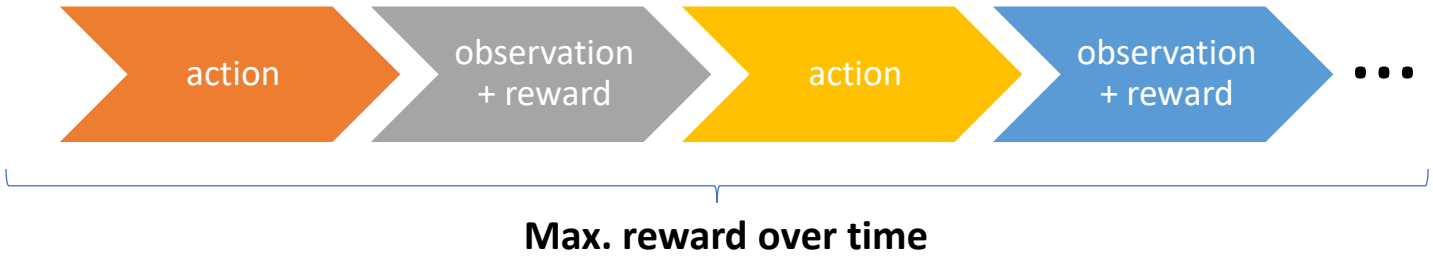
# CS 5/7320 Artificial Intelligence

# More Important AI Topics

Slides by Michael Hahsler

# Reinforcement Learning




**Sequential decision making**: Find a policy $\pi$ that maximizes the expected discounted sum of rewards over time.

$$U = \mathbb{E}\left[\sum_{t=1}^{\infty} \gamma^t R(s_t, \pi(s_t), s_{t+1})\right]$$

Models for the environment and the reward are known (and states evolve Markovian)
- Markov Decision Model (MDP)
- Partially Observable Markov Decision Model (POMDP)

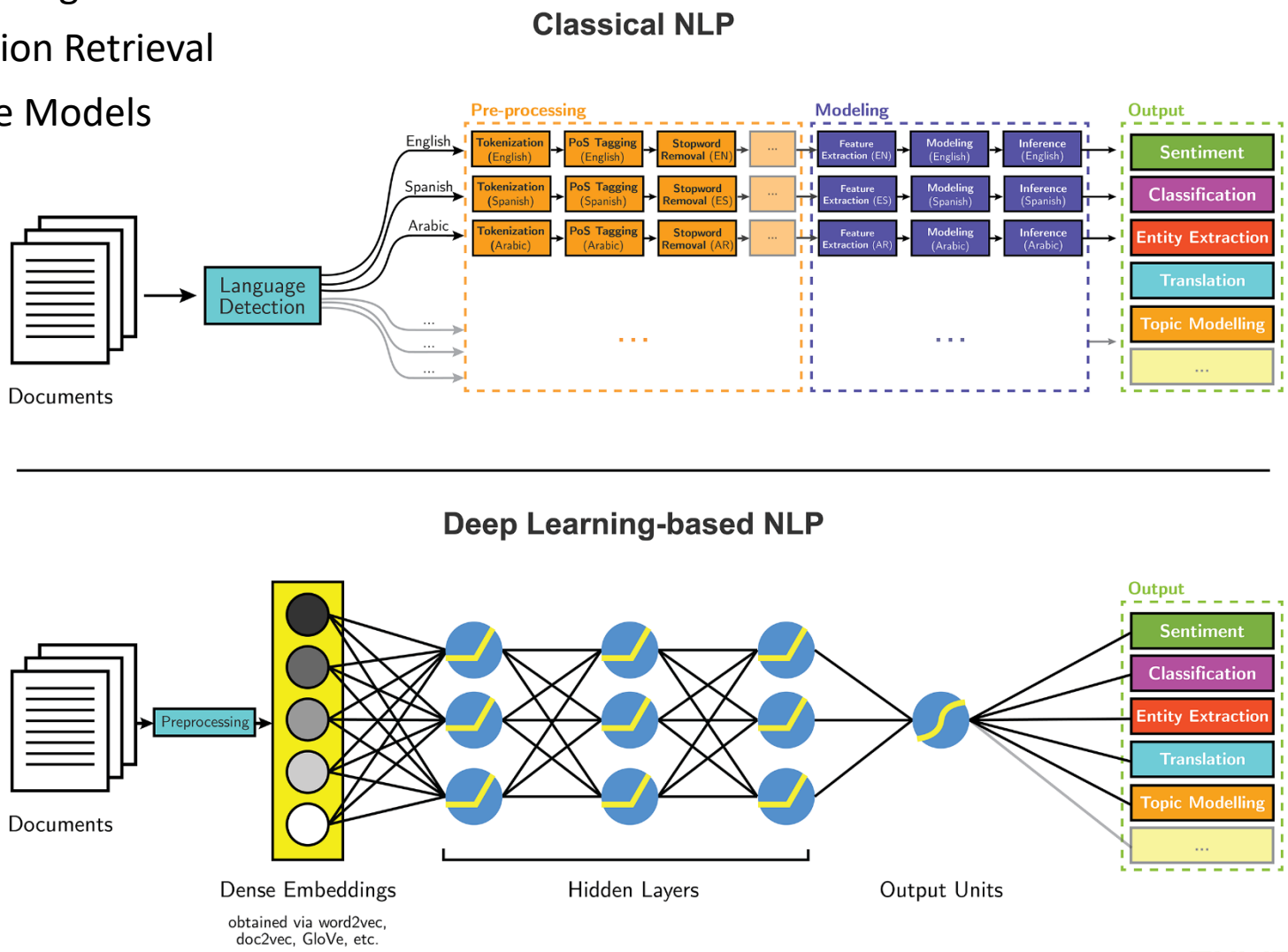
Dynamic Programming
- Value iteration $V(s)$
- Policy iteration $\pi(s)$

Model-free approaches
- Q-Learning (learns the value of actions in states $Q(s, a)$)
- Time differencing (TD learning)

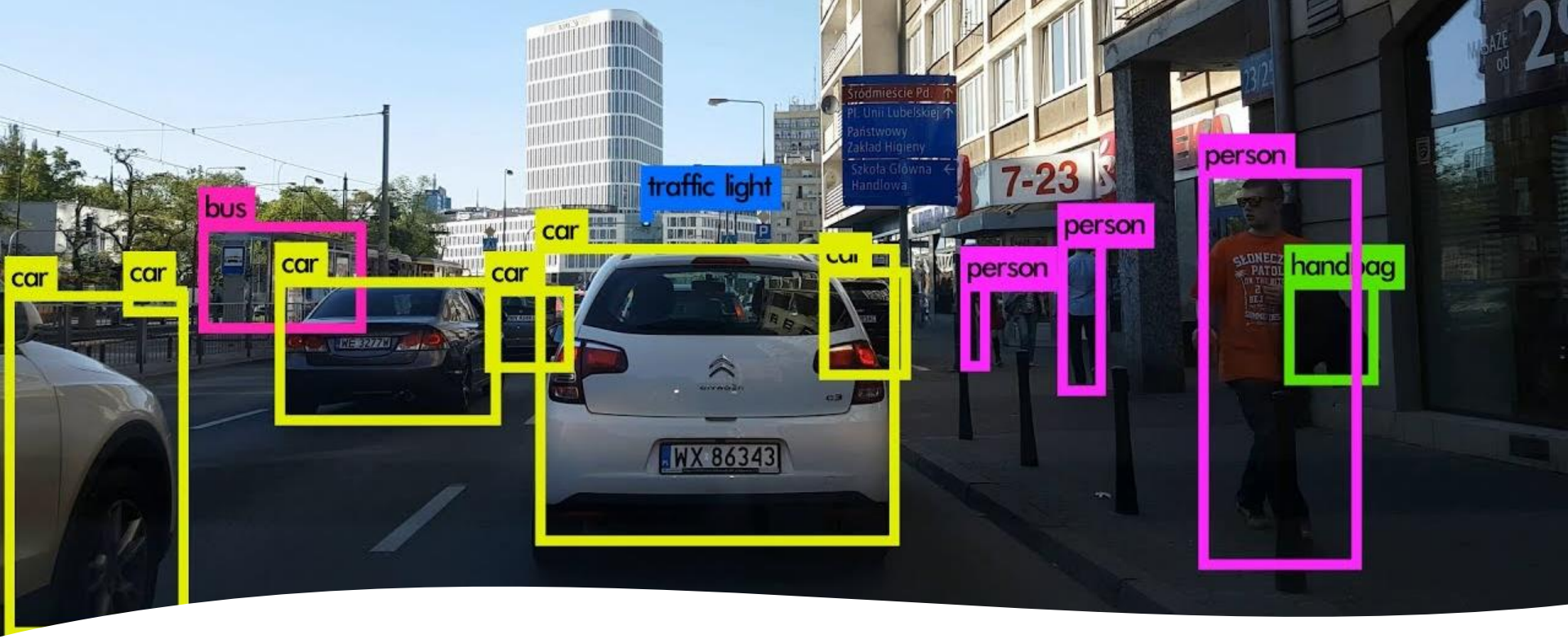
Learn iteratively

# Natural Language Processing

- Speech recognition
- Information Retrieval
- Language Models




Source: [Leveraging Deep Learning for Multilingual Sentiment Analysis - AYLIEN News API]




# Computer Vision
# Image Processing & Object Recognition

Uses Deep Convolutional Neural Networks

# Robotics

- Hardware, sensors, control theory (feedback-based controllers)