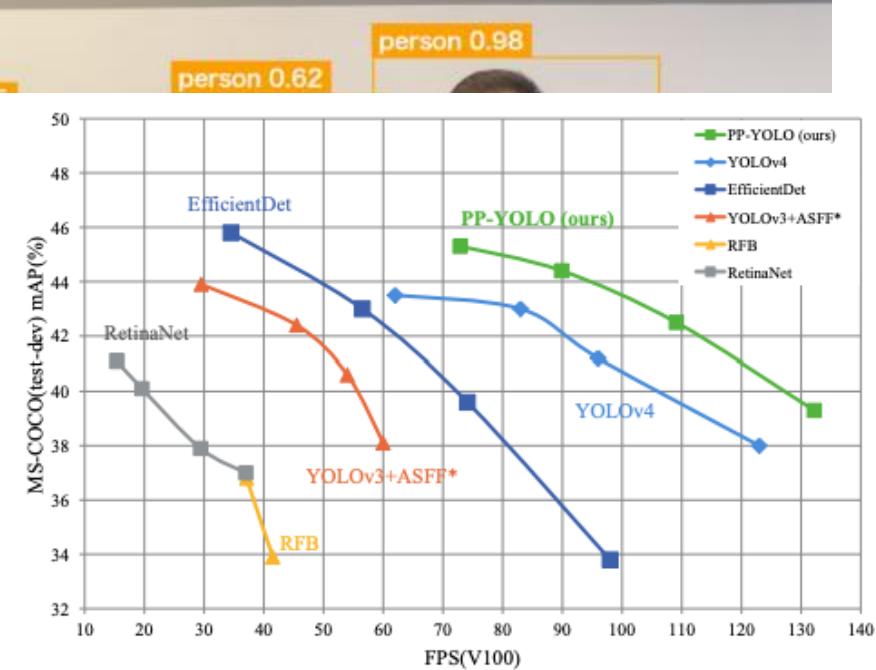
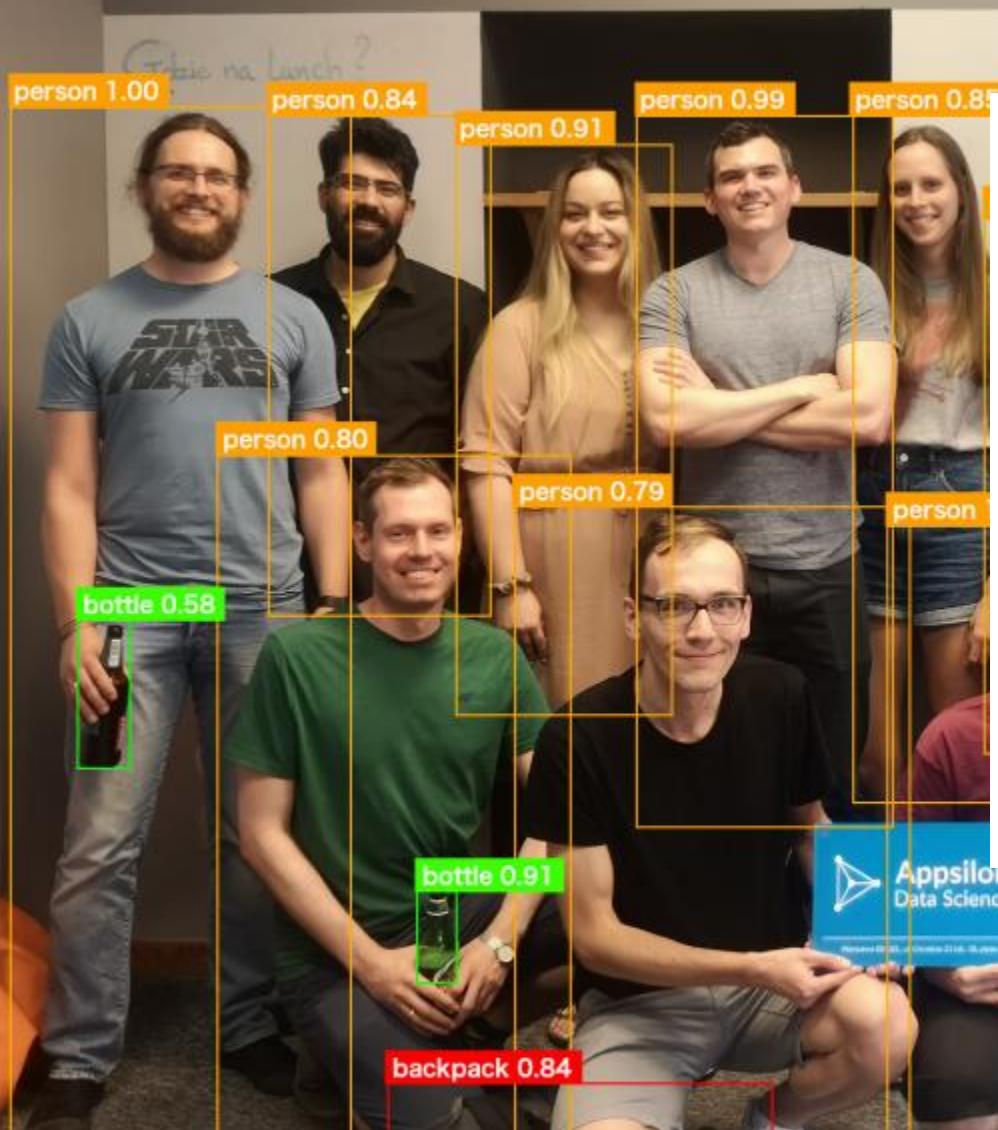


Figure 1. Comparison of the proposed PP-YOLO and other state-of-the-art object detectors. PP-YOLO runs faster than YOLOv4 and improves mAP from 43.5% to 45.2%.



PP-YOLO Object Detection Algorithm: Why It's Faster than YOLOv4, 2020
appslon.com/pp-yolo-object-detection/

Objekterkennung mit PP-YOLO



People on streets : Object detection | PP YOLO 2x, 2020

www.youtube.com/watch?v=X5-UMqz5oNQ