

Context-aware AI systems of the future

Aleksandra Przegalinska, PhD

Where is AI today?

MACHINE INTELLIGENCE 3.0

ENTERPRISE INTELLIGENCE

VISUAL

Orbital Insight Pionet
clarifai DEEPIVISION
cortica Igocean
SPACE_KNOW Captricity
netra deepomatic

AUDIO

Gridspace TalkIQ
nexidia twilio
CAPIO Expect Labs
Clover Mobvoi
QuirousAI pop2P archive

SENSOR

PREDIX GYIOT MAANA
Senterai PLANET OS
UPTAKE IMUBIT Perficient
thingworx KONUX Alluvium

INTERNAL DATA

PRIMER IBM WATSON
Dycorp Palantir ARIMO
Alation Sapho Outlier
Digital Reasoning

MARKET

mattermark Quid
Datafox PREMISE
Bottlenose MOTIVA
enigma CB INSIGHTS
Trackx predata

ENTERPRISE FUNCTIONS

CUSTOMER SUPPORT

DigitalGenius Kasisto
ELOQUENT Wiseio
ACTIONIQ zendesk
Preact CLARABRIDGE

SALES

collective*i* sense
fuse*i*machines AVISO
salesforce INSIDE SALES .COM
Zensight clari

MARKETING

MINTIGO Lattice RADIUS
LiftIgniter PERSADO
brightstun retention MOTIVA
COGNICOR AIRPR megal

SECURITY

CYLANCE DARKTRACE
ZIMPERIUM deepinstinct
Sentinel DEMISTO
graphistry drawbridge
SignalSense AppZen

RECRUITING

textio entelo
Wide & Wendy hi
unitive SpringRole
GIGSTER HireVue

AUTONOMOUS SYSTEMS

GROUND NAVIGATION

drive.ai AdasWorks
ZOOX moanLeve
UBER Google TESLA
Autonomy Auto Robotics

AERIAL

SKYDIO SHIELD AI
Airware DJI LILY
DroneDeploy pilo.ai
SKYCATCH

INDUSTRIAL

JAYBRIDGE OSARO
CLEARPATH fetch
KINDRED rethink robotics
HARVEST

AGENTS

PERSONAL

amazon alexa
Cortana Allo
facebook
Siri Replika

PROFESSIONAL

butter.ai pogo SKIPFLAG
clara x.ai slack
talla Zoom sudo

INDUSTRIES

AGRICULTURE

BLUERIVER MAVIX
tule TRACE Pivot
Terrion AGRI-DATA
Descartes Labs udio abundant

EDUCATION

KNEWTON volley
gradescope
CTI coursera
UDACITY school

INVESTMENT

Bloomberg sentient
ISENTIUM KENSHO
alphasense Dataminr
CEREBELLUM CAPITAL Quandl

LEGAL

blue J BEAGLE
Everlaw RAVEL
Seal ROSS
LEGAL ROBOT

LOGISTICS

NAUTO Acerta
PRETECKT
Routific clearmetal
MARBLE PITSTOP

INDUSTRIES CONT'D

MATERIALS

zymergen Citrine
Eigen Innovations
SIGHT MACHINE
GINKGO nanotronics
CALCULARIO

RETAIL FINANCE

TALA zest finance
Lendo earnest
Affirm MIRADOR
wealthfront Betterment

HEALTHCARE

PATIENT

PULSE CareSkore
ZEPHYR HEALTH Watson Health
Oncote SENTRIAN
Atomwise Numerate

IMAGE

BUTTERFLY JSCAN
ARTERYS enlitic
BAYLABS imago
Google DeepMind

BIOLOGICAL

iCarbonX color GRAIL
deep genomics RECURSION
LUMINIST Numerate
Atomwise verily WHOLE BIOME

TECHNOLOGY STACK

AGENT ENABLERS

OCTANE.AI howdy. Maluuba KITT.AI
OpenAI Gym Kasisto AUTOMAT
semanticmachines

DATA SCIENCE

DOMINO SPARKBEYOND rapidminer
kaggle DataRobot yhat AYASDI
data iku seldon yseop bigml

MACHINE LEARNING

CognitiveScale GoogleML context.relevant
Dycorp HyperScience NOROLOGICS minds.ai H2O.ai
SCALED INFERENCE sparkcognition loop GEOMETRIC INTELLIGENCE
deepsense.io reactive sky mind bonsai

NATURAL LANGUAGE

agolo FYLIEN LEXALYTICS
Narrative Science spaCy LUMINOSO
cortical.io MonkeyLearn

DEVELOPMENT

SIGOPT HyperOpt fuzzyio okite
rainforest lobe Anodot
Signifai LAYER 6 bonsai

DATA CAPTURE

CrowdFlower diffbot CrowdAI import
Paxata DATASIFT amazon mechanicalturk enigma
WorkFusion DATALOGUE TRIFACTA parsehub

OPEN SOURCE LIBRARIES

Keras Chainer CNTK TensorFlow Caffe
H2O DEEPLARNING4J theano torch
DSSTNE Scikit-learn AzureML neon
MXNet DMTK Spark PaddlePaddle WEKA

HARDWARE

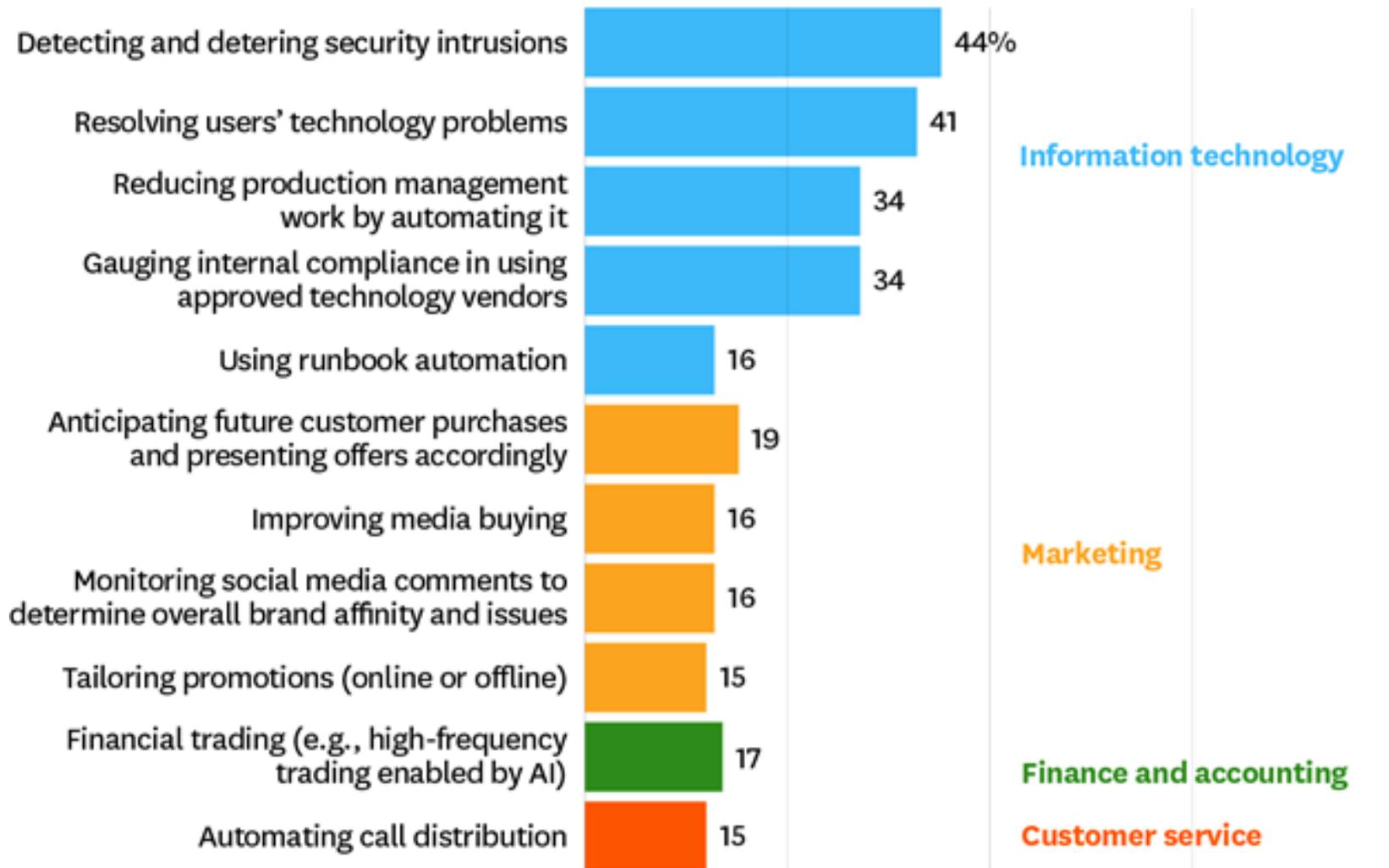
KNUPATH TENSTORRENT Cirrascale
NVIDIA intel nervana Movidius
tensilica GoogleTPU IO Labs Qualcomm
Cerebras Isosemi

RESEARCH

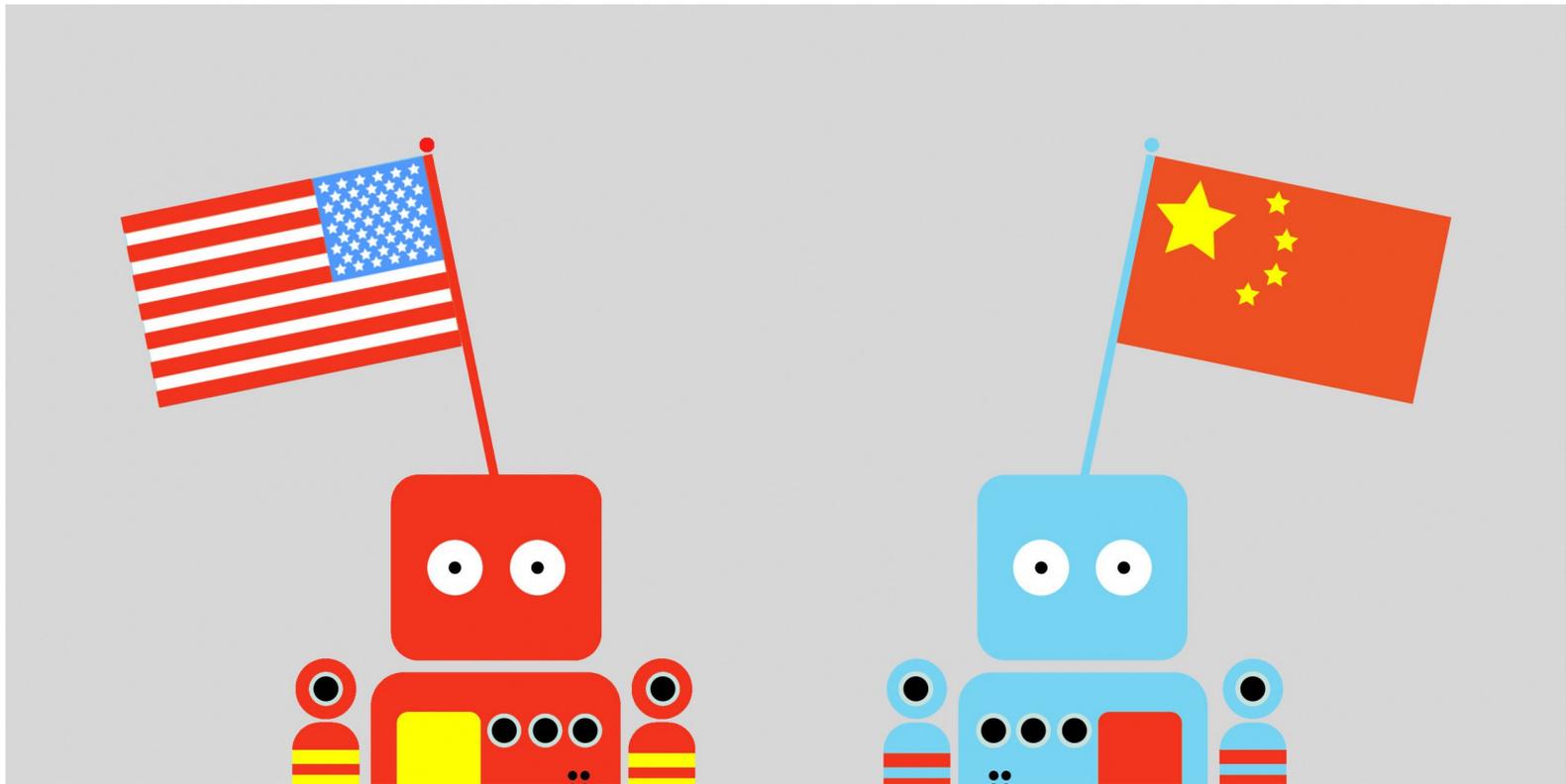
OpenAI mabense ELEMENT vicarious
KNOGGIN Numenta Kimera Systems Cogital

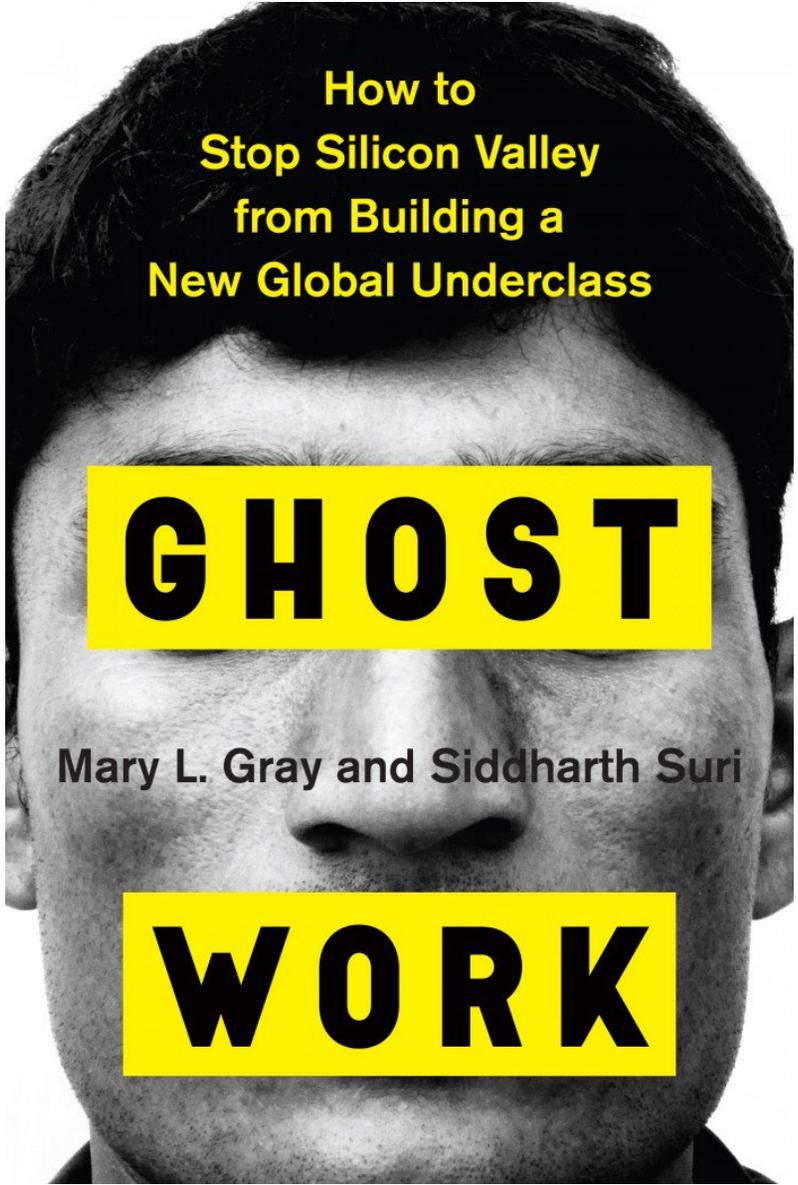
How Companies Around the World Are Using Artificial Intelligence

IT activities are the most popular.



AI AND GEOPOLITICS





How to
Stop Silicon Valley
from Building a
New Global Underclass

GHOST

Mary L. Gray and Siddharth Suri

WORK

**THE AI
- GIG
ECONO
MY**

BOTICS AND AI AGENTS





IBM
Project
Debater



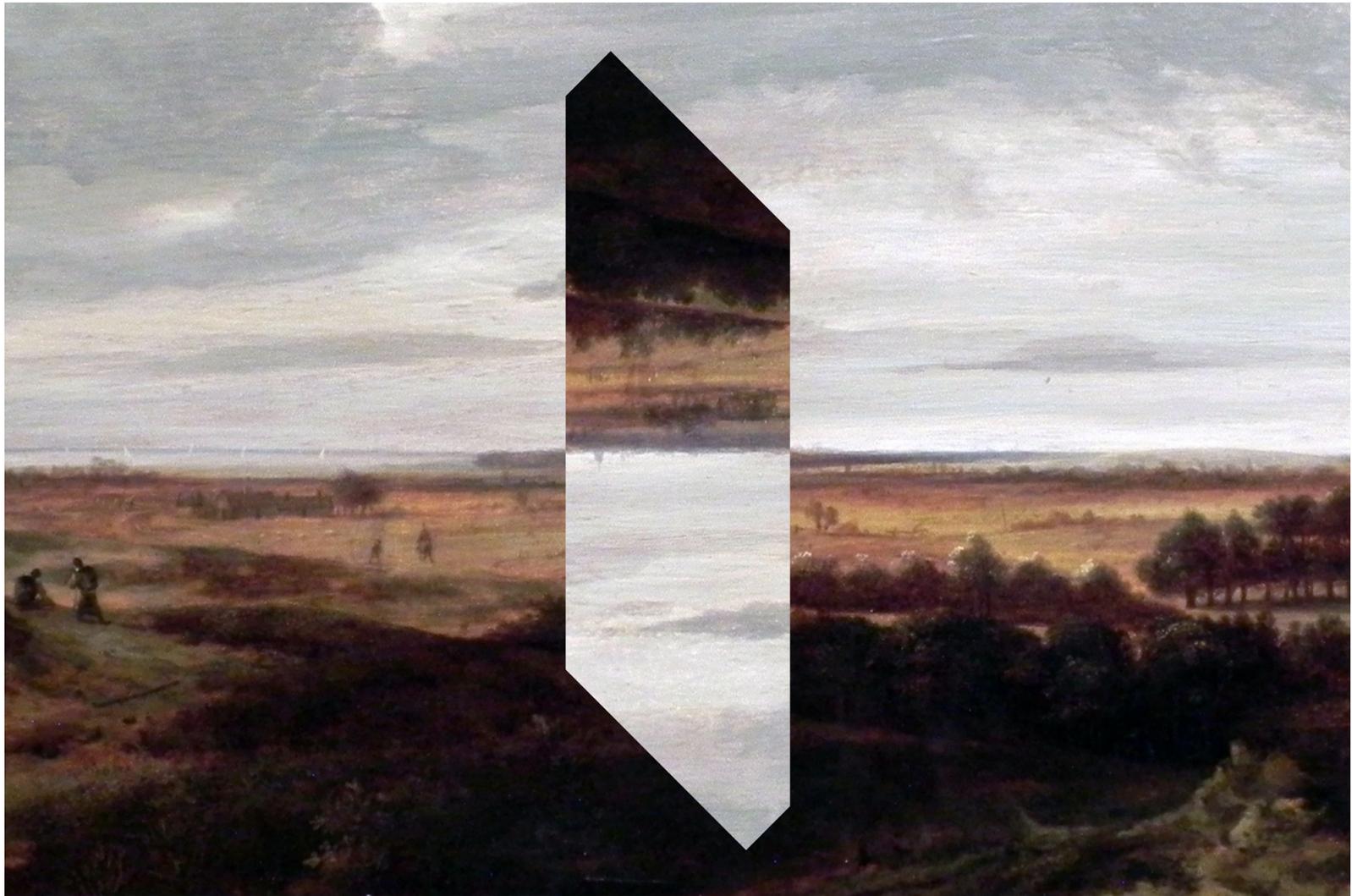
APPLIED IN DIVERSE DISCIPLINES

Alexa, do we have enough Logistics 4.0 in stock?

At CeMAT 2018, TEAM GmbH is demonstrating how ambitious Logistics 4.0 concepts can help businesses shape up for the digital revolution, particularly if Amazon's Alexa has anything to say about it.



**Context-awareness
so far...**



Reynauld Drouhin

Context-awareness is the ability of devices to sense their physical environment and adapt their behavior accordingly.

The major types of context inputs are:

- **Location:** Identify the device's current location (with user permission) or be notified when entering or leaving a location.
- **Time:** Identify the current date and time or the device itself notifies users when they're in a different timezone.
- **Activity:** React to an outside occurrence, based on sensors, relevant to the user.
- **Environment:** Get information from a device's sensors, movement, speed or time zones.

The device can receive the inputs either explicitly/implicitly:

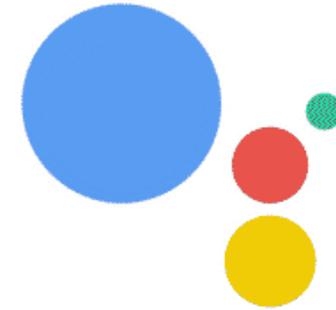
- **Gathered when the application is in use** (system accesses the current location, time or speed through APIs)
- **Received as relevant contextual input** (system wakes up at a specific time, a location trigger, or other signal)

**Context-awareness
today...**



Google Duplex

Advancing AI for Everyone



Home > Technology > Elon Musk's OpenAI builds artificial intelligence so powerful it must be kept...

Technology

Elon Musk's OpenAI builds artificial intelligence so powerful it must be kept locked up for the good of humanity

February 15, 2019



**Emerging context-
awareness**

TOMNET



"(...) we formulate a meta-learning task. We construct an observer, who in each episode gets access to a set of behavioral traces of a novel agent. The observer's goal is to make predictions of the agent's future behavior. Over the course of training, the observer should get better at rapidly forming predictions about new agents from limited data. This "learning to learn" about new agents is what we mean by meta-learning. Through this process, the observer should also learn an effective prior over the agents' behavior that implicitly captures the commonalities between agents within the training population"

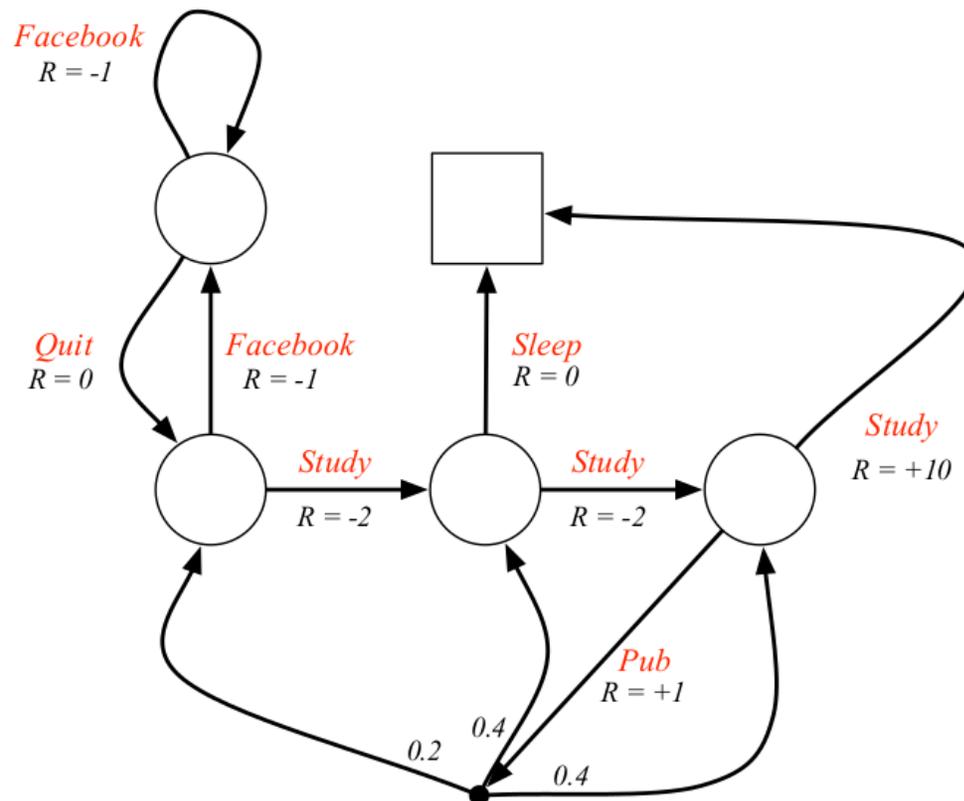
[Rabinovitz et al. 2018]

And, on top of that...

- *general theory of mind* – the learned weights of the network, which encapsulate predictions about the common behaviour of all agents in the training set
- *agent-specific theory of mind* – the “agent embedding” formed from observations about a single agent at test time, which encapsulates what makes this agent’s character and mental state distinct from others’.

Model

Family of partially observable Markov decision processes (POMDPs)



Our research

Wirtualna Asystentka



Ola:

Witaj na stronie Akademii Leona Koźmińskiego!

Jestem Wirtualną Asystentką i chętnie odpowiem na Twoje pytania dotyczące rekrutacji oraz korzystania przez studentów z systemów informatycznych ALK.

- Rekrutacja
- Rekrutacja online
- Jak zalogować się do serwisu Wirtualna Uczelnia?

Wpisz swoje pytanie...

✉ Prośba o kontakt

pow

Wirtualna Asystentka



Ola

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Wpisz swoje pytanie...

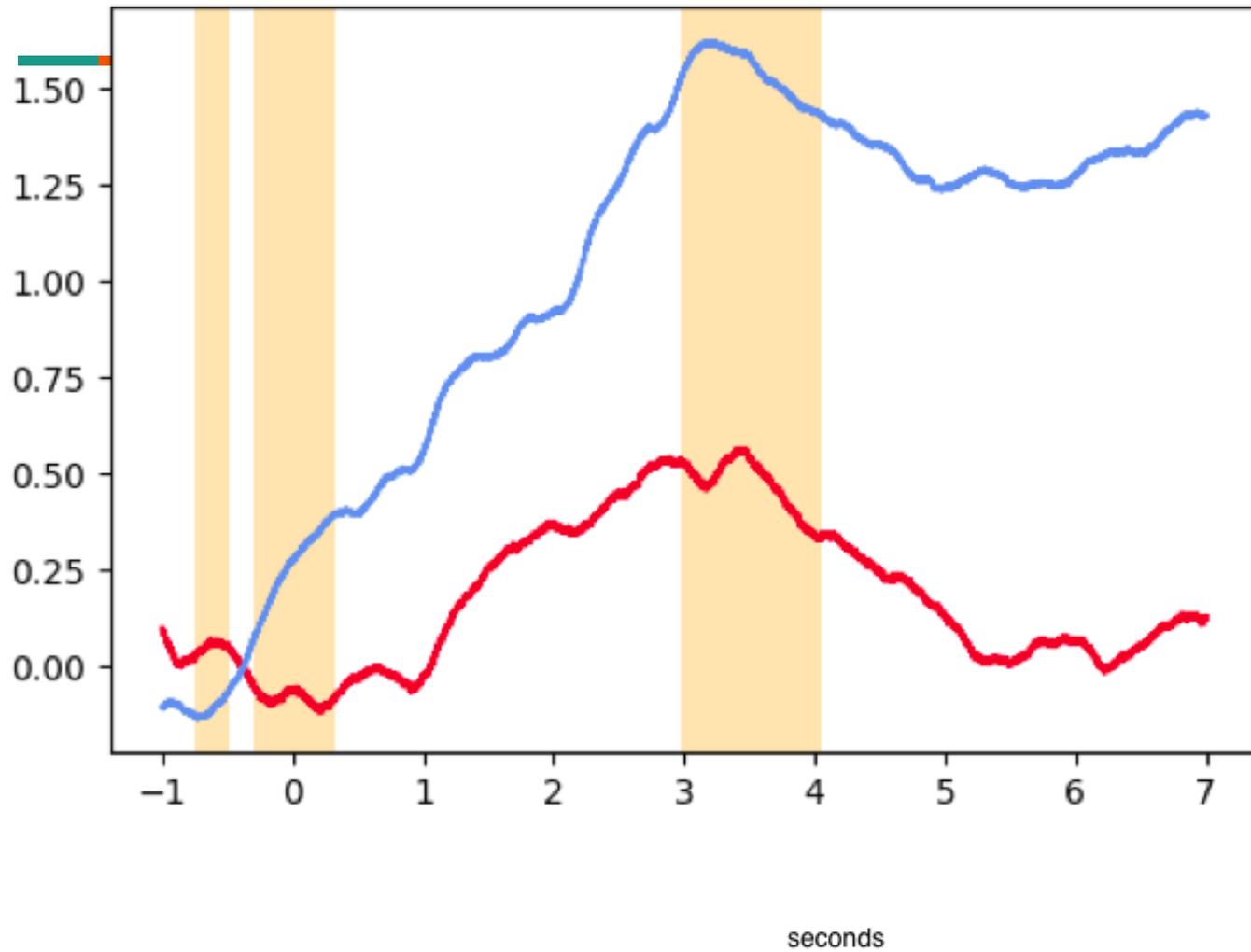


✉ Prośba o kontakt

powered by IntelliWISE



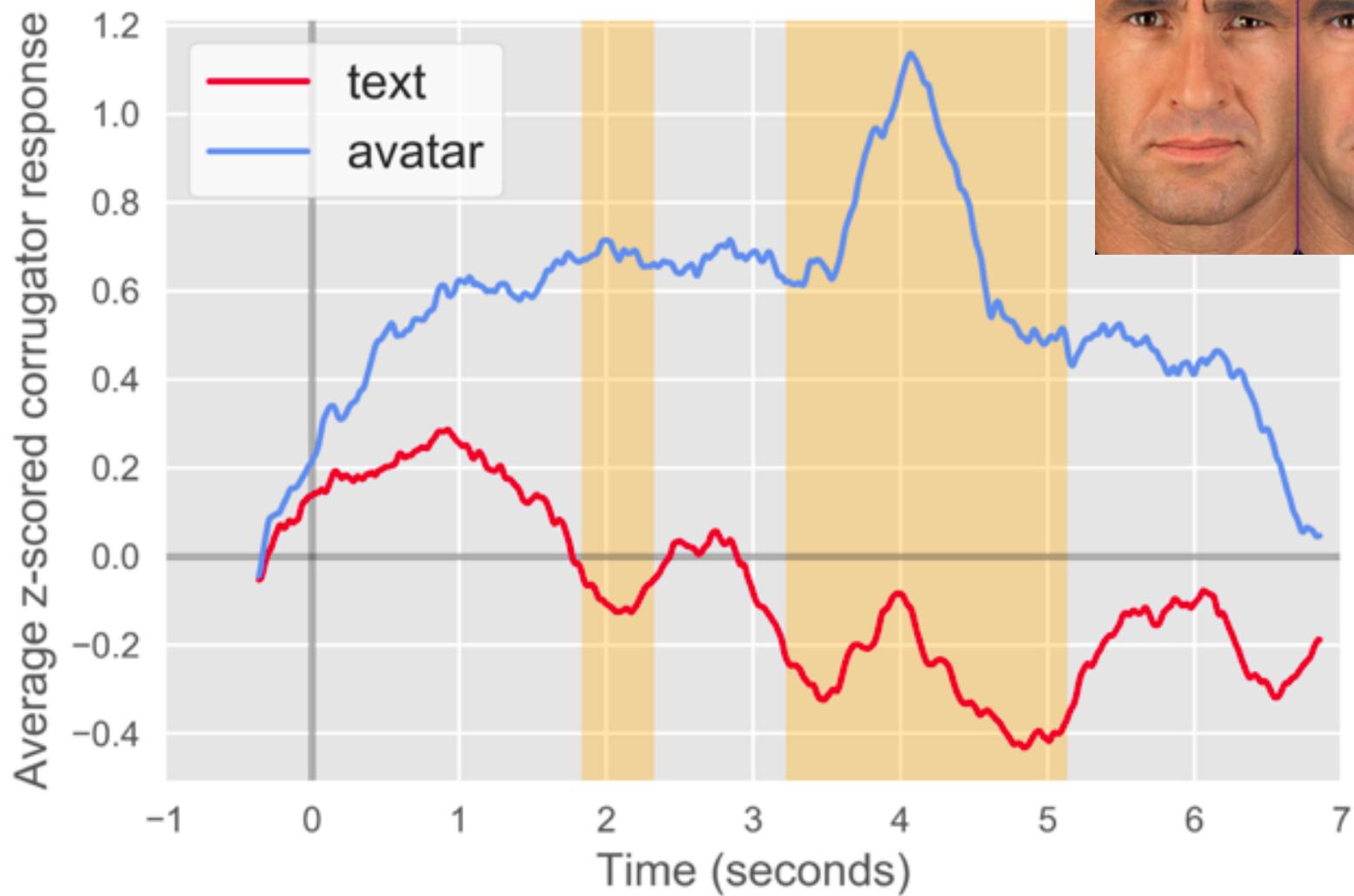
Average standardized EDA signal

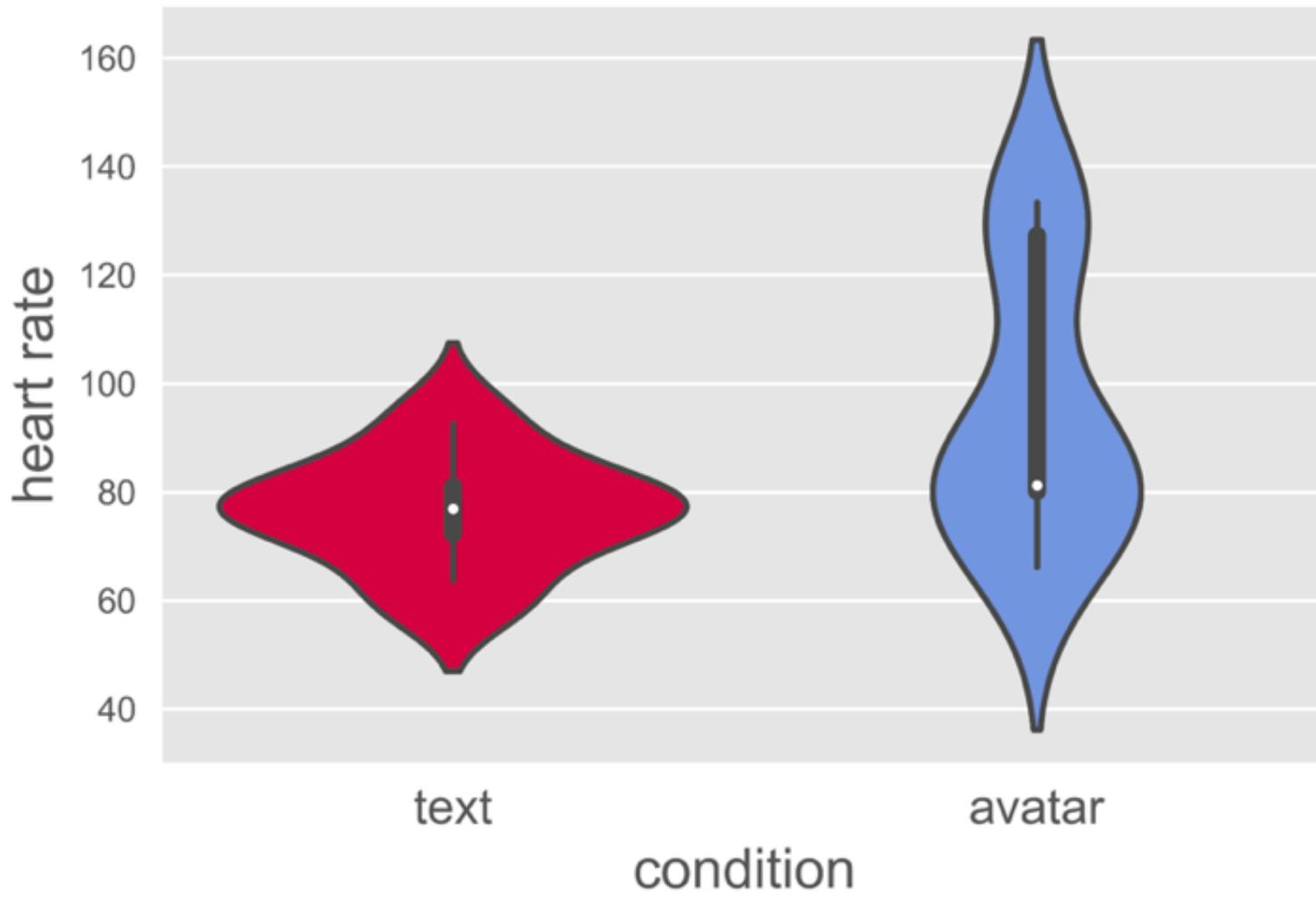


simple text chatbot

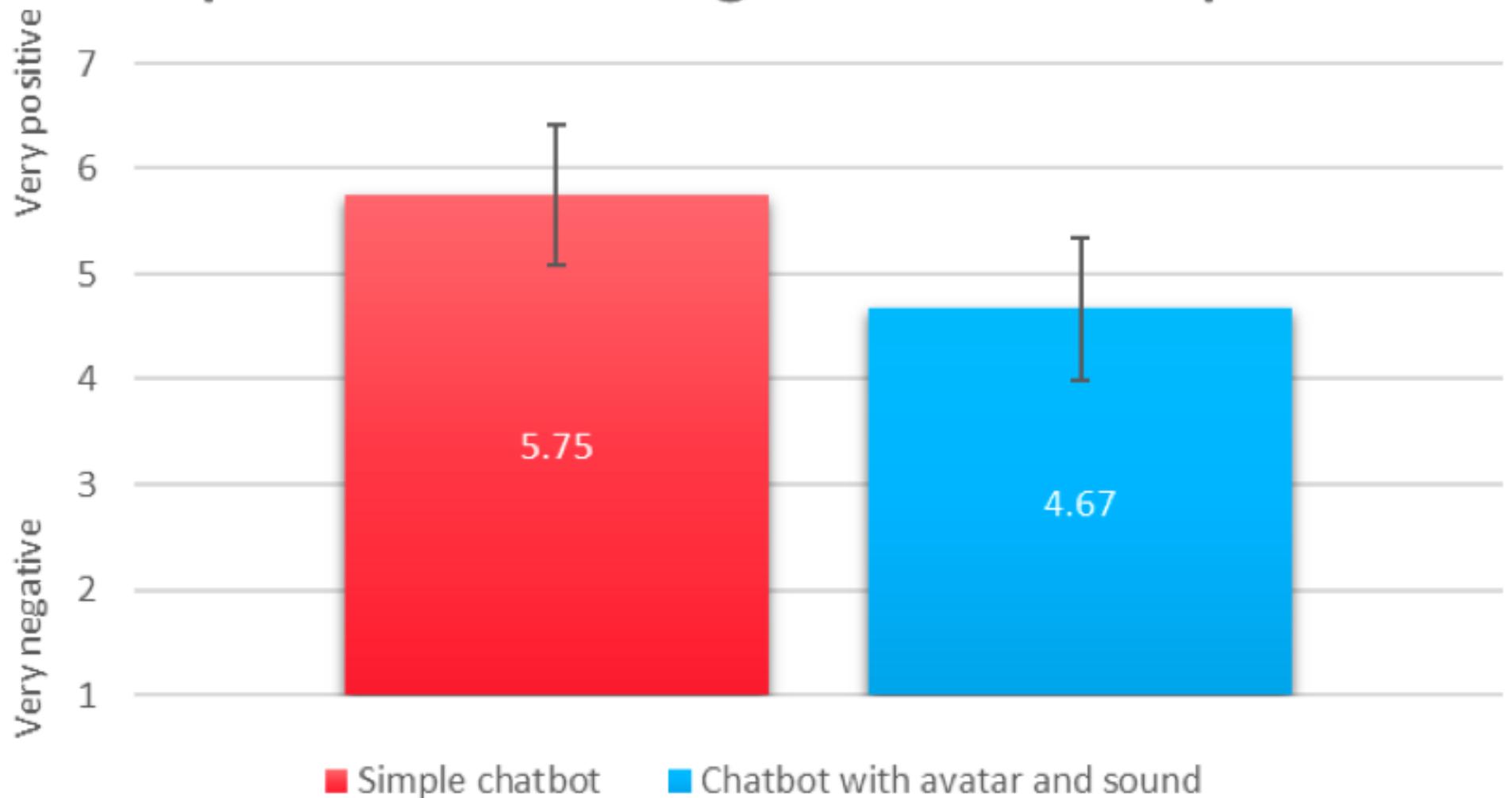
chatbot with avatar and animation

statistically significant difference

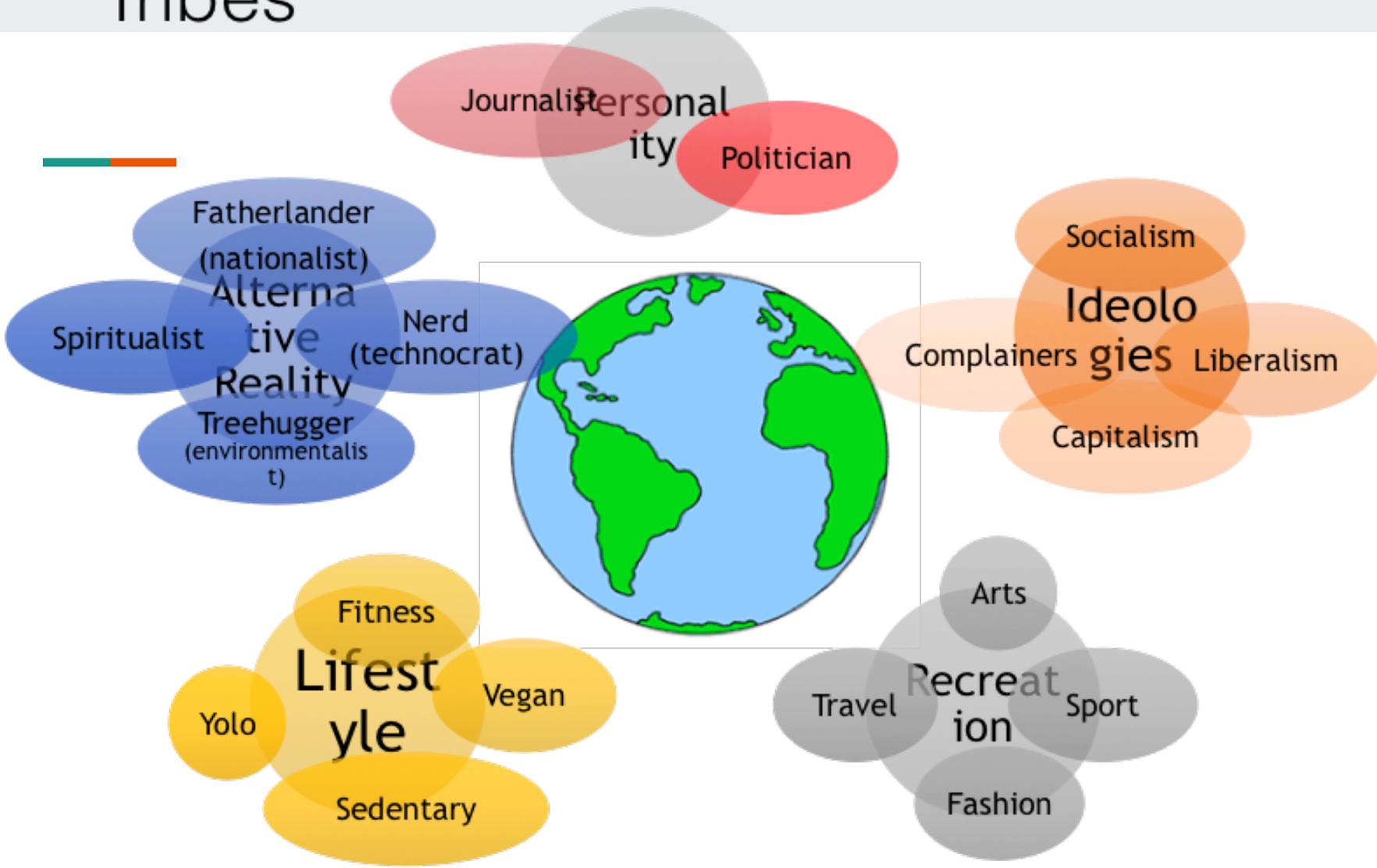




Opinion about using robots at workplace

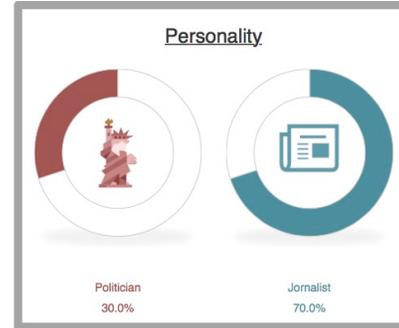


Tribes

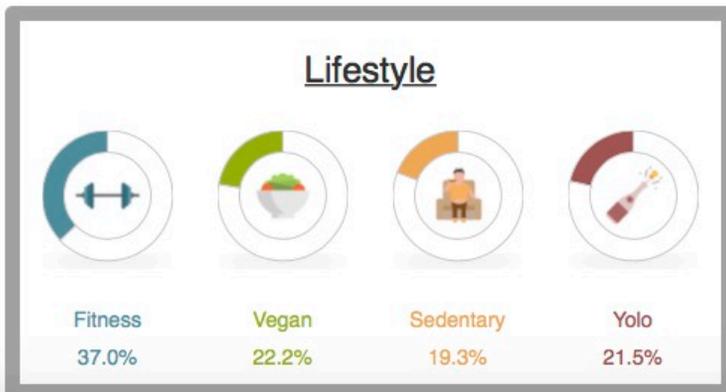
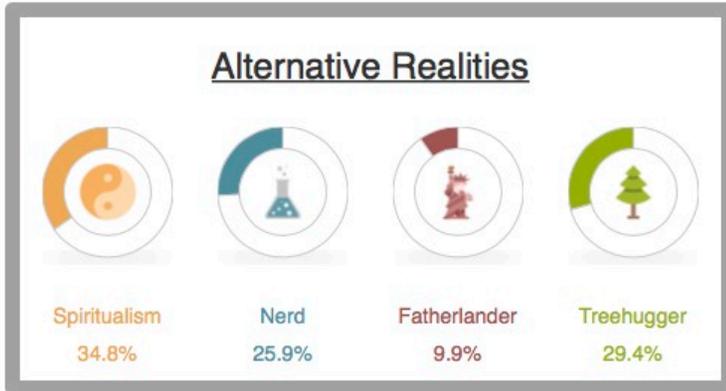




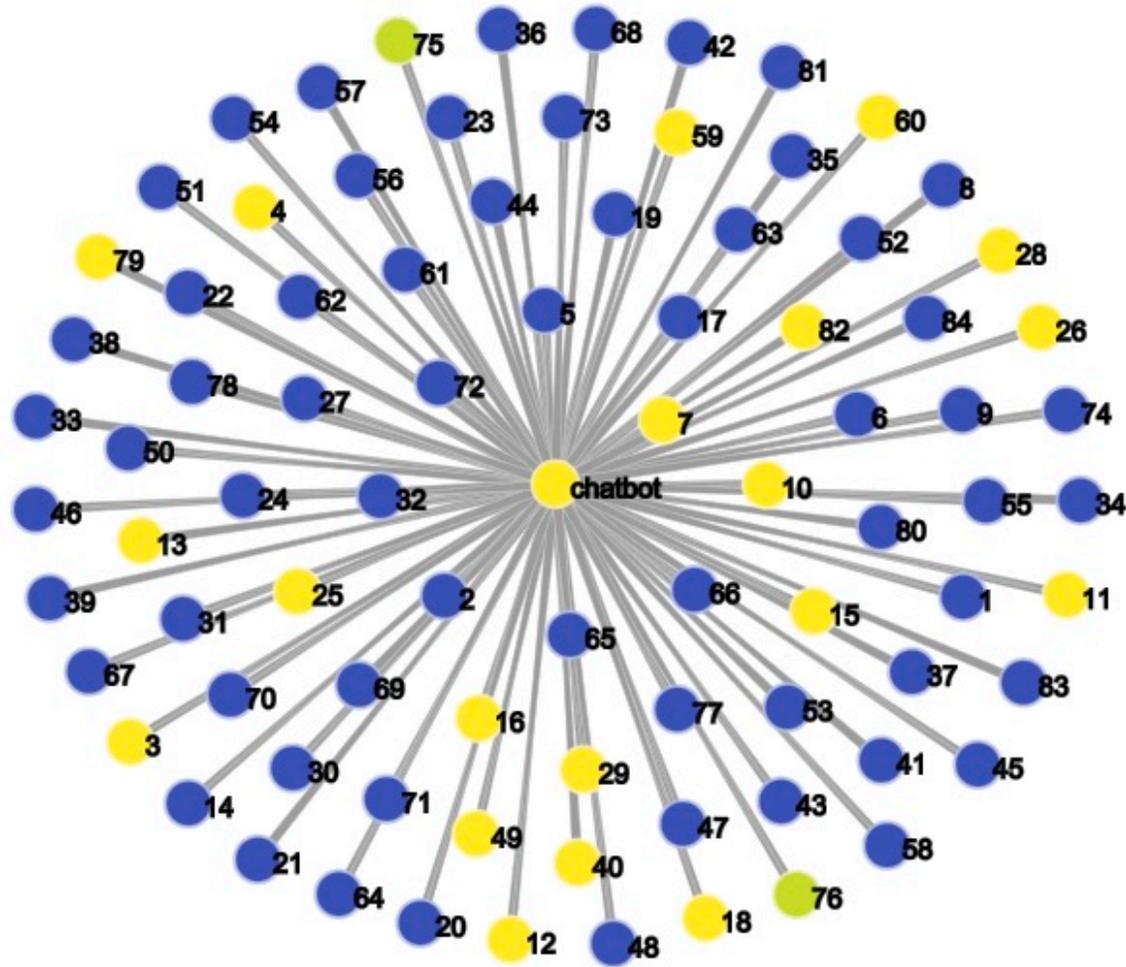
adidas



* click on tribe icons for see tweets



By Personality



Top values:

- Jornalist
- Politician

Edge colors

Color:

Color by top:

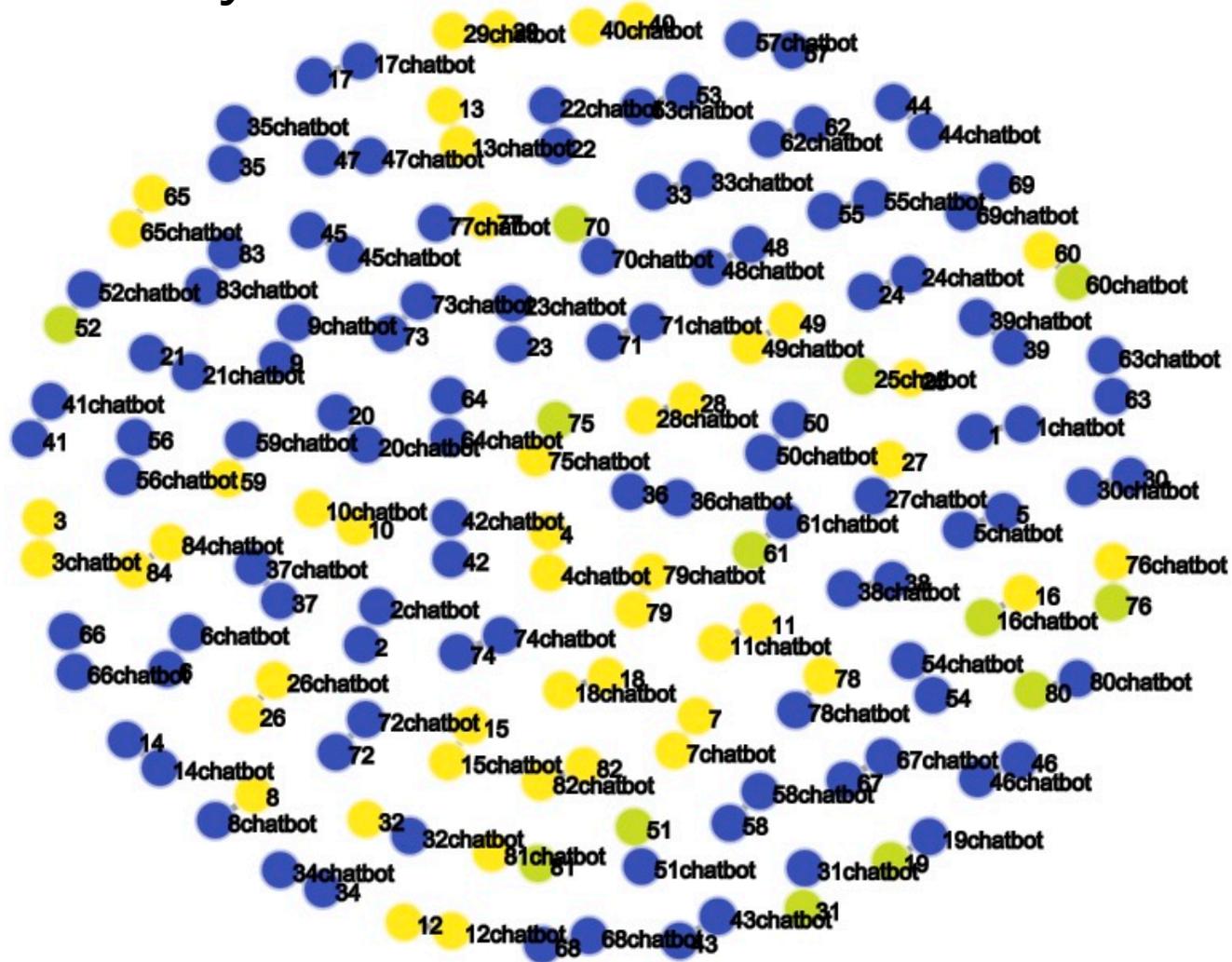
Top values:

Node shapes

Sha

Circle

By Personality



Color by top:

Top values:

- Journalist
- Politician

Edge colors

Color:

Color by top:

Top values:

Node shapes

Shape

Circle

DIMENSIONS OF TRUST IN A CHATBOT

ABILITY/ EXPERTISE: Performance measurements (customer retention, conversation length, lead generation). Expertise is seen as a factor associated with credibility, a cue for trustworthiness. In the context of an automated system, trust has been argued to be mainly based on users' perceptions of the systems' expertise. Here, the chatbots expertise is assumed to impact users' trust.

PRIVACY/ SAFETY: ALEXA, CAN I TRUST YOU? „Security diagnostics expose vulnerabilities and privacy threats that exist in commercial Intelligent Virtual Assistants (IVA) – diagnostics offer the possibility of securer IVA ecosystems”

NEW CATEGORIES?

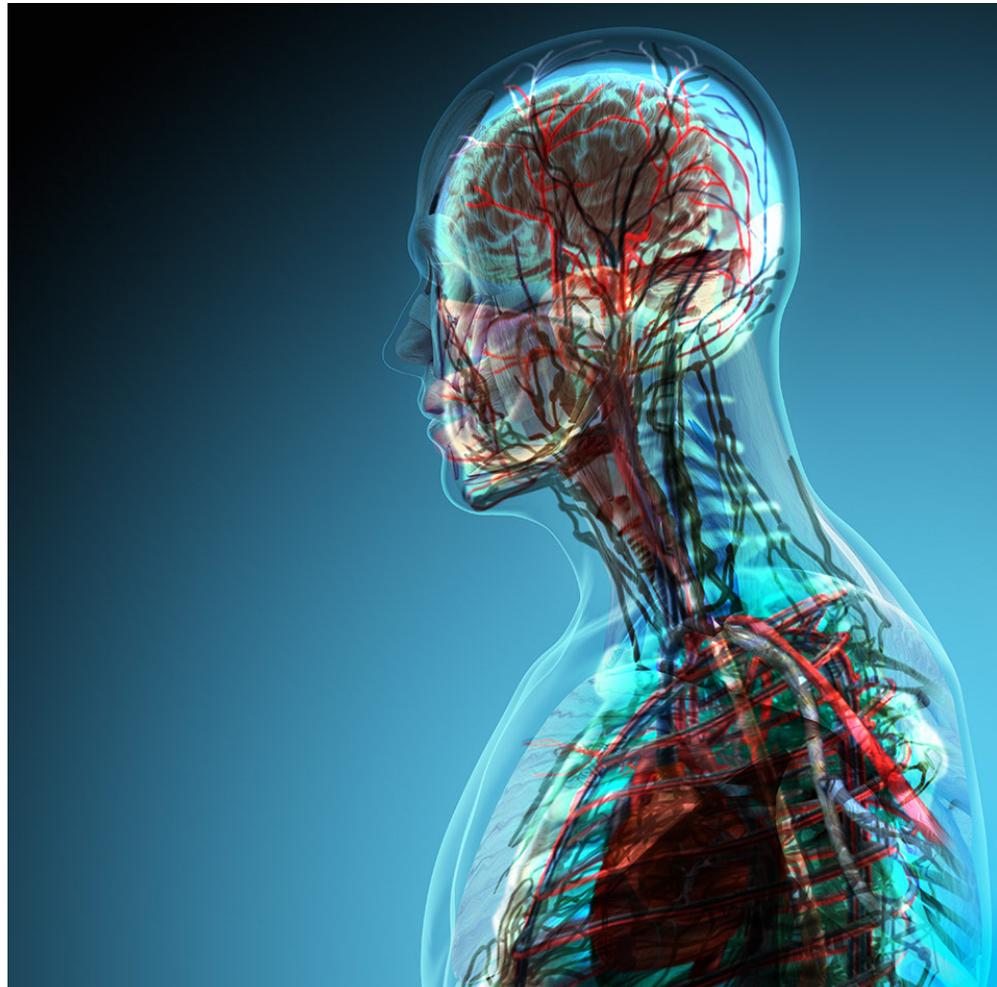
TRANSPARENCY—-> HONESTY: the agent is what it is and it does not pretend to be something else. It does not deny its status.

PREDICTABILITY—-> INTEGRITY: seen as a factor associated with credibility, and concerns the trustors' expectation that an object of trust will act consistently in line with past experience. If the user perceives the chatbots as predictable, this may lead to a feeling of trust in the chatbot.

CONTROL —> BENEVOLENCE: the degree to which the motivations and intents of the trustee are in line with those of the trustor.

Next steps?

1. Physiological signal values looping
2. The task for the observer is to predict the agent's behavior (e.g. atomic actions) and potentially its latent states on a “current episode” as it acts within the model

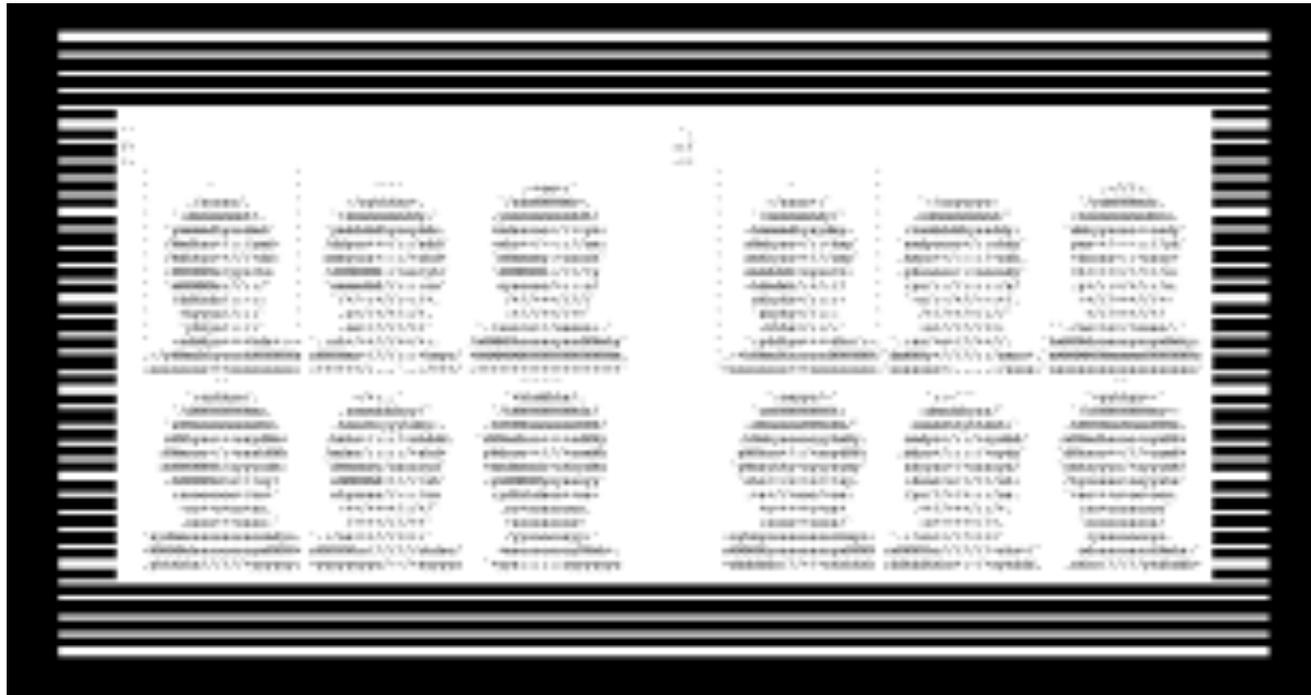


RULES

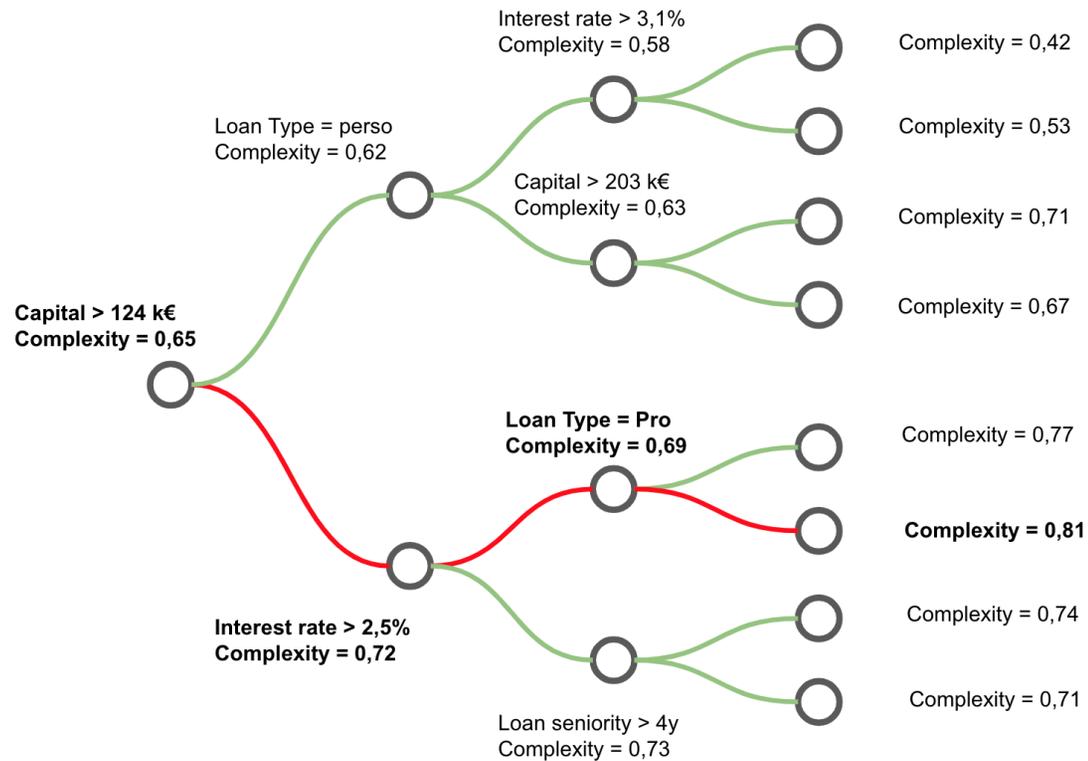


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ALGORITHMIC BIAS



EXPLAINABILITY



prediction 0,81 = **0,65** (trainset mean complexity) + **0,07** (gain from Capital) - **0,03** (loss from Interest rate) + **0,12** (gain from loan type)

QUESTIONS?
@Przegaa