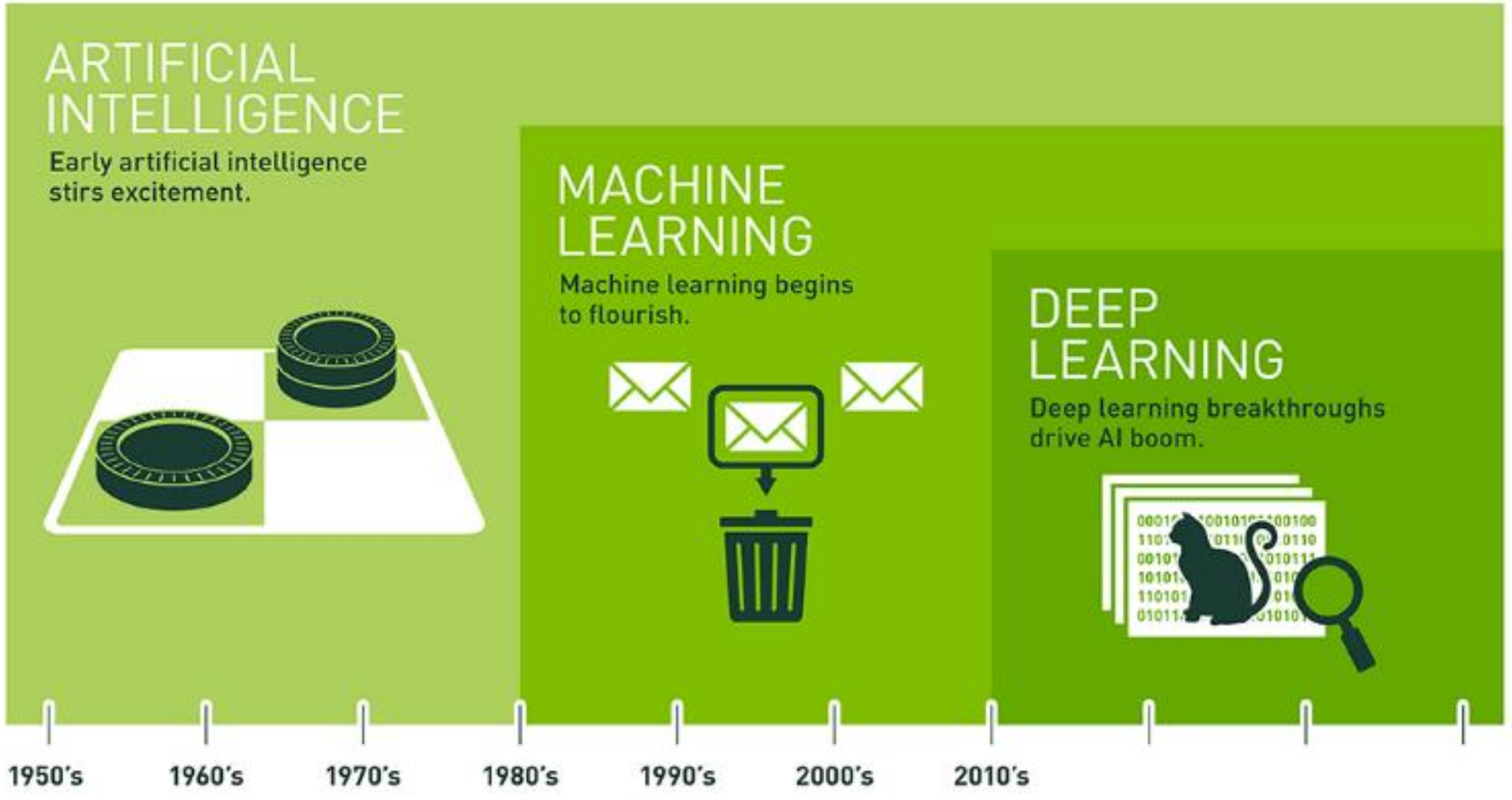
Tobias Weis

ML Praktikum 17/18

Intro – ML in (your) daily life

Terms



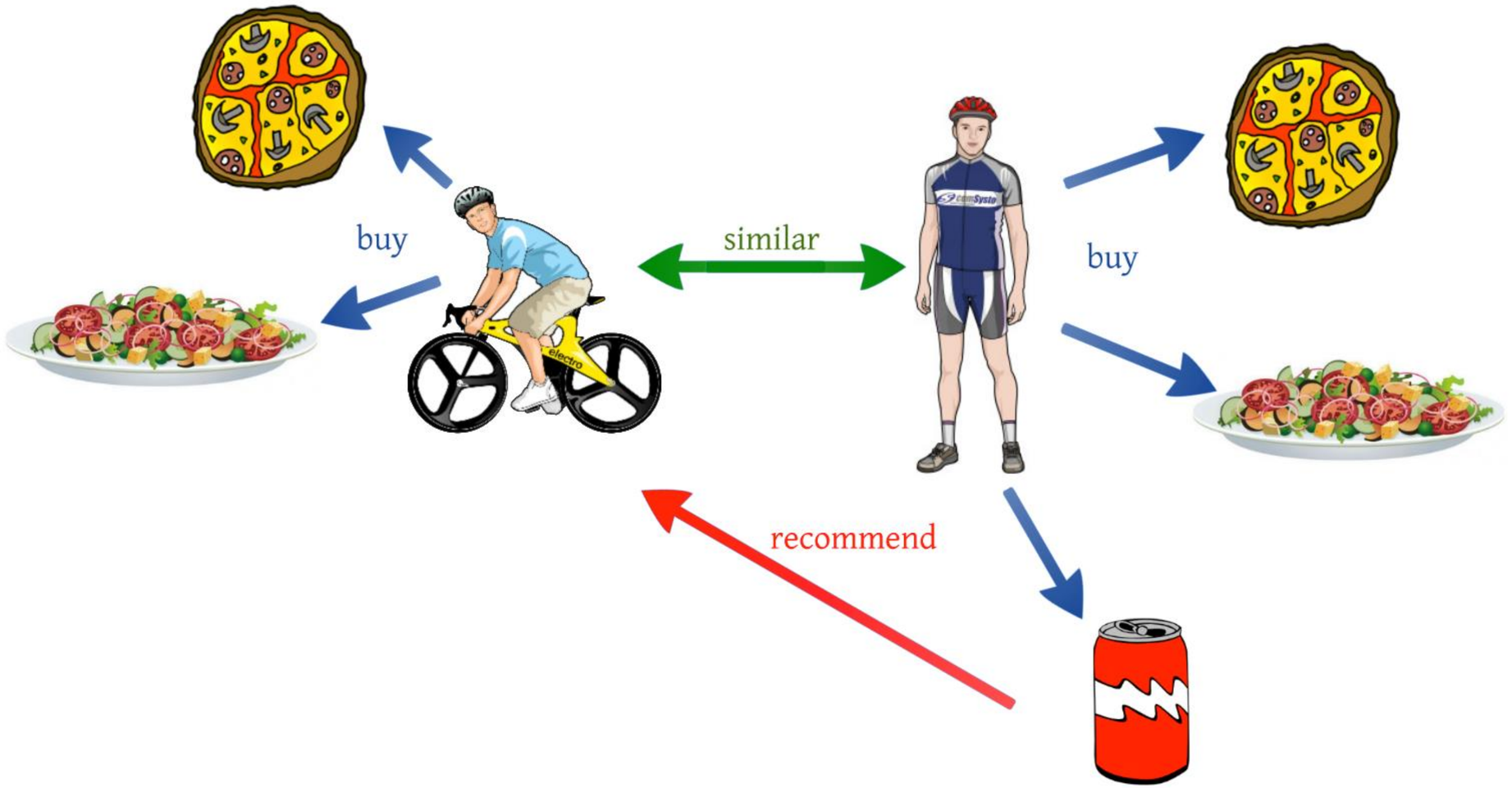
Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/

ML in daily life

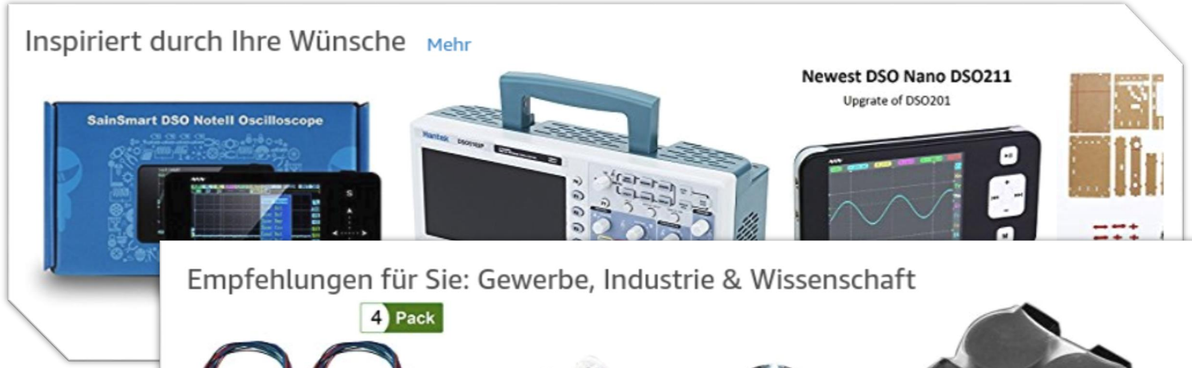
Recommender systems
Medicine/Pharma
E-commerce
Finance, Fraud detection
Smart home devices
Video games
Customer support, chat bots
Machine translation
Smart cars
Surveillance, Security
Recruiting, Job market
Robot control

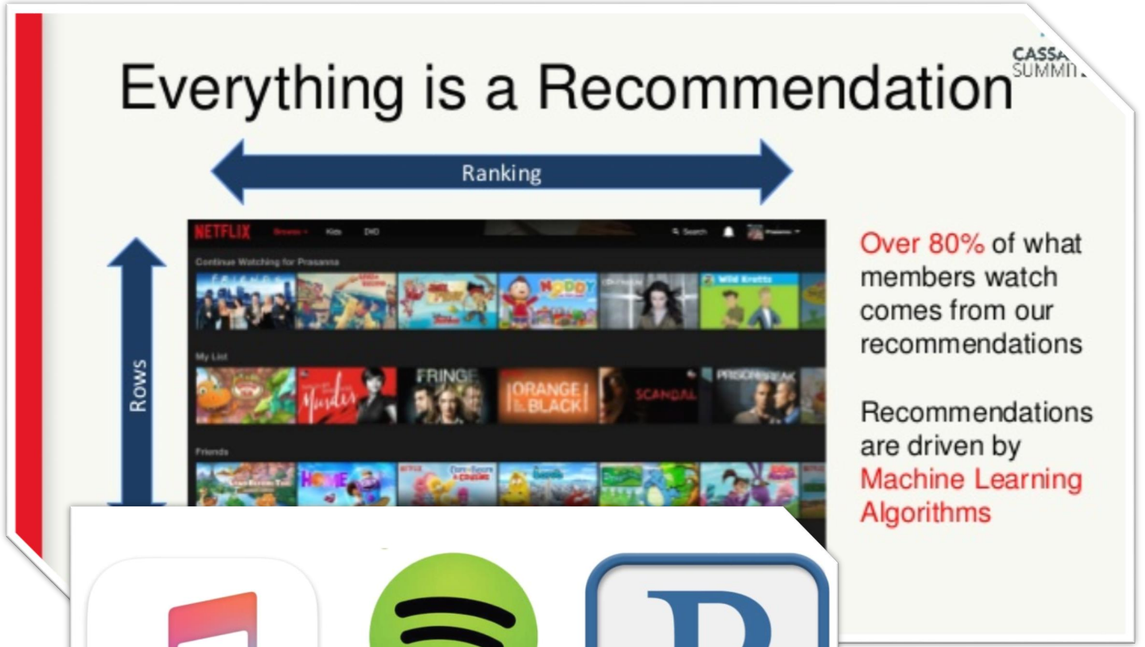
Recommender systems

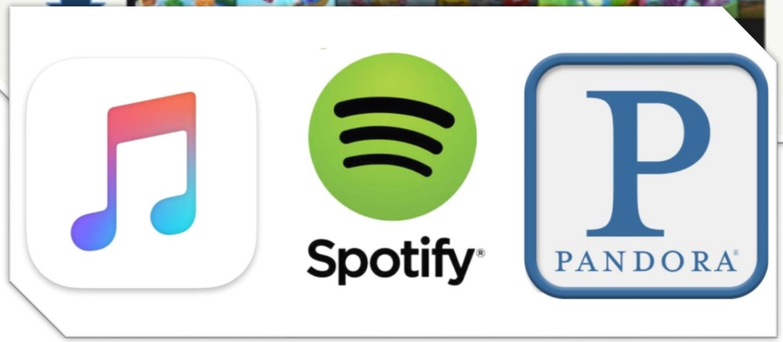


[https://blog.soton.ac.uk/smallworld/2015/04/25/game-theory-and-recommendation-systems/]

Recommender systems - Examples



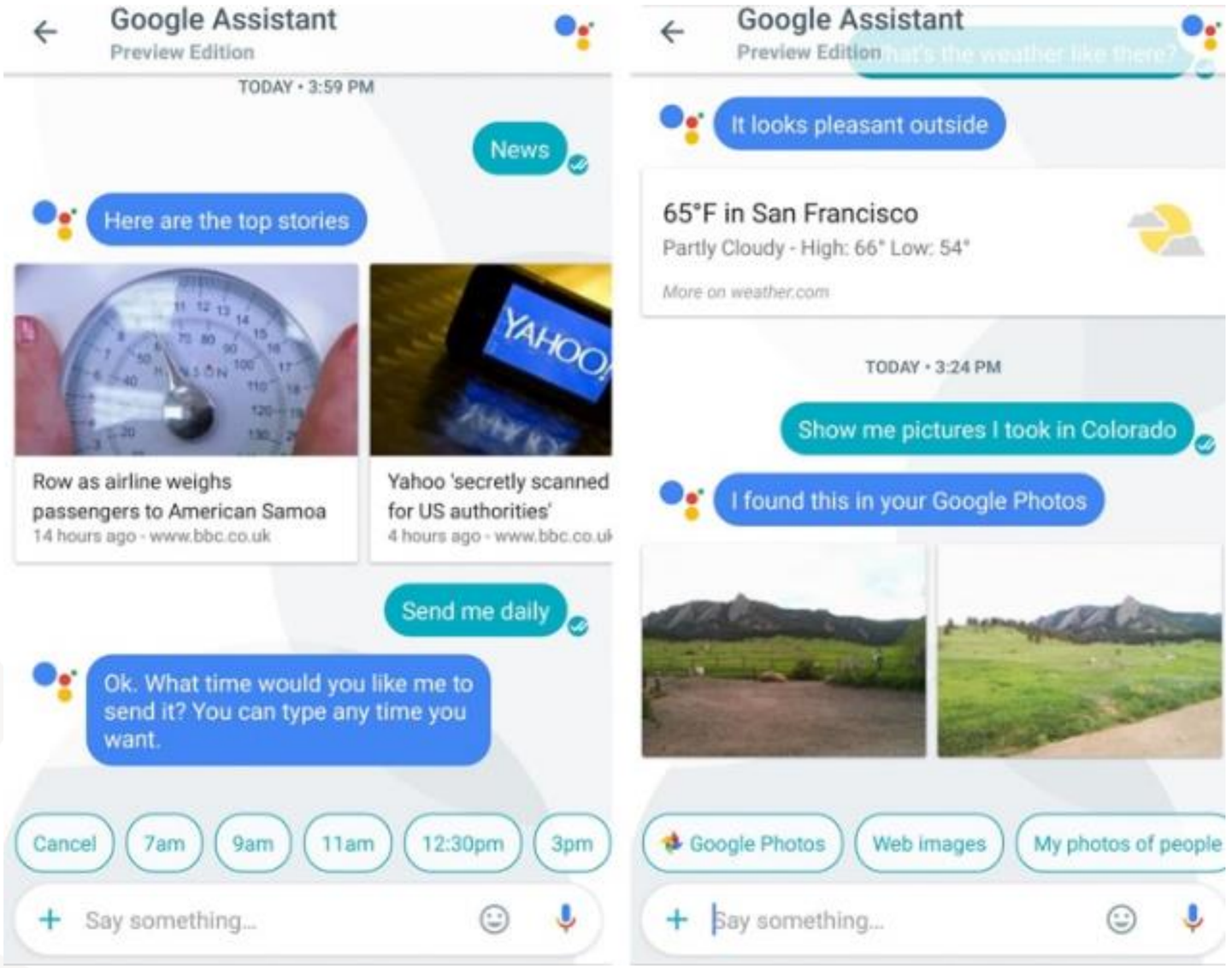




„We use math to get you dates“

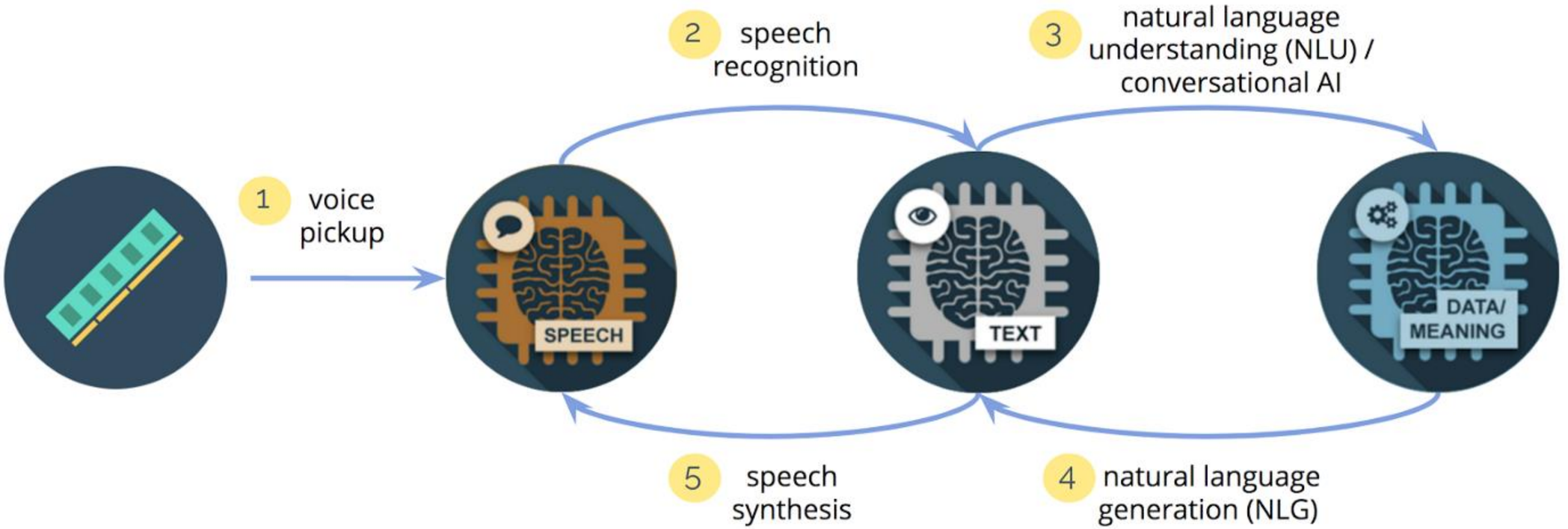
[amazon.de]
[https://www.okcupid.com/about]
[https://www.slideshare.net/DataStax/netflix-recommendations-using-spark-cassandra]

Personalized assistants - NLP



https://www.fudzilla.com/news/41763-google-assistant-uses-ai-machine-learning-to-become-people-friendly

Personalized Assistants – NLP and Speech recognition

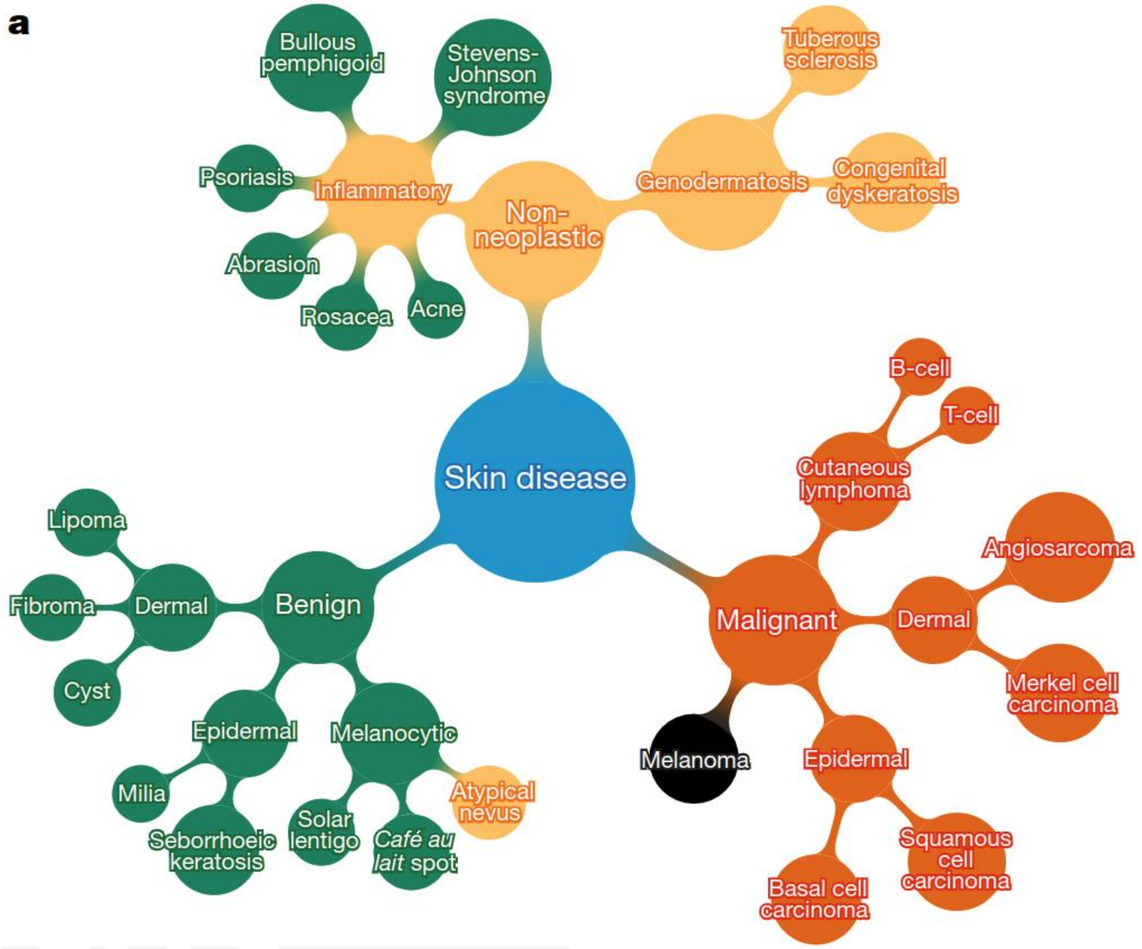


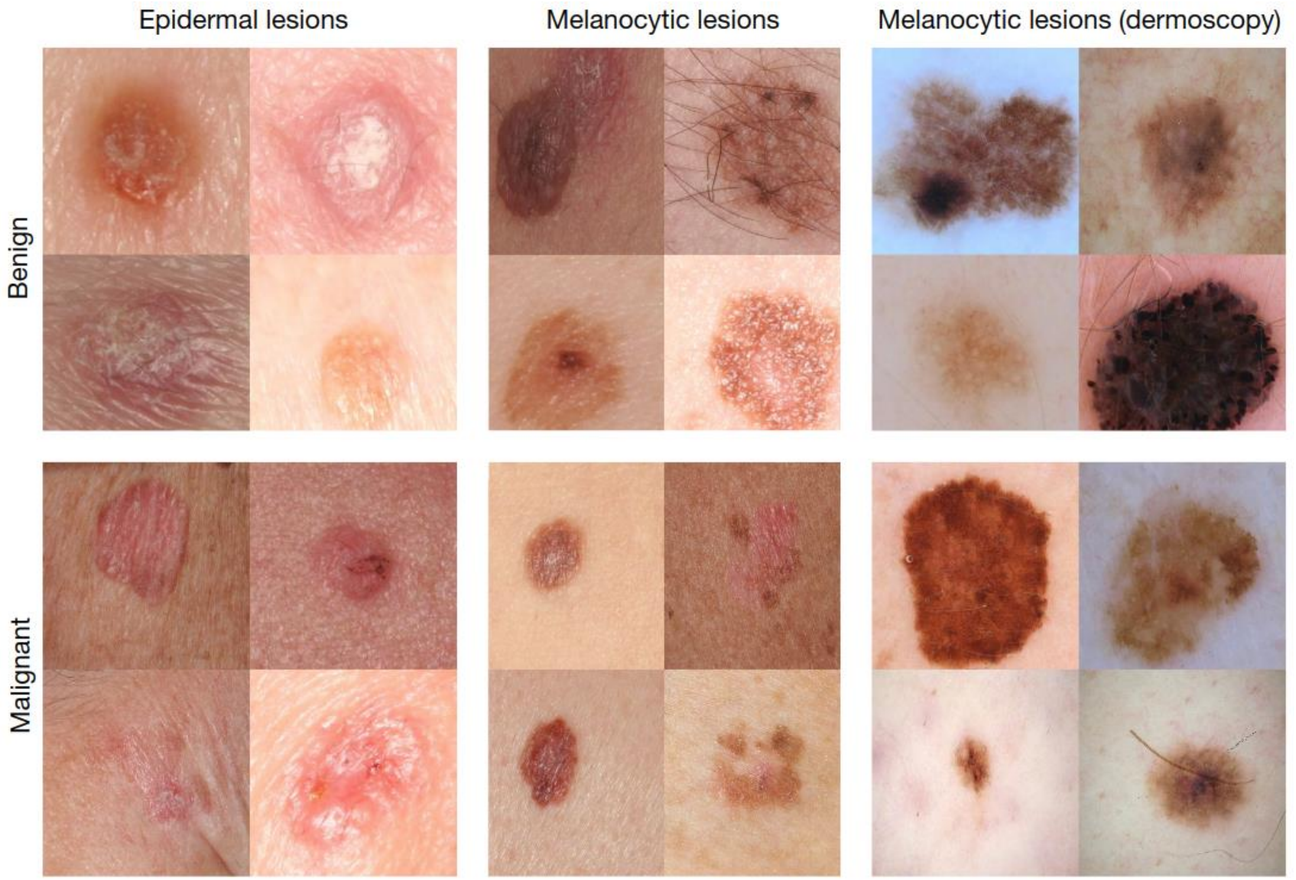
* There may be substitutions and more complicated functionalities within NLU/conversational AI in the future.

Medicine/Pharma

Disease identification / diagnosis
Personalized treatments
Drug discovery
Clinical trial research
Radiology, radiotherapy
Smart electronic health records
Epidemic outbreak prediction

Dermatologist-level classification of skin cancer with deep neural networks





Medicine - Diagnosis

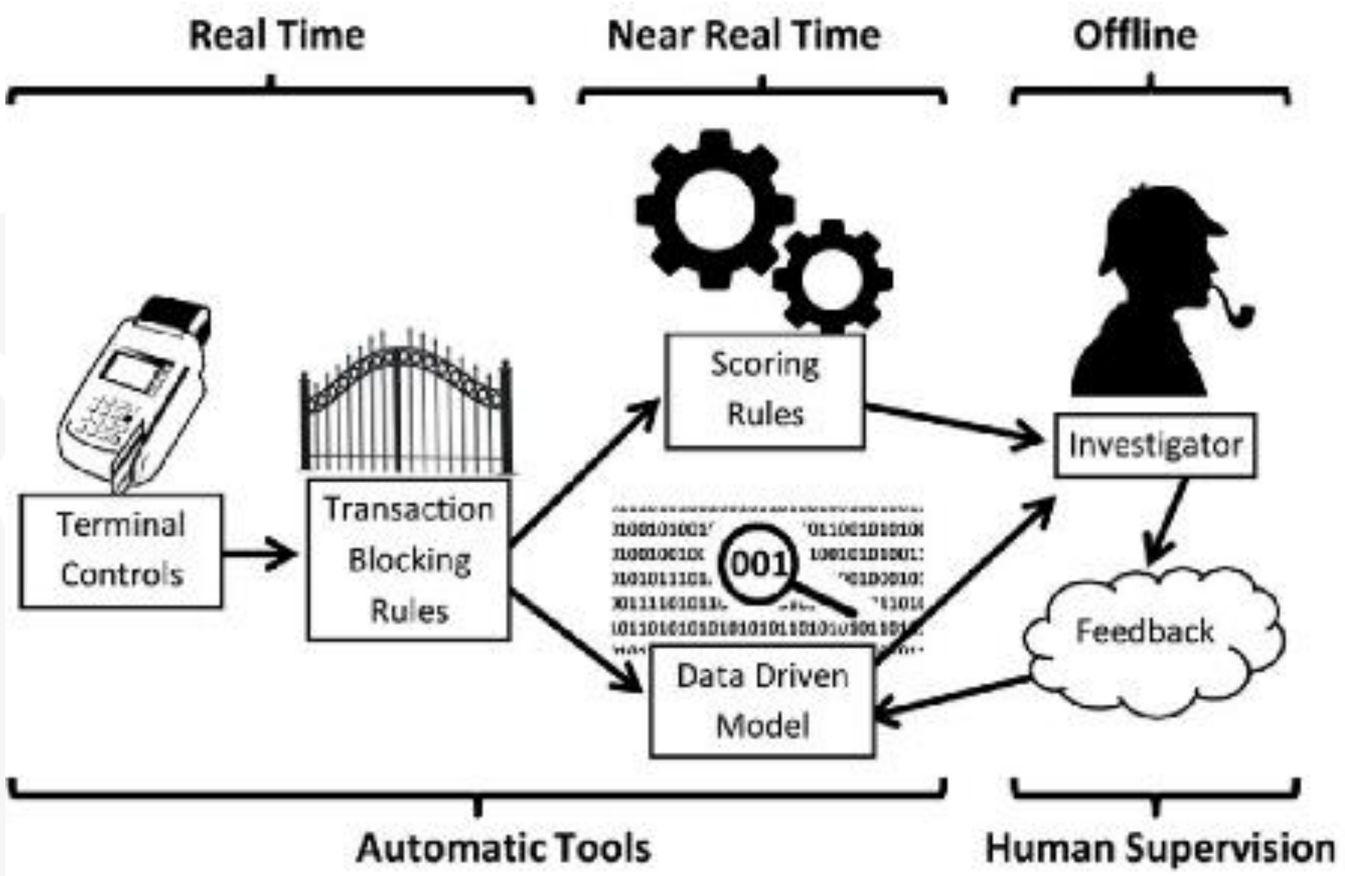
“Face2Gene is a suite of phenotyping applications that facilitate comprehensive and precise genetic evaluations.” [face2gene.com]

E-Commerce

- All areas of Search (ranking,query understanding, query expansion, related queries)
- Recommendation (you may like ...)
- Merchandising (this item goes with this item)
- Image recognition and understanding
- Concept extraction
- Sentiment and trend analysis
- Shipping cost and time estimation
- Inbound and outbound logistics optimization
- All manner of fraud detection and prevention (a long list here)
- Classification
- Pricing
- Supply and demand analysis and forecast
- Various scheduling and optimal resource allocation

Fraud detection

SCARFF: A scalable framework for streaming credit card fraud detection with spark

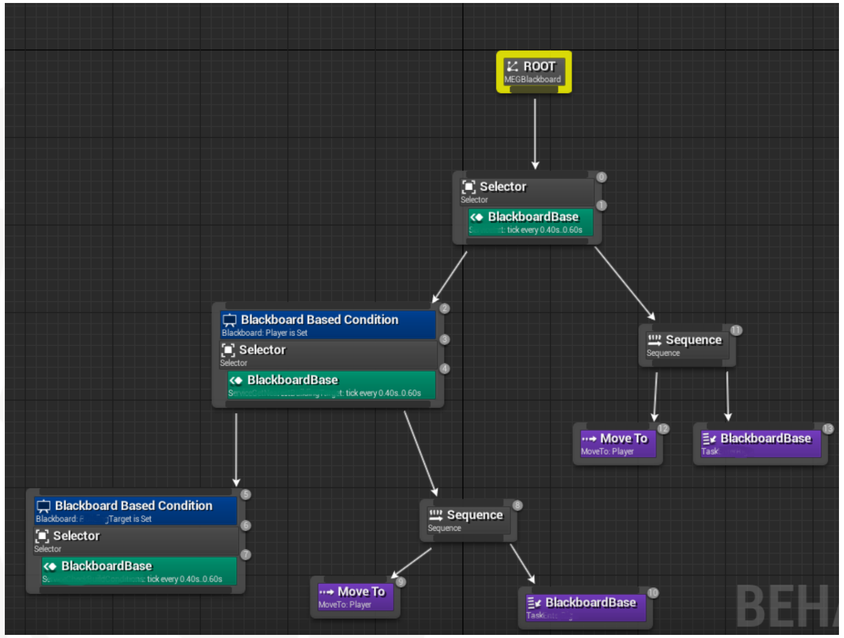


Smart Home

http://blog.airpatrol.eu/wp-content/uploads/2016/10/bigstock-Smart-Home-103718372-1200x800.jpg

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

NPCs - Unreal Engine 4 – Behavior trees (also used in Halo)



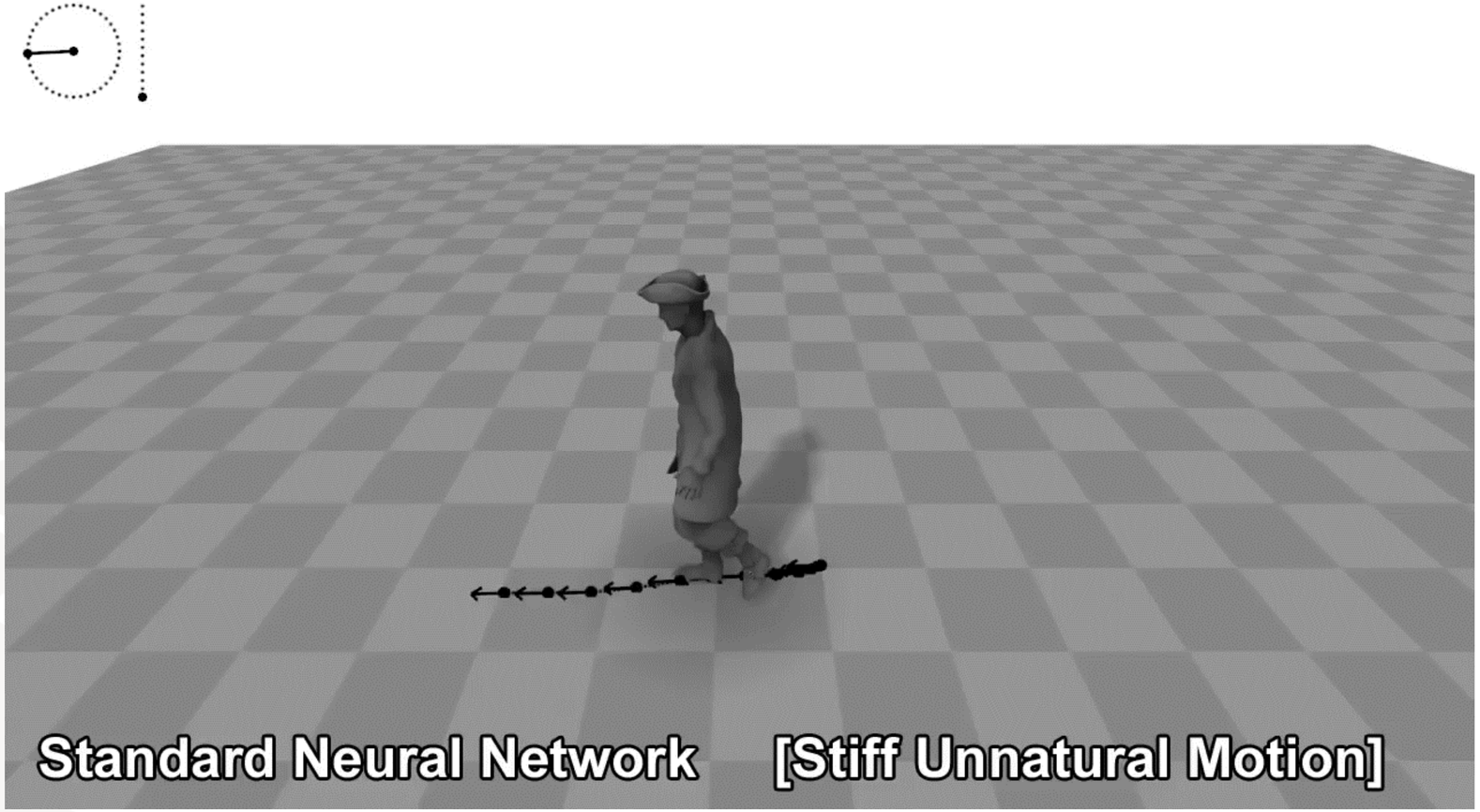
DEBUG MODE:

SHOWS HOW THE AI PERFORMS THE SEARCH.

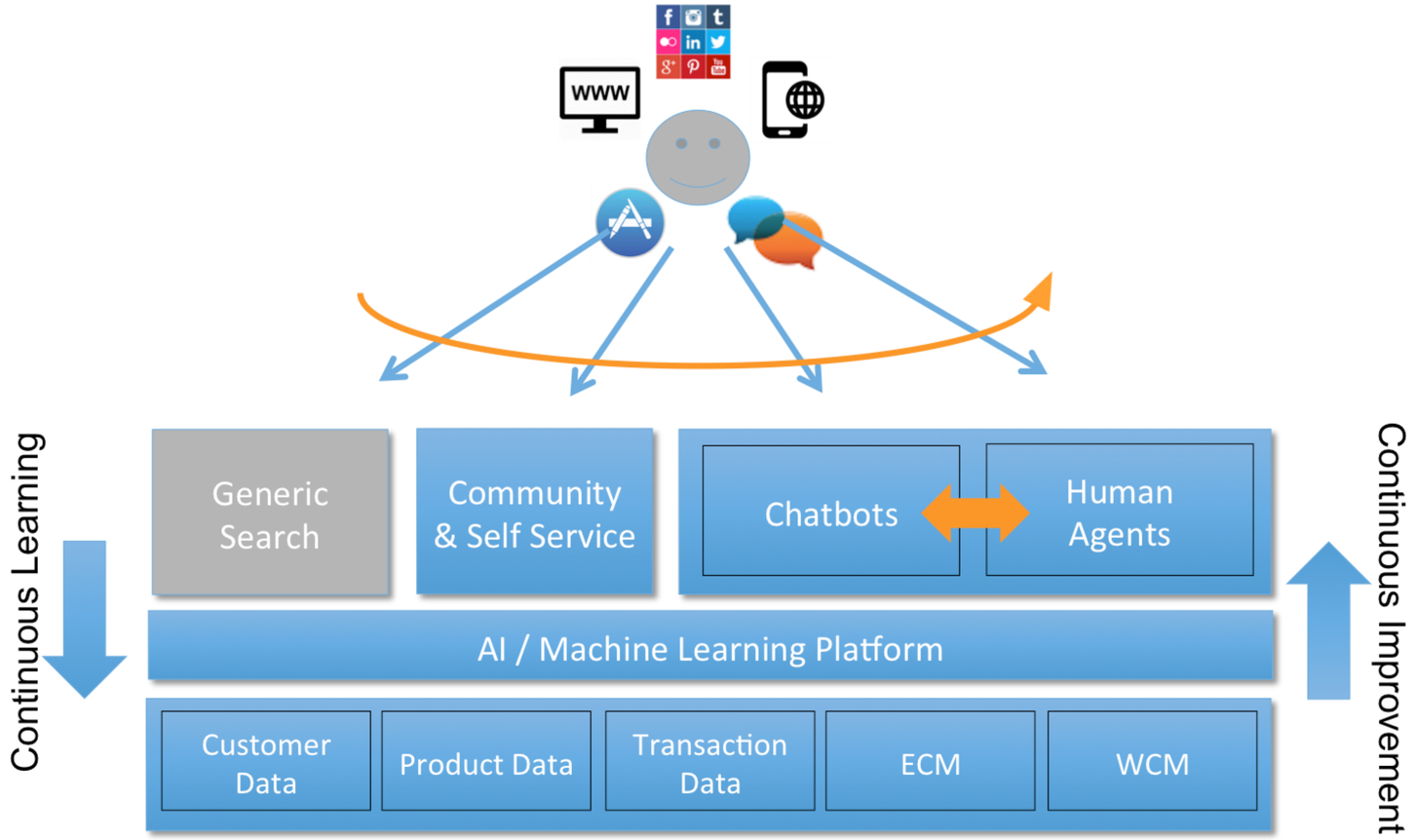
https://answers.unrealengine.com
https://www.youtube.com/watch?v=36cKiPPrGHo

Video Games

Simulation of realistic motions

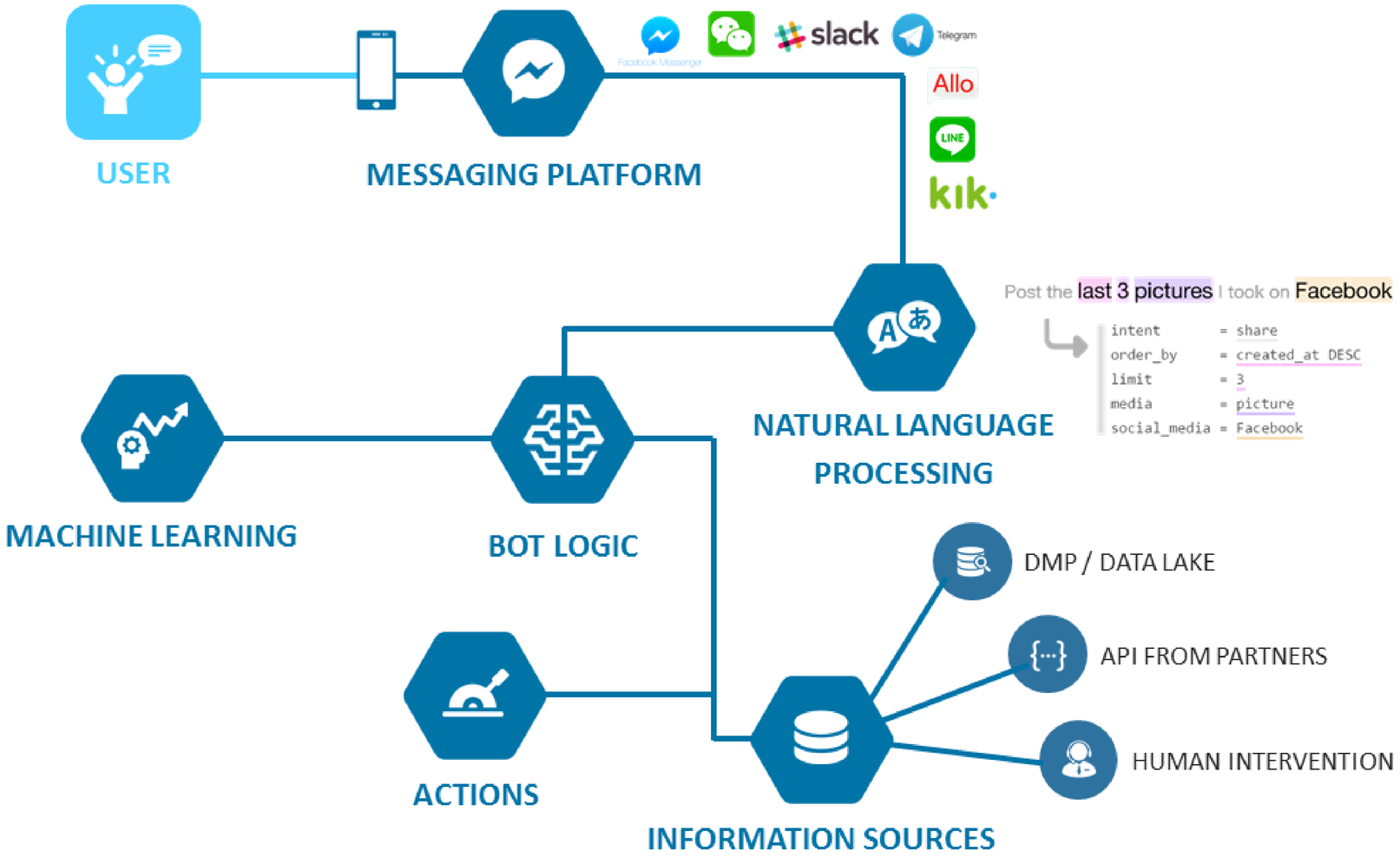


Customer Service Infrastructure



http://www.epikonic.com/wp-content/uploads/Customer-Service-Infrastructure.png

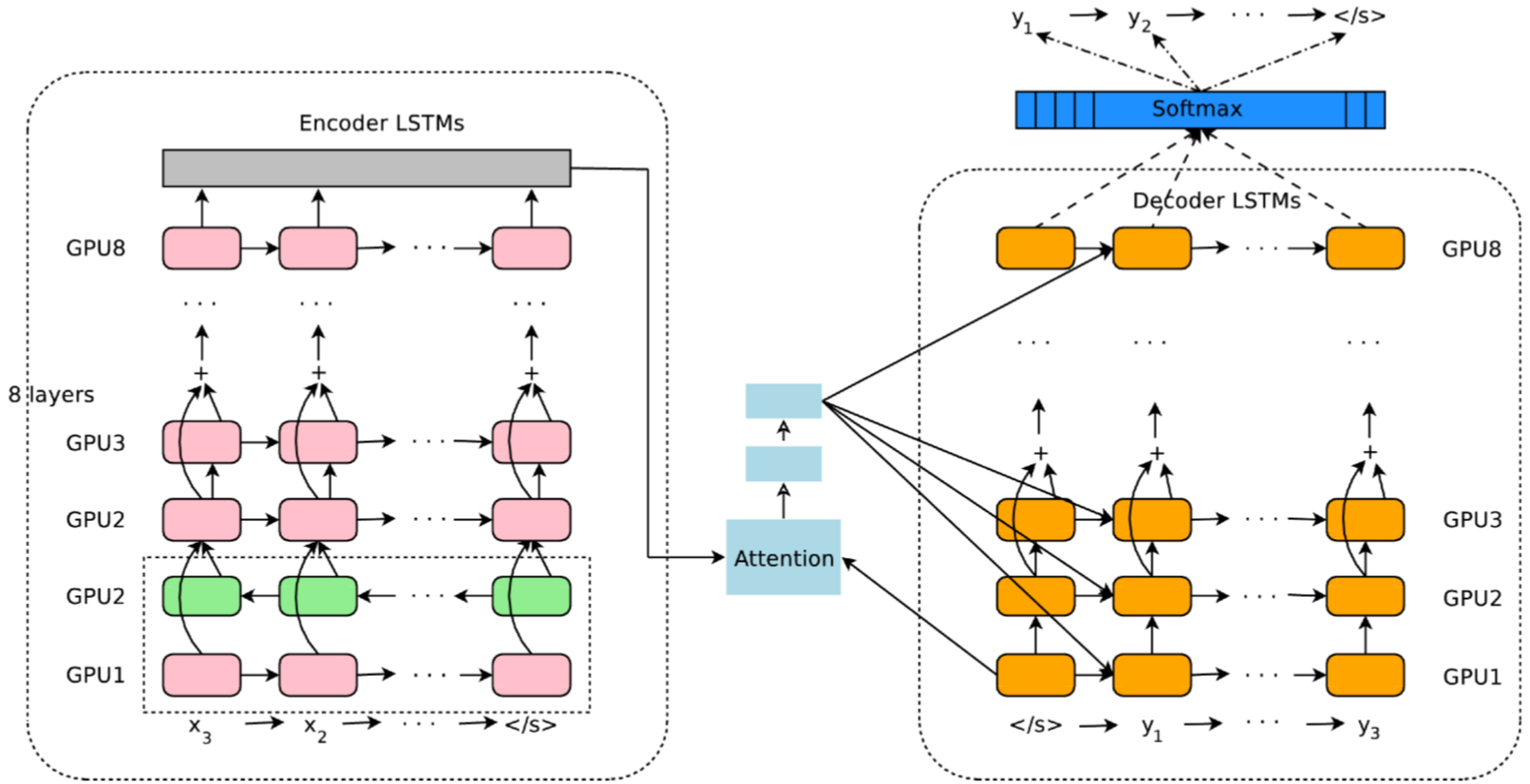
Chatbots



https://chatbotsmagazine.com/the-ultimate-guide-to-designing-a-chatbot-tech-stack-333eceb431da

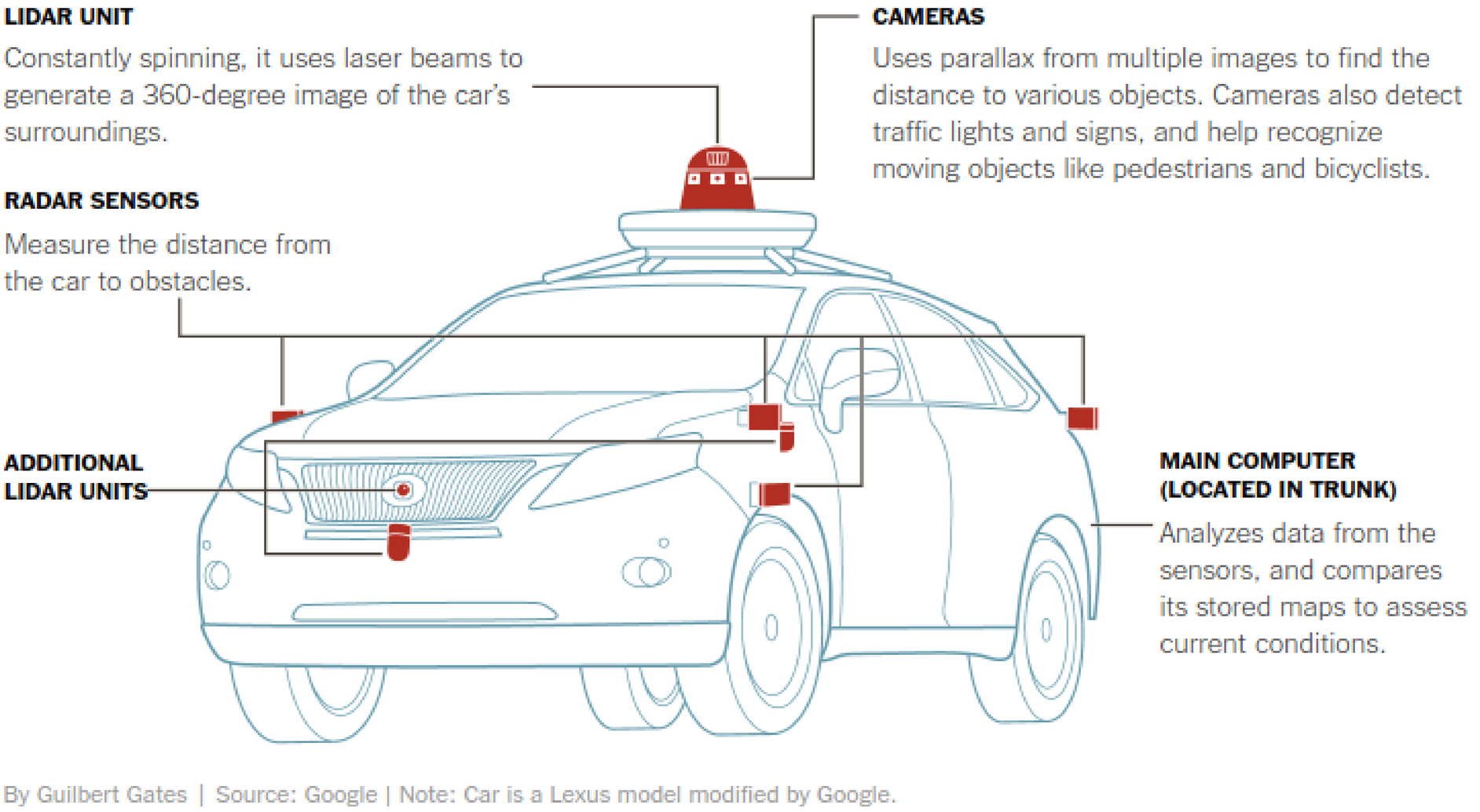
Machine translation

Neural machine translation currently employed by google



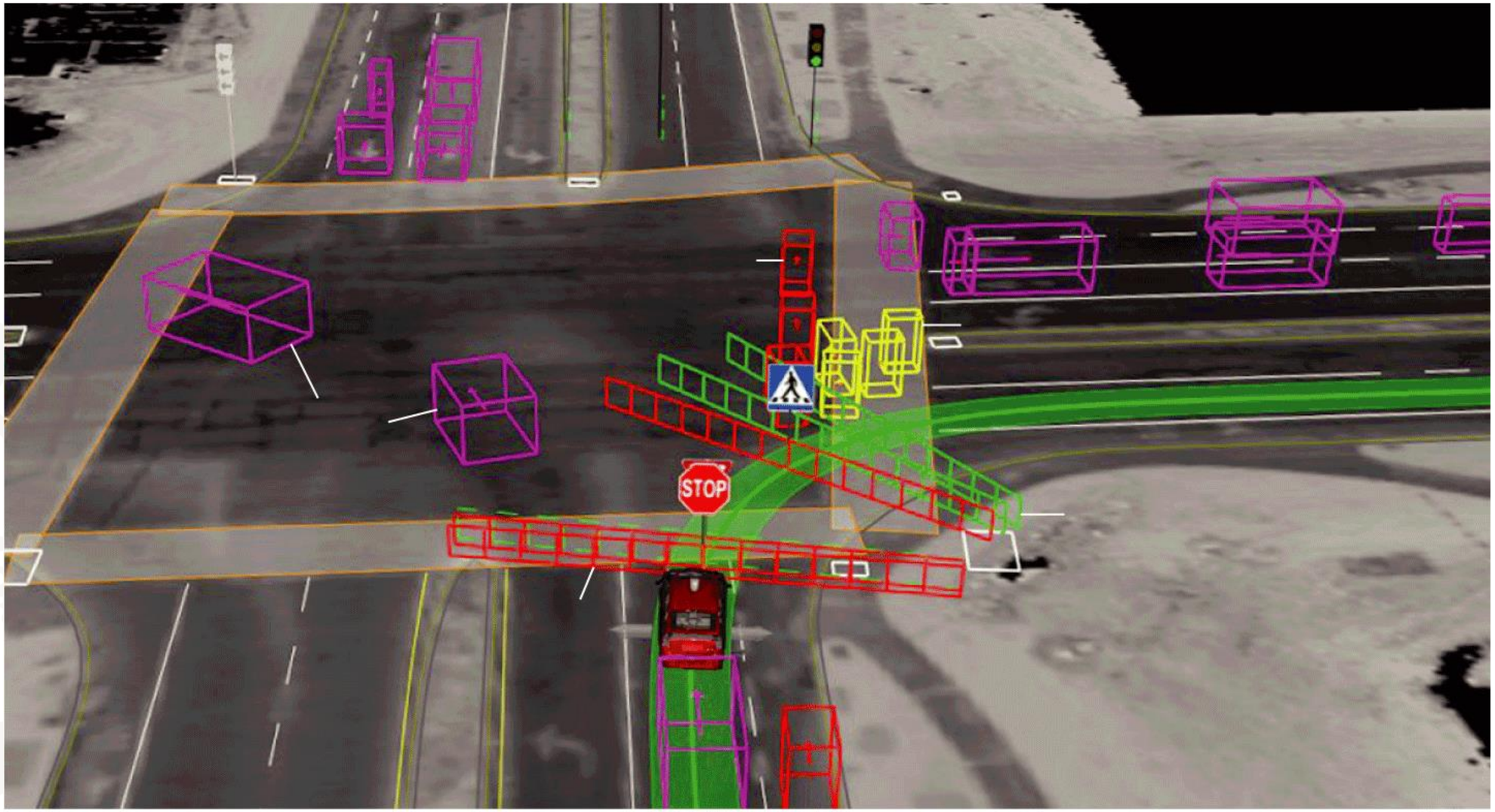
[Google's Neural Machine Translation System: Bridgin the Gap between Human and Machine Translation]

Smart cars – autonomous driving



https://www.nytimes.com/interactive/2016/12/14/technology/how-self-driving-cars-work.html?_r=0

Smart cars – autonomous driving

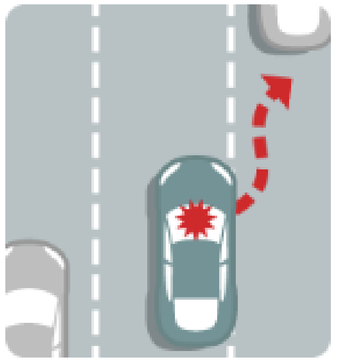


https://www.nytimes.com/interactive/2016/12/14/technology/how-self-driving-cars-work.html?_r=0

Smart cars – autonomous driving

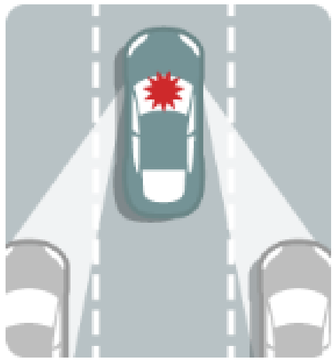
Collision avoidance

Radar-, laser-, or camera-based systems warn of an impending collision, and can automatically apply the brakes in some cases.



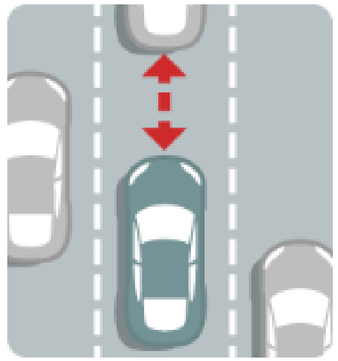
Drifting warning

If a car begins to deviate from its lane, some systems alert the driver and apply a small counter-steering force.



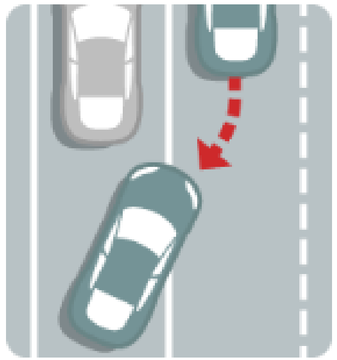
Blind-spot detectors

Cameras or radar can detect vehicles in the driver's blind spot and then alert the driver with sounds or warning lights.



Enhanced cruise control

A predefined distance can be maintained to the vehicle ahead. If it slows, your car also slows.

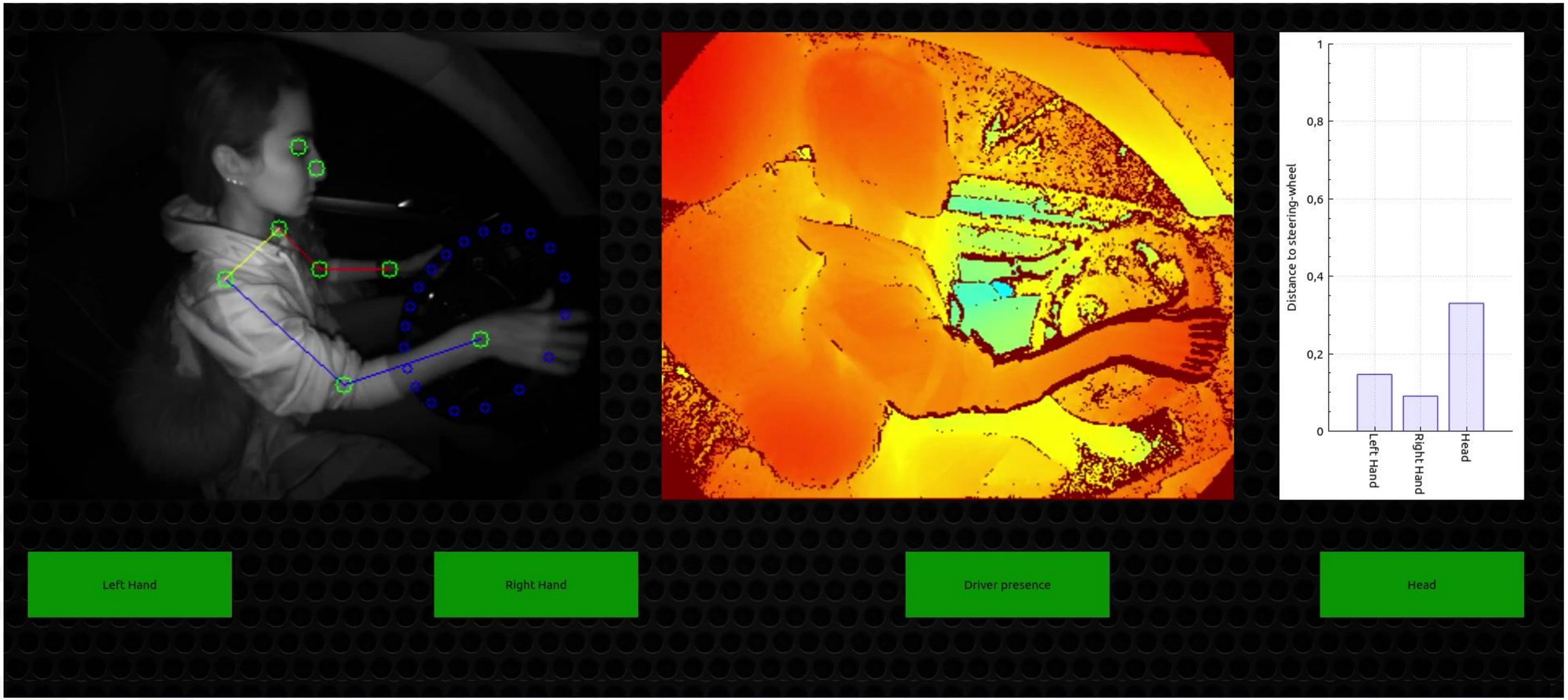


Self parking

The car maneuvers itself into a parking spot using cameras or sonar. But the driver usually has to brake and follow commands.

https://www.nytimes.com/interactive/2016/12/14/technology/how-self-driving-cars-work.html?_r=0

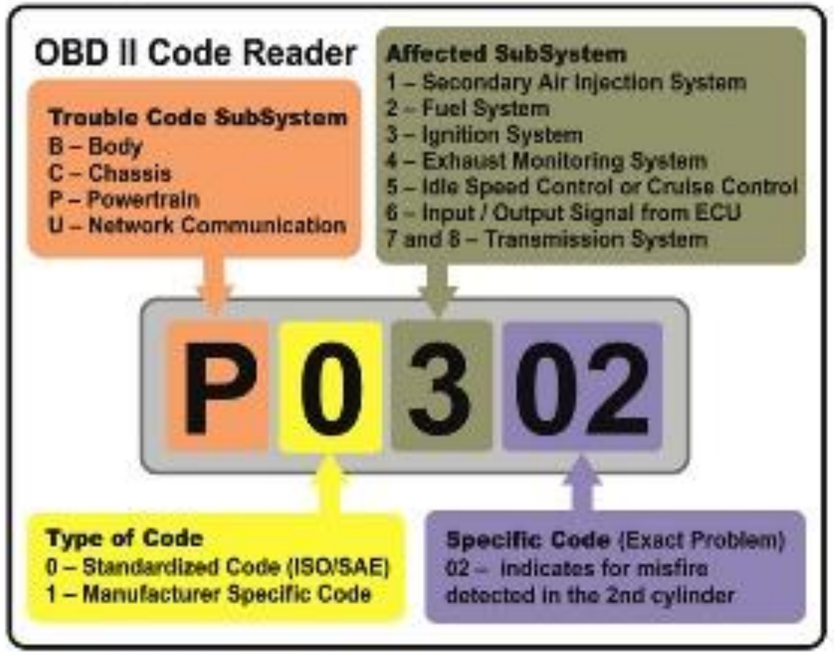
Smart cars – Driver/passenger monitoring



Smart cars – Predictive maintenance

On-Board Diagnostics

Diagnostic Trouble Codes (DTC)



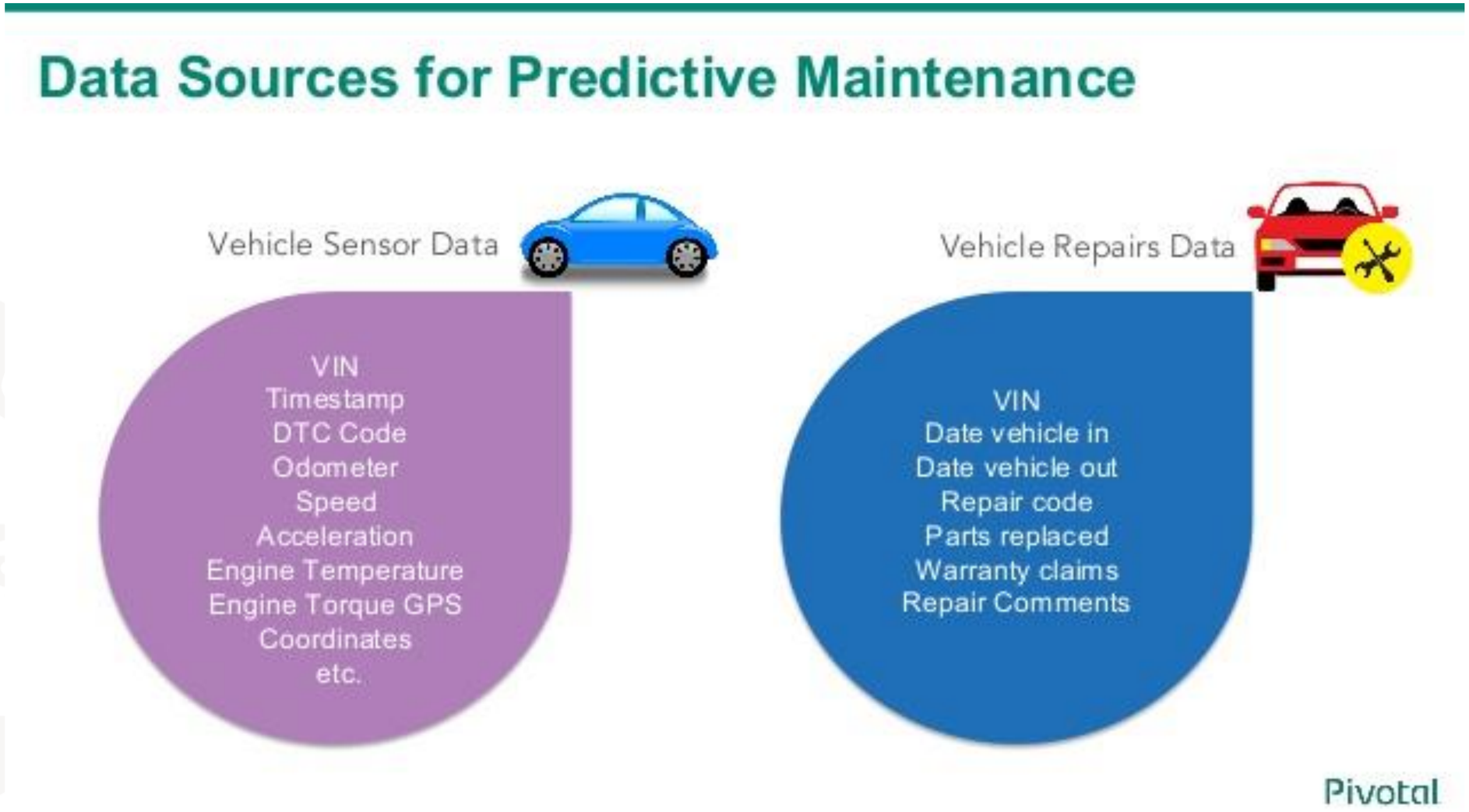
Unscheduled repairs

AB1029 - Power steering pump replacement
CT3408 - Wheel alignment

Pivotal

https://www.slideshare.net/EstherVasiete/the-data-science-behind-predictive-maintenance-for-connected-vehicles

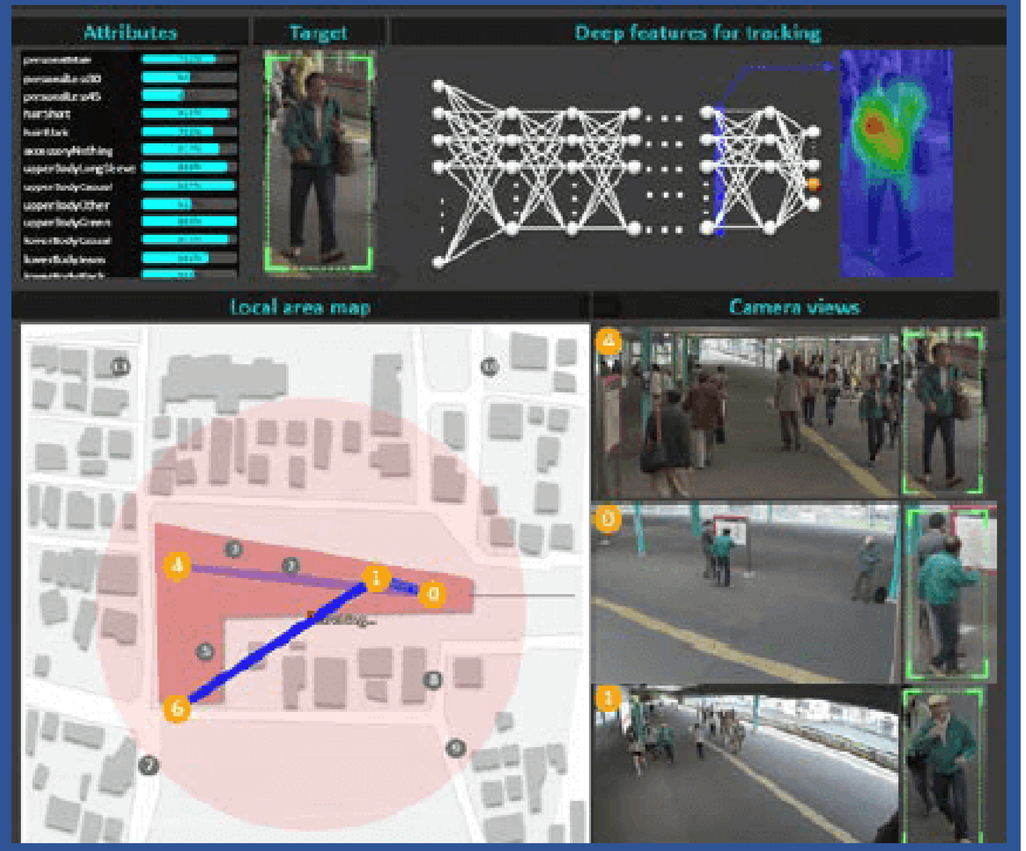
Smart cars – Predictive maintenance



https://www.slideshare.net/EstherVasiete/the-data-science-behind-predictive-maintenance-for-connected-vehicles

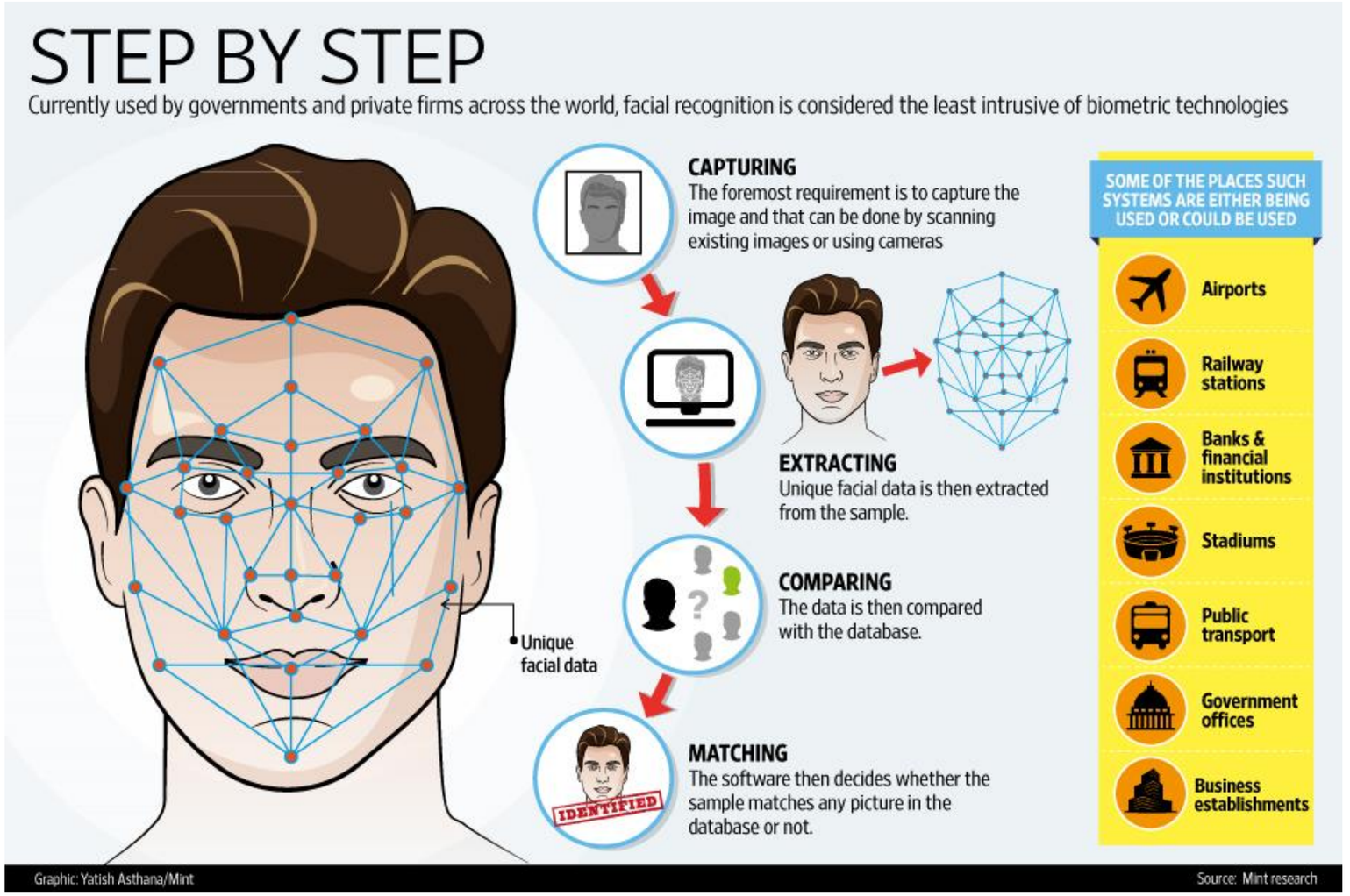
Surveillance, security

1. Detection
Real-time categorization and search of external appearance and movement features



2. Tracking
Analysis of the entire body image, and extract images of the same person

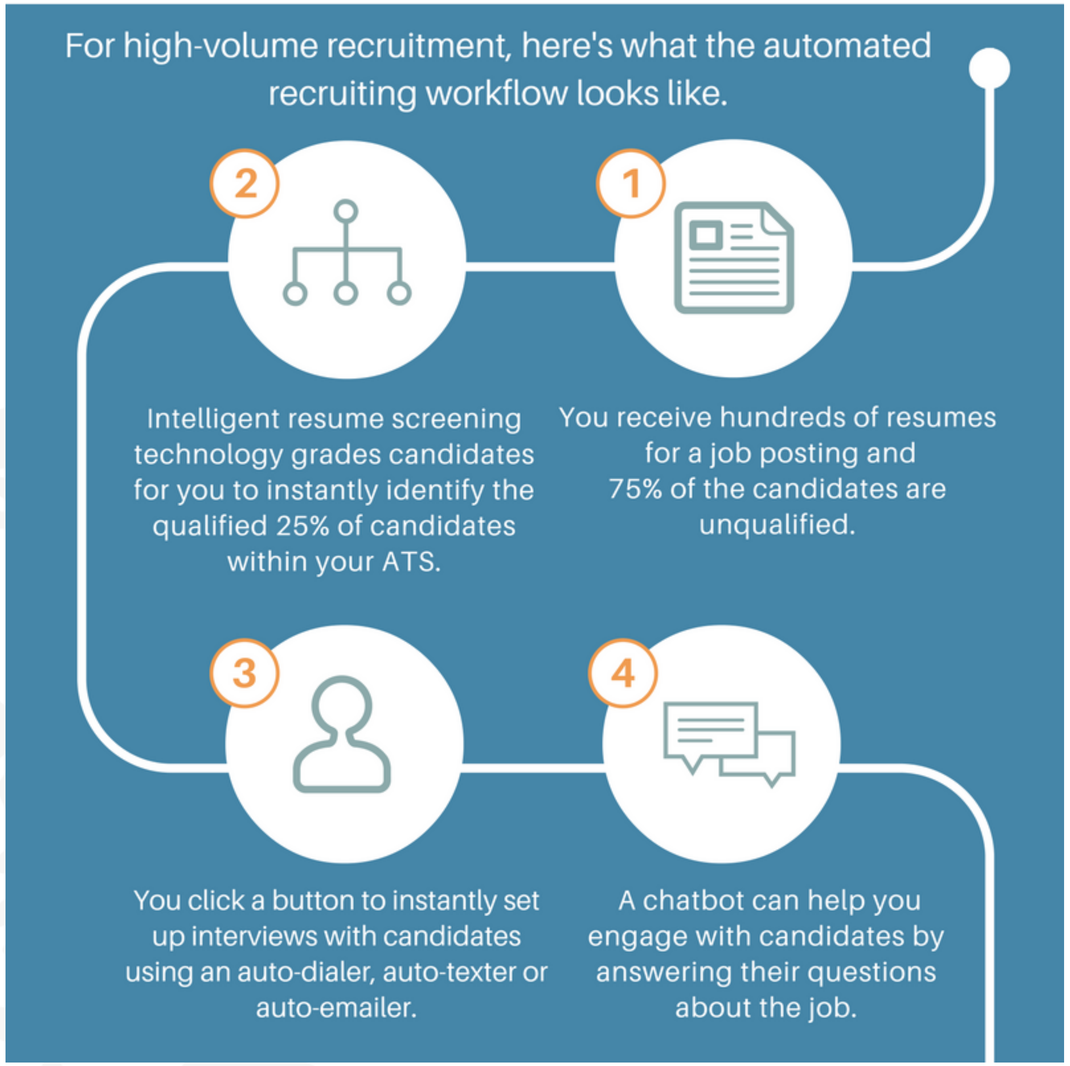
Surveillance, security

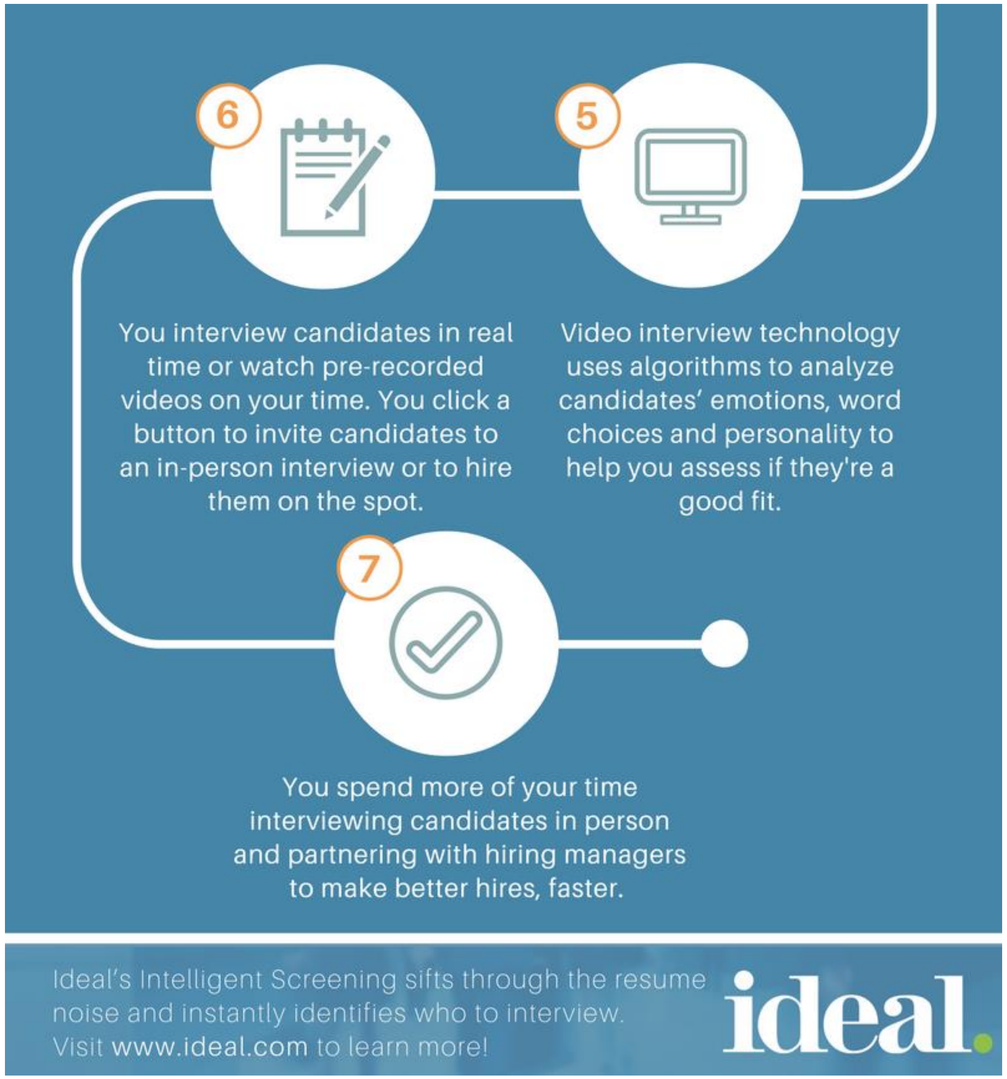


https://www.computerworld.com/article/3225874/mobile-wireless/apples-clever-strategy-for-forcing-partners-to-use-face-id.html

http://www.livemint.com/Consumer/pFBcdMfLmXKXOiphe2RbFL/How-facial-recognition-works.html

Recruiting





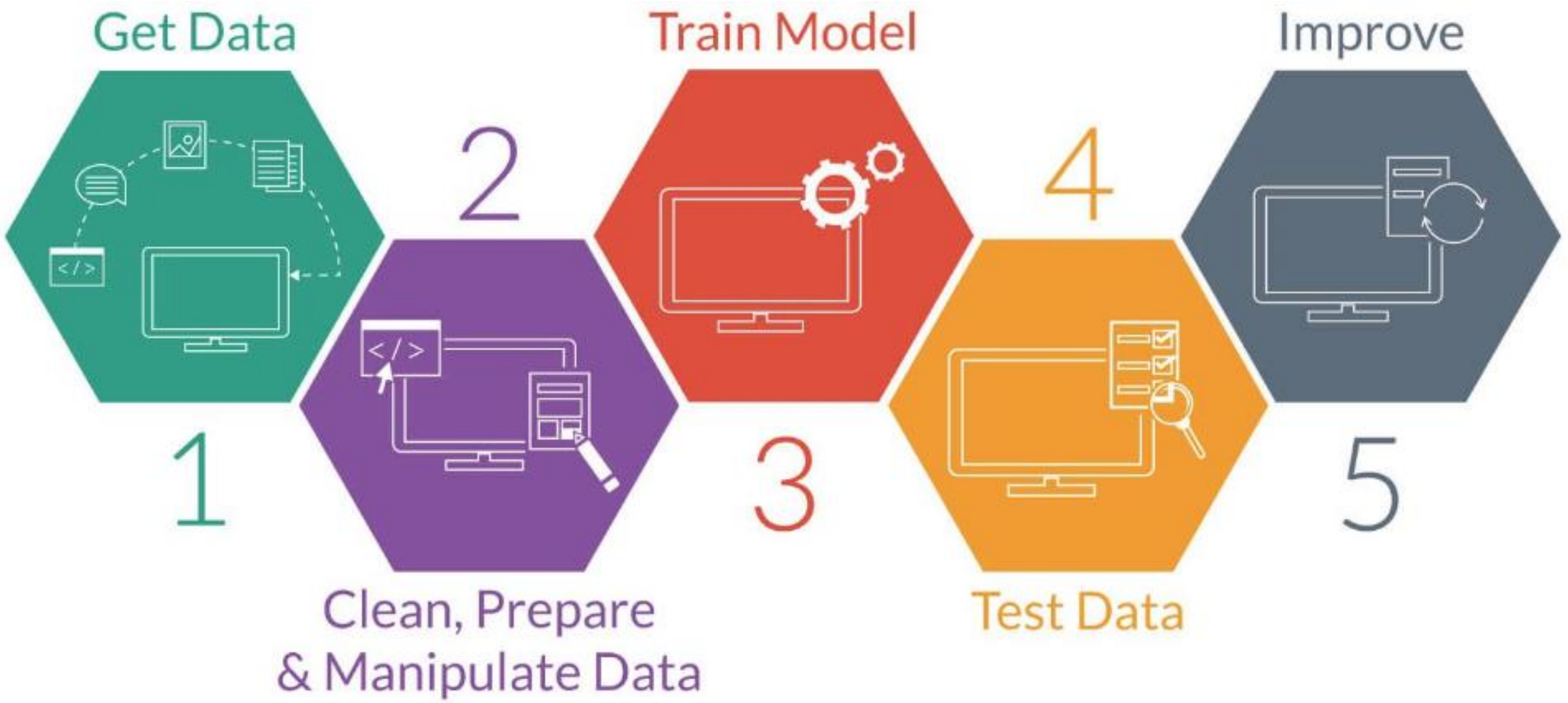
http://www.hrmblogs.com/2018/01/17/ai-recruitment-the-future-of-automated-recruiting/

Robot control

Robot control

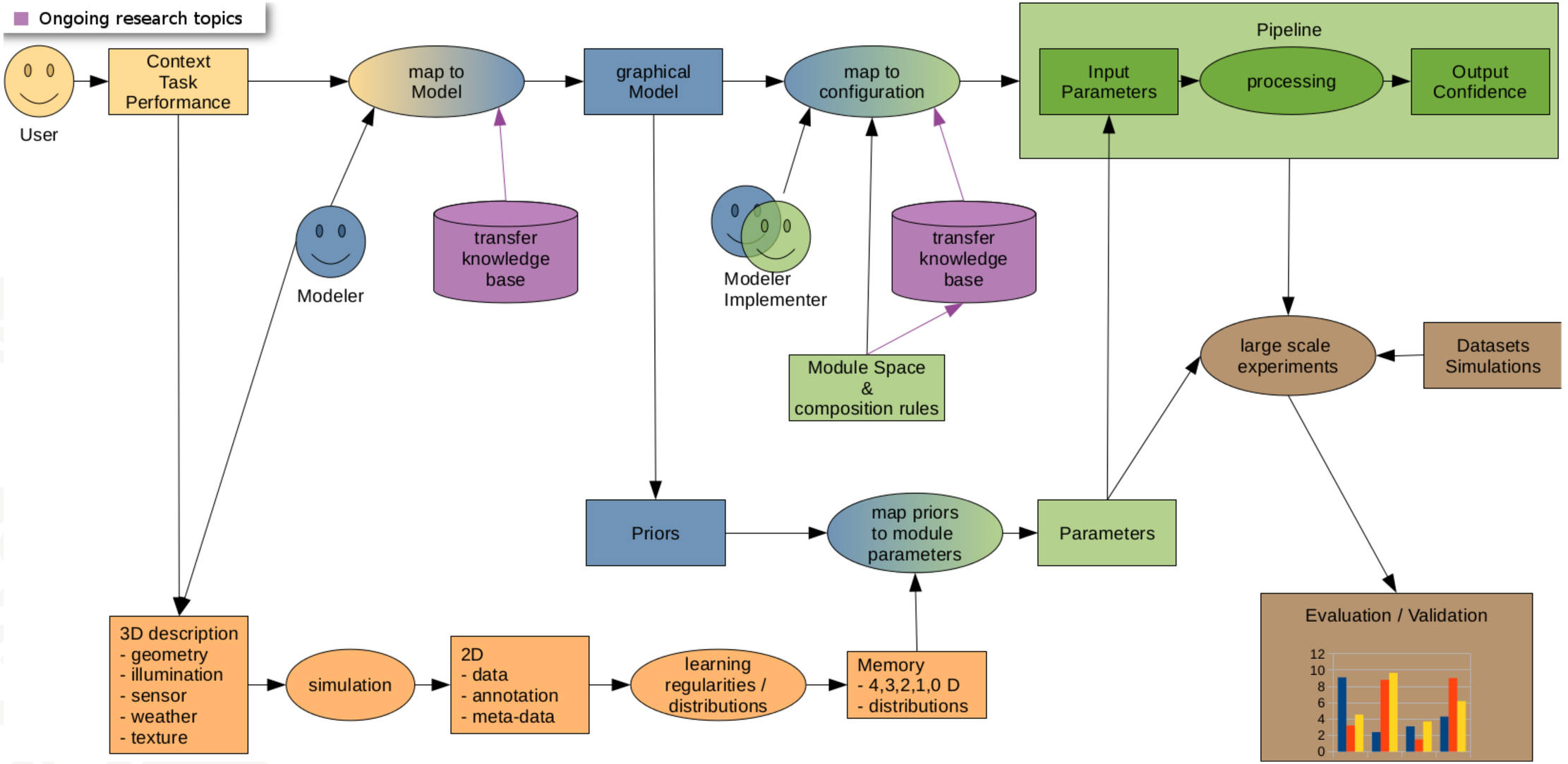
Summary & Outlook

Current approaches to create models



https://medium.freecodecamp.org/every-single-machine-learning-course-on-the-internet-ranked-by-your-reviews-3c4a7b8026c0

Curent approaches to create models



Trends – future developments

- Context-sensitivity
- Multi-source-fusion
- Multi-model-fusion
- Deployment in critical systems -> explainability
- Models closer to general-purpose algorithms -> reasoning and abstraction
- Systematic re-use of previously learned features and architectures -> meta-learning