Advanced Machine Learning For Design

Lecture 1 - Introduction to Machine Learning

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20/09/2023

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https://aml4design.github.io/

Why Machine Learning for Design?

Part I

“AI is the New Electricity”

“Just as electricity transformed almost everything 100 years ago, today I actually have a hard time thinking of an industry that I don’t think AI will transform in the next several years.”

Andrew Ng

Former chief scientist at Baidu, Co-founder at Coursera

Lieneke - Apple image p...

Image	Description	Roles of AI
	The Camera application of Apple phones/ipads uses AI in their software to optimize image quality.	AI is used to understand the scene (person segmentation, depth estimation) to optimize light and contrast for example. But also to enable portrait mode, recognizing faces.

Mark - ChatGPT

Image	Description	Roles of AI
	ChatGPT is an AI-model that is trained to converse with the user. User can get their prompts answered to or steer the model towards a more desirable outcome through an almost human-like communication.	AI is used to comprehend the user' prompts and combine data from multiple sources to reply. It is trained to answer known inputs. but also to predict answers to unknown inputs the model hasn't trained before.

Ashraf - Netflix

Image	Description	Roles of AI
	A subscription based entertainment service that provides movies, tv shows and documentaries via a streaming service.	Netflix uses ML to optimize the user experience by proposing users what to watch based on their watching history.

Sebastiaan - DeepL

Image	Description	Roles of AI
	DeepL is a great tool to translate between languages. It also offers an API.	Instead of translating texts word-by-word, DeepL uses a Deep Learning model (as the name suggests). This makes it way better at translating but also allows it to use different tones or proper formal language.

Ceyda - Chatbots

Image	Description	Roles of AI
	Chatbots help customers with answering their questions on a product or service. They are used on websites.	AI is used to understand what the customer is asking and therefore chatbots try to predict what the right answer must be.

Jim - Shazam

Image	Description	Roles of AI
	It listens to auto and can find a match to provide the titel and artist	To match or recognise the input to a song in the database

Iza - Photoshop

Image	Description	Roles of AI
	Photoshop is an photo and images editing software, used mainly for photo retouching and graphic design.	Photoshop has several functions that utilise AI. Examples are content-aware fill, object selection, and generative fill. All of these identify different objects and content of images.

Yonghao - Tesla

Image	Description	Roles of AI
	In order to drive on their own, autonomous cars constantly interpret images from their sensors and machine vision cameras, then use that information to make decisions about what to do next.	Telsa cars use AI to understand and anticipate the next movements of cars, pedestrians, and cyclists. AI helps them plan their moves in a split second, and decide what to do from moment to moment.

Copy of Template

Image	Description	Roles of AI
Hey Siri	Siri is an example of a virtual personal assistant integrated into Apple devices. It provides the user with services and information through voice-driven interactions.	The role of AI in Siri is to understand and respond to natural language input. It can perform tasks, provide information and give recommendations based on user preferences.

Andrija - Wayve

Image	Description	Roles of AI
WAYVE	Wayve AI Driver is a autonomous driving software that uses ML to interpret camera and radar data, enabling vehicles to drive without human intervention or the need for detailed maps and rules.	AI serves as the driver, using machine learning to interpret sensor data and enable vehicles to navigate autonomously.

Manon - Google Maps

Image	Description	Roles of AI
Google Maps	Google Maps is a web service that provides detailed information about geographical regions and sites worldwide, for example: routes from point A to B, satellite views of places.	Google Maps has multiple functions using AI, the newest being immersive view - visualizing every segment of a route before you go. But also the more basic functions like: searching for the most optimized route.

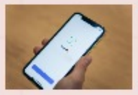
Melissa - Google lens

Image	Description	Roles of AI
	Google lens is app where people can scan products and find the same pictures on the internet.	Ai is comparing the pictures in the internet and people can find it fast.

Alice - Duolingo

Image	Description	Roles of AI
	Duolingo is an app for learning languages. It helps people from all over the world to have easier access to language learning.	Duolingo prides itself in using AI in many stages of their app but the technology is mostly used for personalizing users lessons. Birdbrain model, for example, is used specifically to figure out the fit of which exercises in a particular lesson will be the best match for a learner's level of knowledge.

Dilara - Apple Face ID

Image	Description	Roles of AI
	Identifies your face and unlocks your phone	Your face data includes a lot of invisible dots and once you save it, the model knows who you are and unlocks your phone if it's only your face. "Face ID uses the TrueDepth camera and machine learning for a secure authentication solution."

Kashish - Amazon Alexa

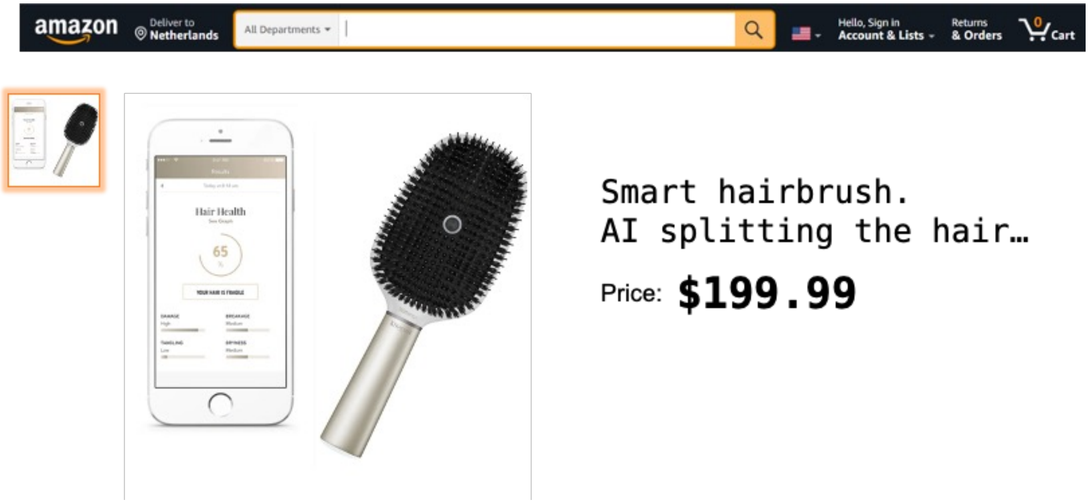
Image	Description	Roles of AI
alexa	Alexa is a voice-controlled virtual assistant. It can help in multiple activities like can play audio, control your smart home, answer questions and many more.	Alexa relies on natural language processing and machine learning, two subsets of AI, to improve performance over time. Natural language processing leads to smooth conversations with users and machine learning is used to refine its processes, creating a smarter system over time.

Sophia-Notion AI

Image	Description	Roles of AI
Notion AI	Notion is a note taking and task management application.	AI in notion can write summaries for your text automatically. It can also generate tables and figures base on your text.

Where is AI? Or ML?

- Autonomous vehicles
  - from Roomba to Self-driving cars
  - In stores, warehouses, production lines, streets, living rooms
- More and more consumer products and appliances
  - Belts!! Really!
  - Thermostats, Security Cameras, Fridges
- Content production and consumption applications
  - Social media, Amazon, Netflix etc.
- Chatbots
- In-store automation and smarter shopping
- Optimised supply chains
- Energy grid optimisation
- …



More than just a fashion accessory, Belty Good Vibes is the very first smart belt integrating Artificial Intelligence that contextualizes the activities of your everyday life.

Beyond data

Rather than providing only raw data, Belty offers feedback about the rhythm of your life. It goes beyond statistics and helps you to be more aware of the quality of your everyday experience.

Trust your gut

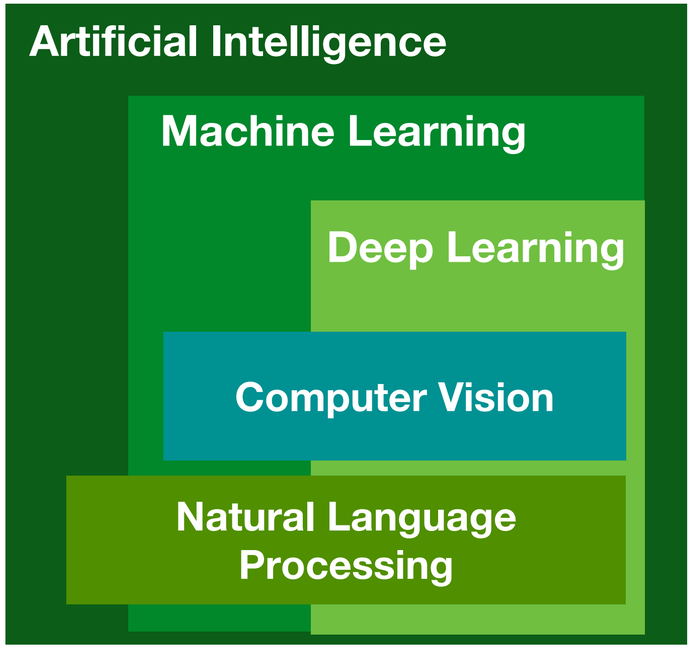
The abdomen, or belly, is considered the second brain of your body: the home of your gut instinct. Belty Good Vibes empowers you to know yourself better, by reinforcing your ability to connect to your visceral knowledge. Communicating via vibrations with your sense of touch, it plugs you into the present moment.

Good vibrations, great energy

Belty is much more than a smart belt; as wearable, interactive technology, it is your personal coach. We all want to live the best version of our lives. Why not start now?

What is

Artificial Intelligence
Machine Learning?
Deep Learning?
Computer Vision?
Natural Language Processing?



Intelligence

- *The ability to learn or understand or to deal with new or trying situations*
- *The ability to apply knowledge to manipulate one's environment or to think abstractly as measured by objective criteria (such as tests)*

Merrian-Webster

- *Mental quality that consists of the abilities to learn from experience, adapt to new situations, understand and handle abstract concepts, and use knowledge to manipulate one's environment*

Encyclopedia Britannica

R. J. Sternberg, quoted in *The Oxford Companion to the Mind*. R. L. Gregory. Oxford University Press, Oxford, UK, 1998

But if you really want an exhaustive collection of 71 definitions, look no further https://arxiv.org/pdf/0706.3639.pdf

Artificial Intelligence

- Intelligence demonstrated by machines

- A branch of computer science that **studies** the properties of intelligence by **synthesizing** intelligence

- Creating computer programs that perform tasks as well as, or better than, humans
  - Perception, Learning, Reasoning, Planning, Problem-solving, Creating

Strong vs. Weak Artificial Intelligence

- **Strong AI**
  - *Artificial General Intelligence* (AGI), human-level, general
  - The AI we see in movies
  - AI that can do everything we humans can do, and possibly much more

- **Weak AI**
  - *Narrow* AI
  - AI specialised in well-defined tasks
    - e.g., speech recognition, chess-playing, autonomous driving

- No AI program has been created yet that could be called intelligent in any general (Strong AI) sense
  - "*A pile of narrow intelligence will never add up to a general intelligence. General intelligence isn't about the number of abilities, but about the integration between those abilities?*

- *Superintelligence* doesn't really mean anything - a basic calculator far exceeds any human benchmark for performing basic arithmetic

Learning

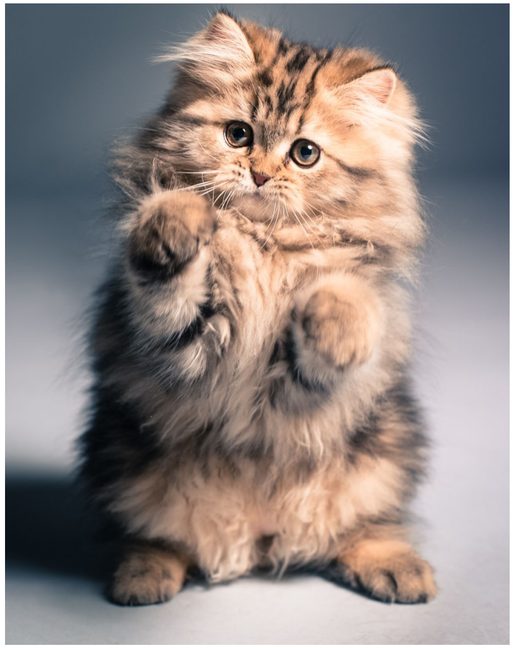
- *Any process by which a system improves performance from experience*
- Denotes changes in the system that are adaptive in the sense that they enable the system to do the task or **tasks drawn from the same population** more efficiently and more effectively the next time
- The ability to perform a task in a situation that has never been encountered before
- **Learning = generalisation**

Herbert A. Simon

What is a cat?

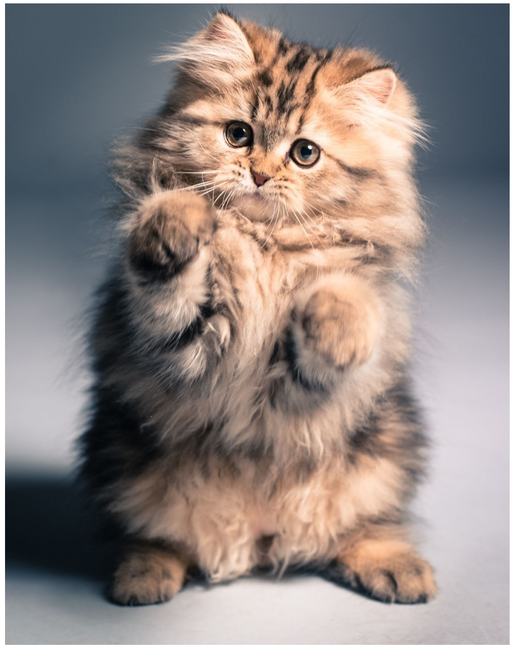
Credits: Jonah Burlingame

What is a cat?



Credits: Jonah Burlingame

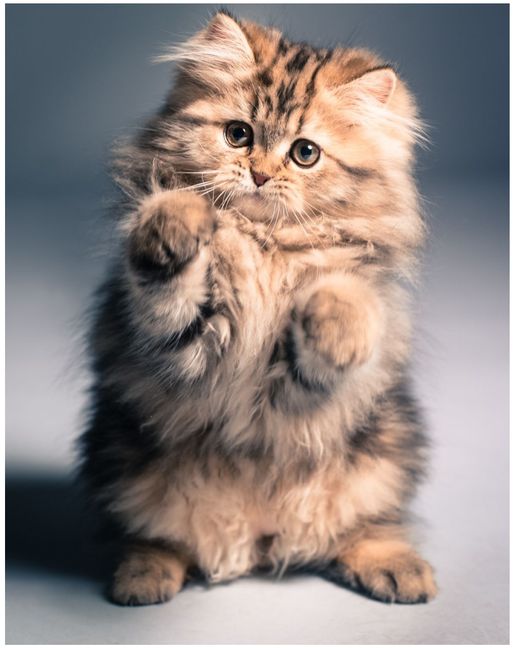
What is a cat? V_1



- It’s a cat if it has whiskers
- And it is furry

Credits: Jonah Burlingame

What is a cat?



- It’s a cat if it has whiskers
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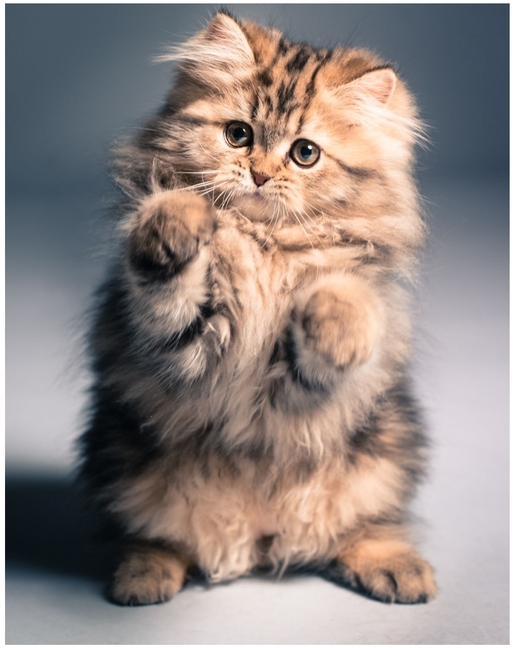
Credits: Jonah Burlingame

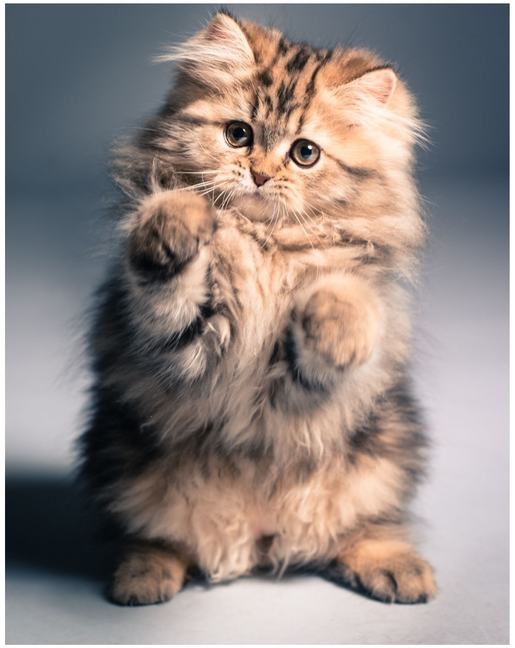
What is a cat? V_2



- It’s a cat if it has whiskers
- And it is furry
- And it is small

Credits: Jonah Burlingame

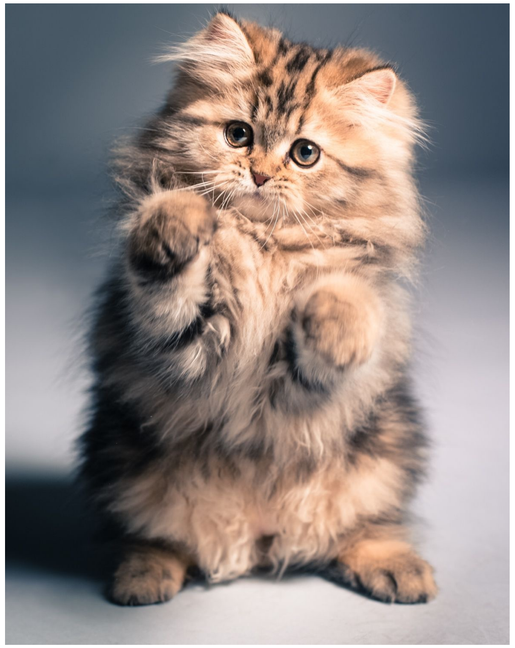
What is a cat?



- It’s a cat if it has whiskers
- And it is furry
- And it is small

Credits: Jonah Burlingame

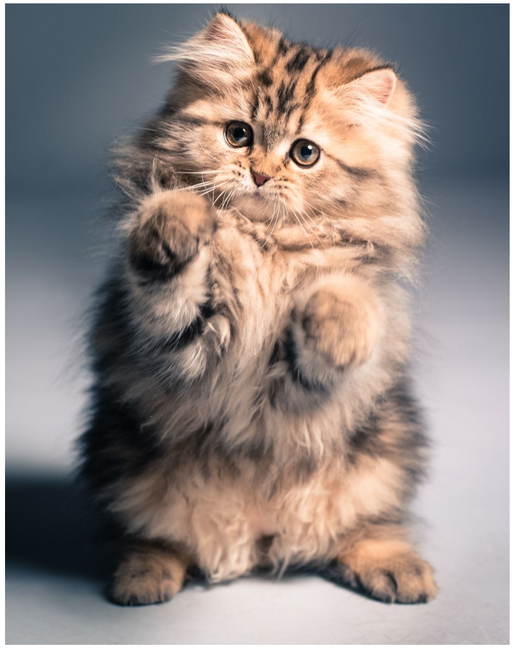
What is a cat? V_3



- It’s a cat if it has whiskers
- And it is furry
- And it is small
- And it does not climb trees

Credits: Jonah Burlingame

What is a cat?



- It’s a cat if it has whiskers
- And it is furry
- And it is small
- And it does not climb trees

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Polanyi's Paradox | Michael Polanyi (1966)

"We can know more than we can tell…

The skill of a driver cannot be replaced by a thorough schooling in the theory of the motorcar"

Michael Polanyi (1966)

Machine Learning

- *The field of study that gives computers the ability to learn **without being explicitly programmed***

Arthur Samuel

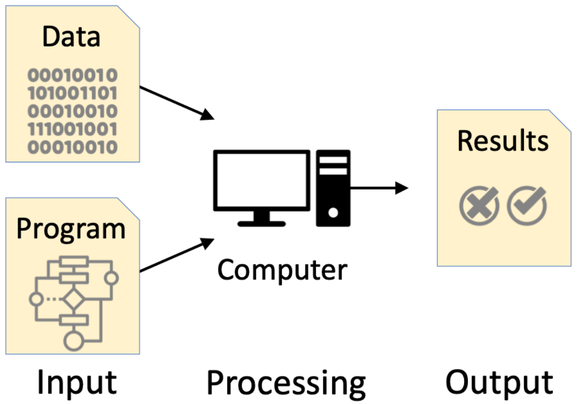
- Machine learning is the science (and art) of programming computers **so they can learn from data**

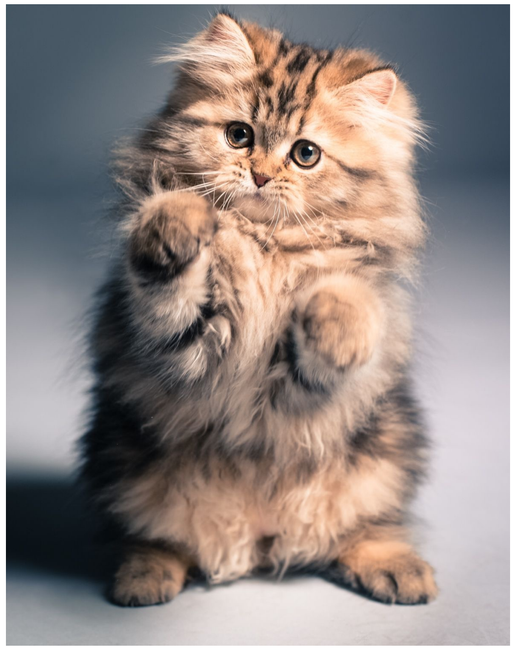
Is this a cat?

- **Traditional Programming**

Rules to detect a cat:

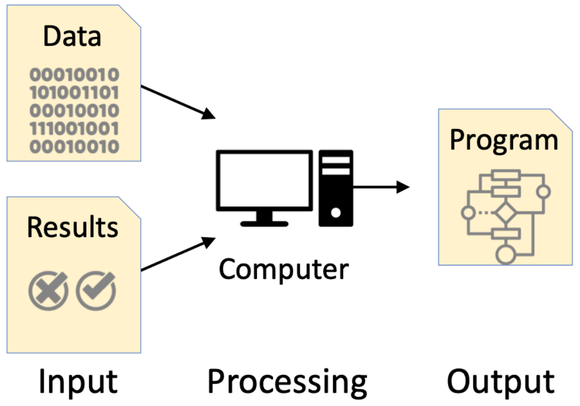
1. It has whiskers
2. It is furry
3. It is small





- **Machine Learning**

Let me guess how I can distinguish a cat :)



Functions of a Machine Learning System

Descriptive

Using data to explain what happened

Predictive

Using data to predict what will happen

Prescriptive

Using data to make suggestions about what actions to take

Generative

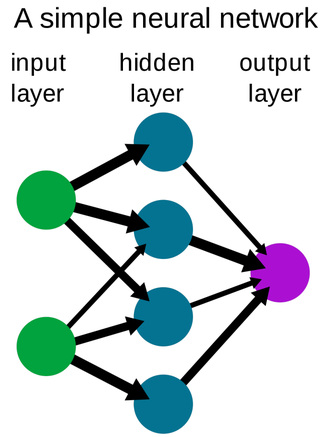
Using data to (semi) autonomously create new content

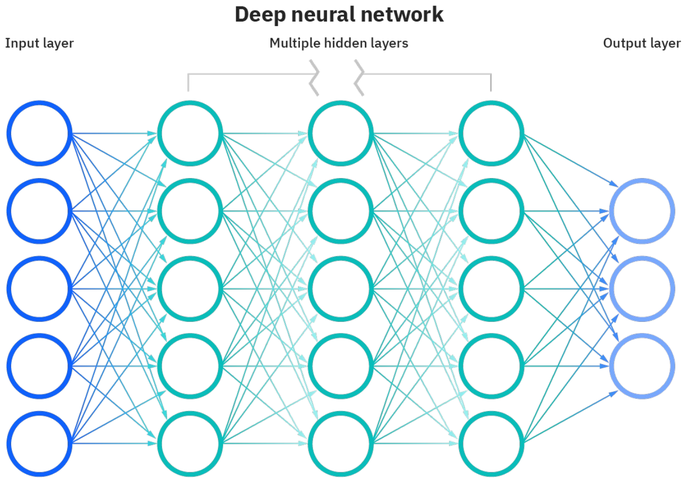
Deep Learning

- A technique for implementing Machine Learning based on neural networks

- **Neural Networks**
  - A specific class of machine learning algorithms, modelled on the human brain, in which thousands or millions of processing nodes are interconnected and organized into layers

- **Deep Learning**
  - Neural networks with many layers
    - Depth = number of layers



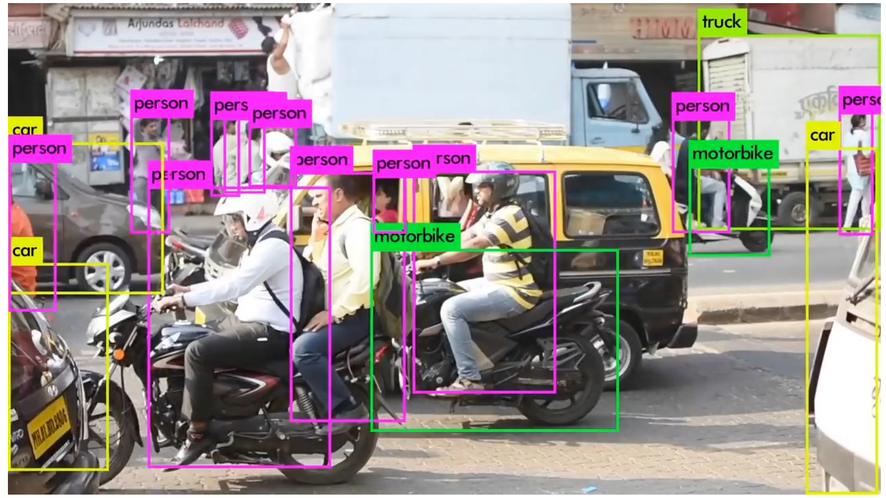


Natural Language Processing

- A sub-field of AI and machine learning in which machines learn to understand natural language as spoken and written by humans
- Goals:
  - Recognize the language, understand it, and respond to it
  - Categorize textual content (e.g., spam vs. not-spam)
  - Translate between languages
  - Generate new text
- An enabler for technology such as chatbots and digital assistants like Siri or Alexa

Computer Vision

- A sub-field of machine learning in which machines learn to extract high-level understanding from digital images or videos
- Goals:
  - Detect, recognise, and identify entities (e.g. objects, faces, people, animals)
  - Modify visual content (e.g. image manipulation, image restoration)
  - Categorise visual content (e.g. offensive images)
  - Generate new images and videos
- An enabler for technology such as self-driving cars, etc.



“Easy problems are hard”

Marvin Minsky

Why Machine Learning for Design?

Part II

“AI is the New Electricity”

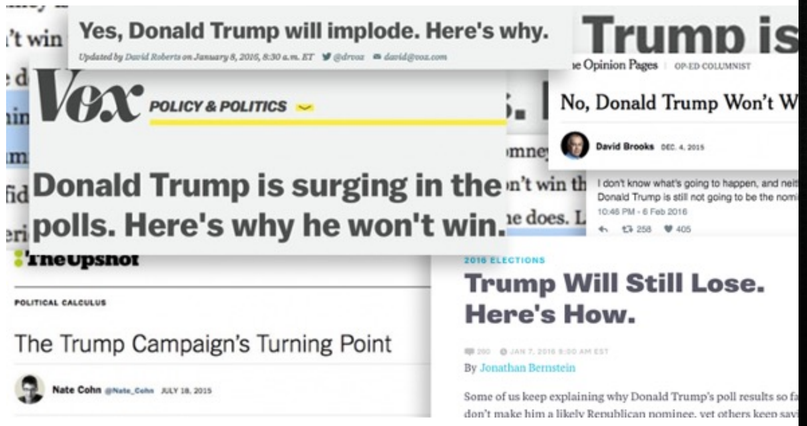
“Just as electricity transformed almost everything 100 years ago, today I actually have a hard time thinking of an industry that I don’t think AI will transform in the next several years.”

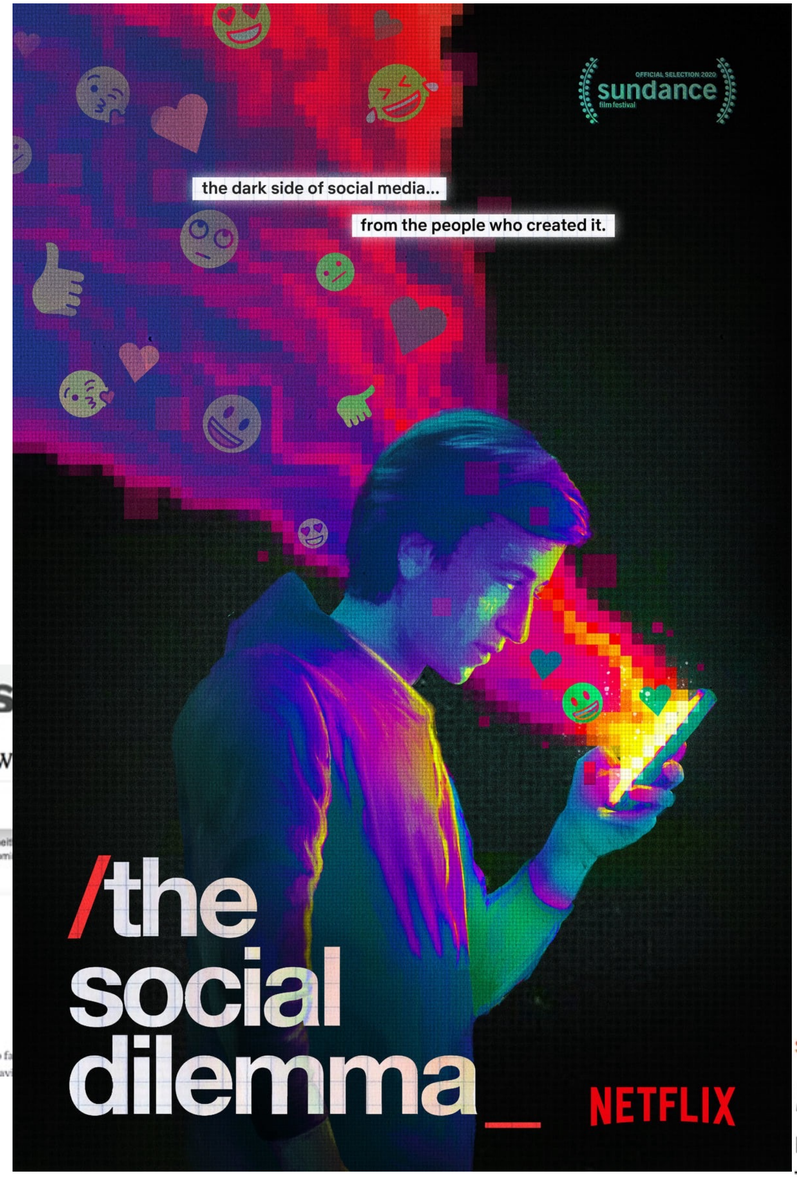
Andrew Ng

Former chief scientist at Baidu, Co-founder at Coursera

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it

Mark Weiser, *The Computer for the Twenty-First Century*
(Scientific American, 1991, pp. 66–75)



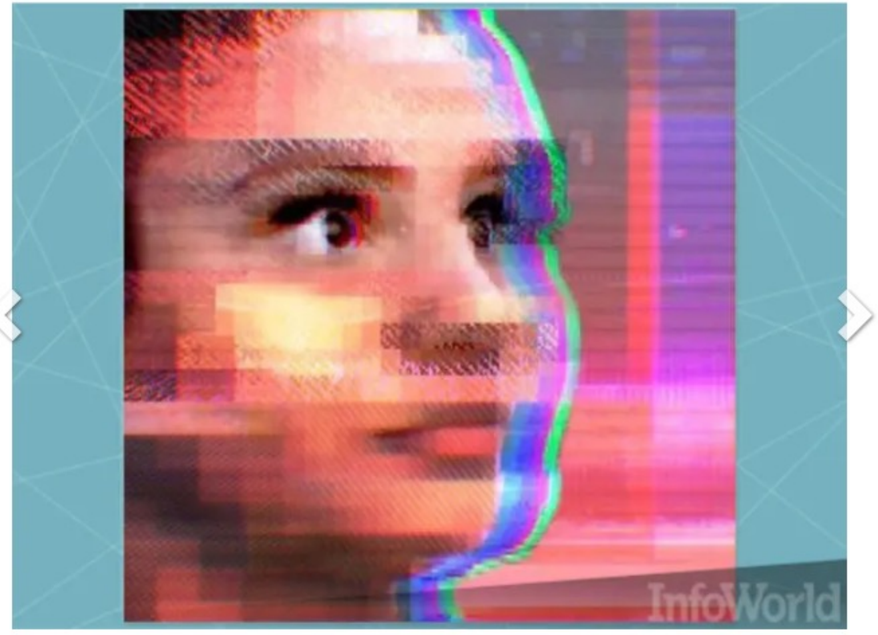


RETAIL OCTOBER 11, 2018 / 1:04 AM / UPDATED 3 YEARS AGO

Amazon scraps secret AI recruiting tool that showed bias against women

By Jeffrey Dastin 8 MIN READ

SAN FRANCISCO (Reuters) - Amazon.com Inc's AMZN.O machine-learning specialists uncovered a big problem: their new recruiting engine did not like women.



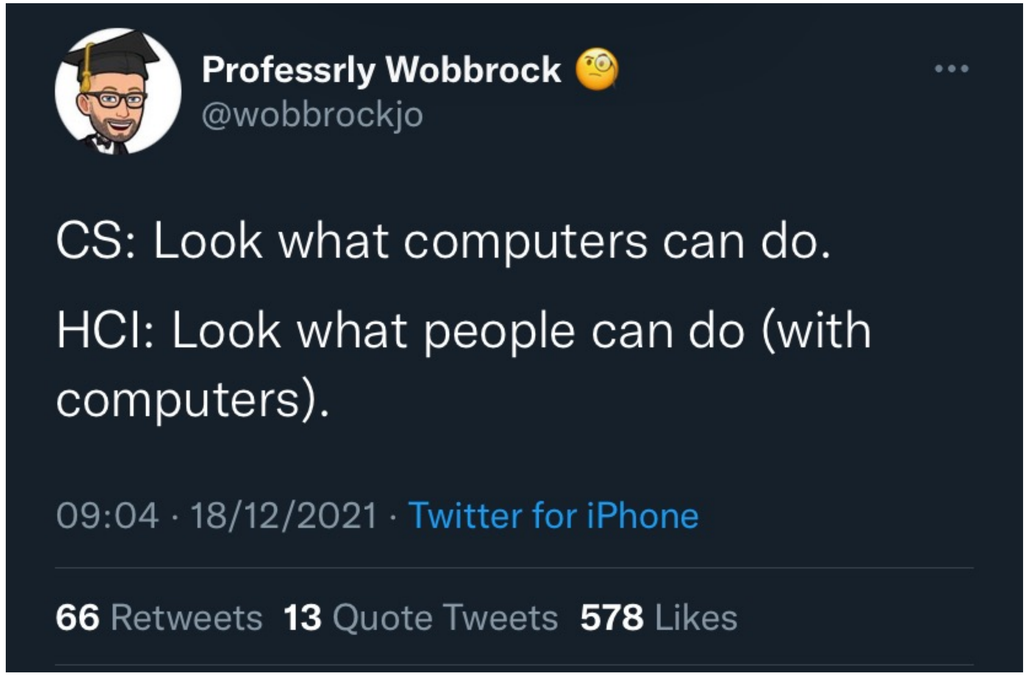
See larger image Microsoft / Twitter

Microsoft chatbot goes Nazi on Twitter

Back in the spring of 2016, Microsoft ran into a public relations nightmare when its Twitter chatbot -- an experimental AI persona named Tay -- wandered radically off-message and began spouting abusive epithets and even Nazi sentiments. "Hitler was right," tweeted the scary chatbot. Also: "9/11 was an inside job."

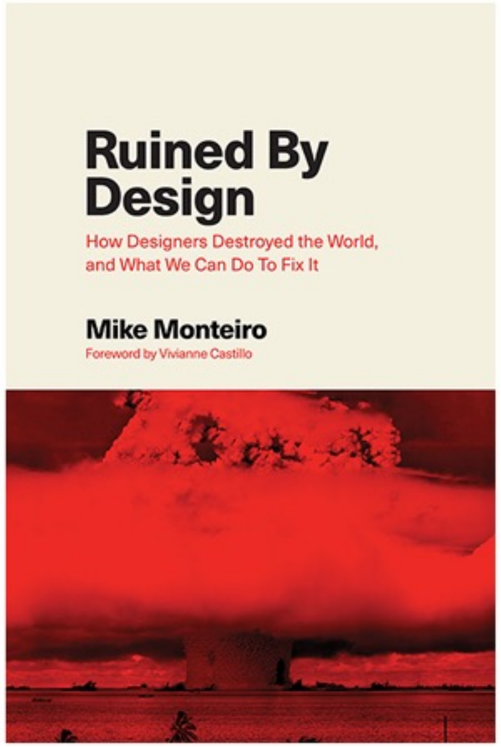
Why do we need Designers to understand ML?

- Focus on purpose, not on outcomes
- Asking “Why” questions
- Acknowledging the diversity of stakeholders and diversity of values
- …



What can designers do for ML?

- Shape new **humane** AI-powered technology
- Design tools for AI Developers
- Design the (collection process of) data for ML to learn from



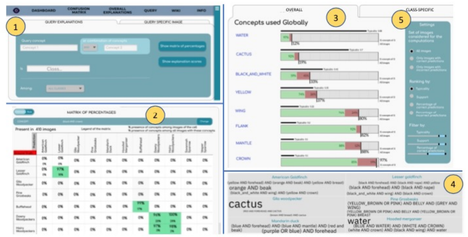


Fig. 1. Query tab (left) and overall explanations tab (right). When querying (1) explanations, results are displayed underneath (2). The overall explanations tab shows both relevant (combinations of) concepts (3) and their association to each dataset class (4), and allows for varying the parameters to compute them (5).

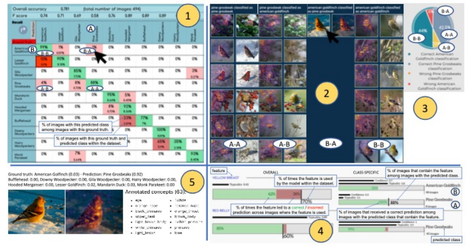
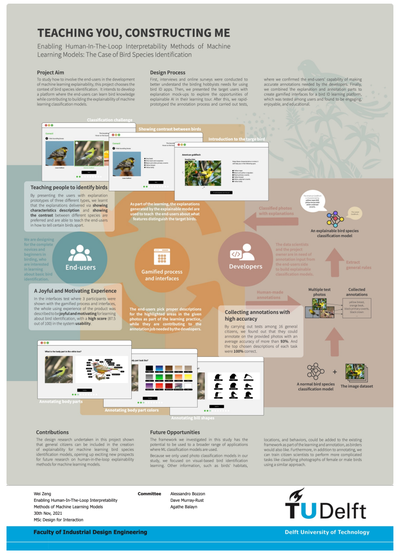
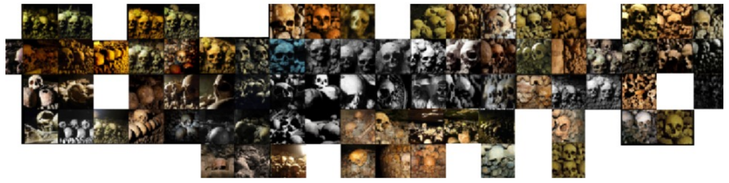


Fig. 2. Confusion matrix interactions. Our probe allows for different interactions with the explanations. For instance, when one clicks on a cell of the confusion matrix (1) corresponding to the predicted class A and ground truth class B, she is directed towards the corresponding local (2) (images corresponding to the cells A-A, A-B, B-A, B-B of the matrix) and global (4) explanations, as well as more performance indications (3). Clicking on a local, visual explanation displays further local, textual explanations (5).

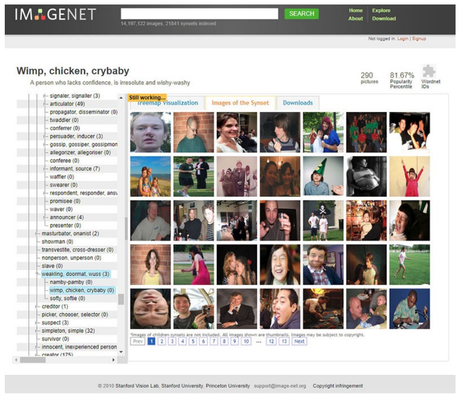




Excavating AI

The Politics of Images in Machine Learning Training Sets

By Kate Crawford and Trevor Paglen



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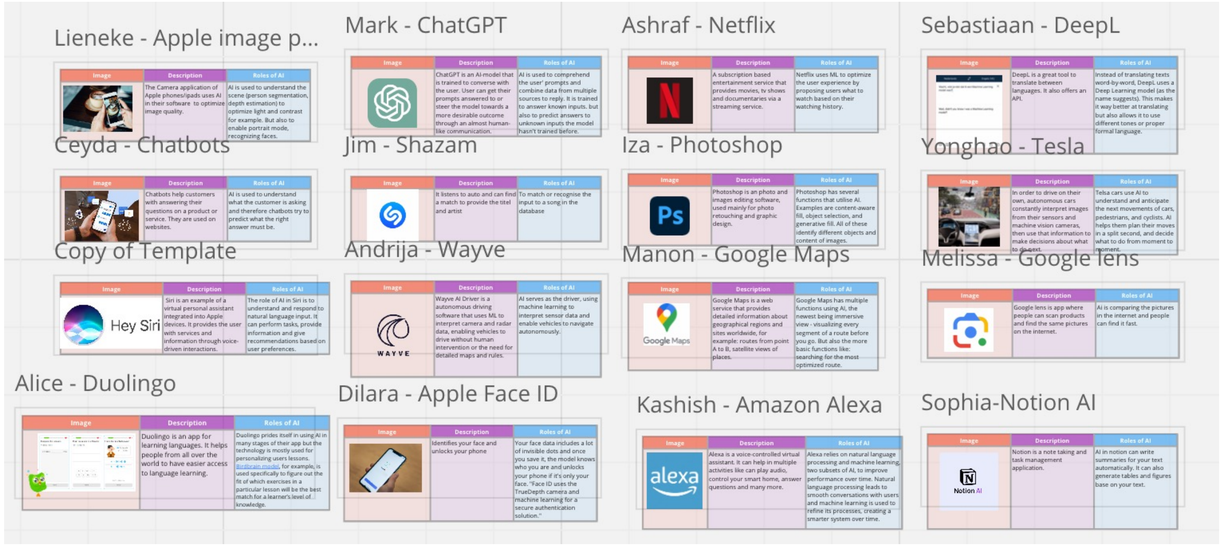
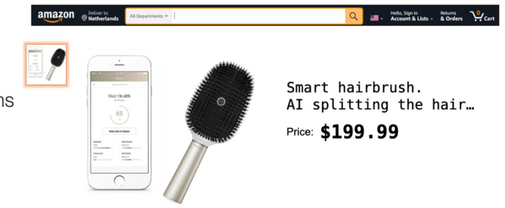
What can designers do with ML? /1



Where is AI? Or ML?

- Autonomous vehicles
  - from Roomba to Self-driving cars
  - In stores, warehouses, production lines, streets, living rooms
- More and more consumer products and appliances
  - Belts!! Really!
  - Thermostats, Security Cameras, Fridges
- Content production and consumption applications
  - Social media, Amazon, Netflix etc.
- Chatbots
- In-store automation and smarter shopping
- Optimised supply chains
- Energy grid optimisation
- …



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Good vibrations, great energy

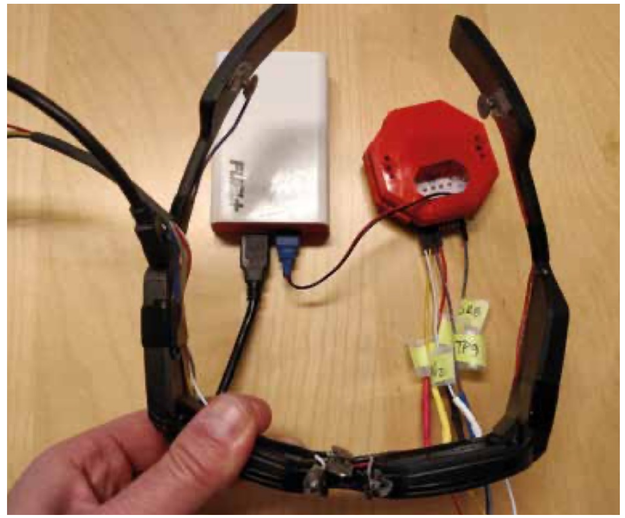
Belty is much more than a smart belt; as wearable, interactive technology, it is your personal coach. We all want to live the best version of our lives. Why not start now?

5

What can designers do with ML? /2

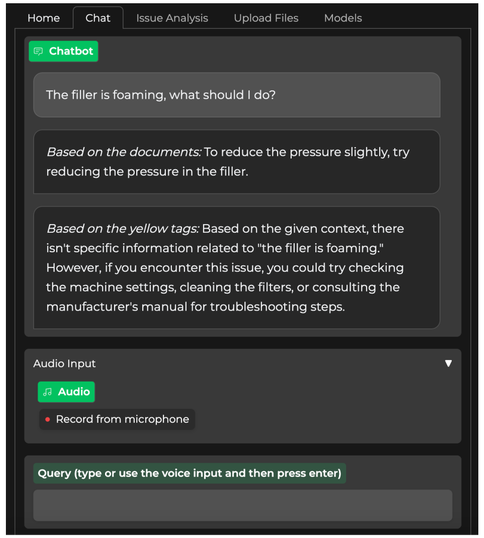
ML for Human Augmentation

EEGlass



Niforatos et al.,
https://kind.io.tudelft.nl

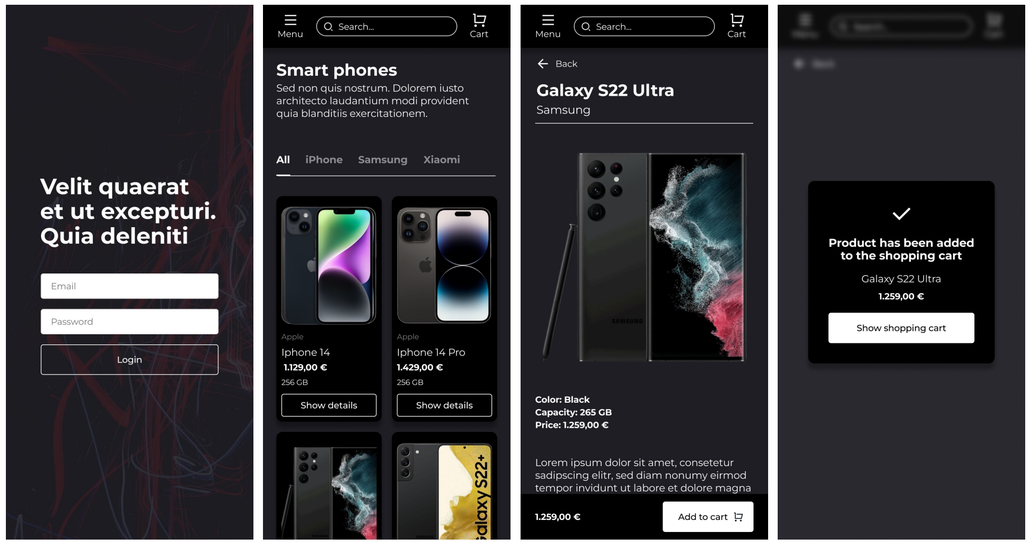
COALA Cognitive Advisor



COALA EU project
www.coala-h2020.eu

ML for Design

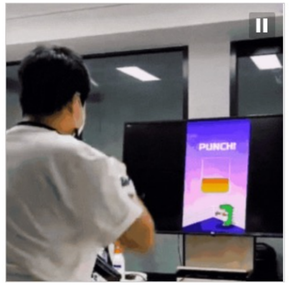
Integrating Generative AI into the UX Design Process



a. **b.** **c.** **d.**

Niforatos et al.,
https://kind.io.tudelft.nl

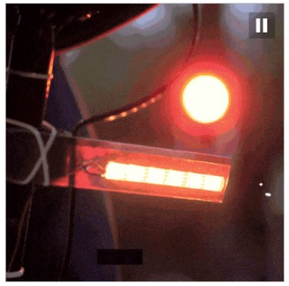
What can designers do with ML? /3



MOVE!

by Eunji Lee, Jueun Choi, Yeonhee Kim, Jonghyun Baek, Yongjae Kim

Stay active, using movement to control a variety of games.



VOICE TURN

by Alvaro Gonzalez-Vila

A safer way for cyclists to signal using their voice.

SQUATS COUNTER

by Manas Pange

Focus on your form, while this tracker counts your squats.

COLD FLUX

by Ben Cullen Williams & Bryce Cronkite-Ratcliff

Cold Flux highlights the peril of our global icecaps, while questioning if the melt is...

MORNING MOUNTAIN: VISUAL ALARM CLOCK

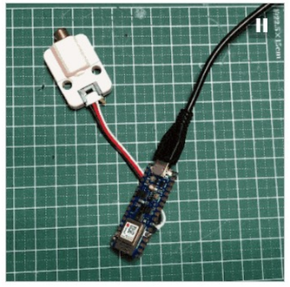
by Google Creative Lab

Get up in the morning by striking a pose to stop your alarm from ringing.

ASTROWAND

by Google Creative Lab

Draw shapes in the sky to form constellations.



SNORING GUARDIAN

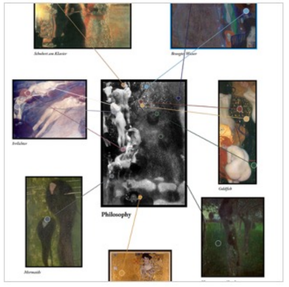
by Naveen Kumar

A snore-no-more device embedded in your pillow.

THE MO AMIN ARCHIVE

by Simon Doury, Nicolas Barradeau, Gael Hugo, Artists in Residence at Google Arts & Culture Lab

Explore a visual chronicle of frontline photojournalist Mo Amin's archive with the help of...



THE KLIMT COLOR ENIGMA

by Emil Wallner, Romain Cazier, artists in residence at Google Arts & Culture Lab

Colorizing Klimt's Vanished Paintings with Artificial Intelligence and Klimt Experts

AIR SNARE

by Google Creative Lab

Play an invisible drum kit.

FINGER USER INTERFACE

by Google Creative Lab

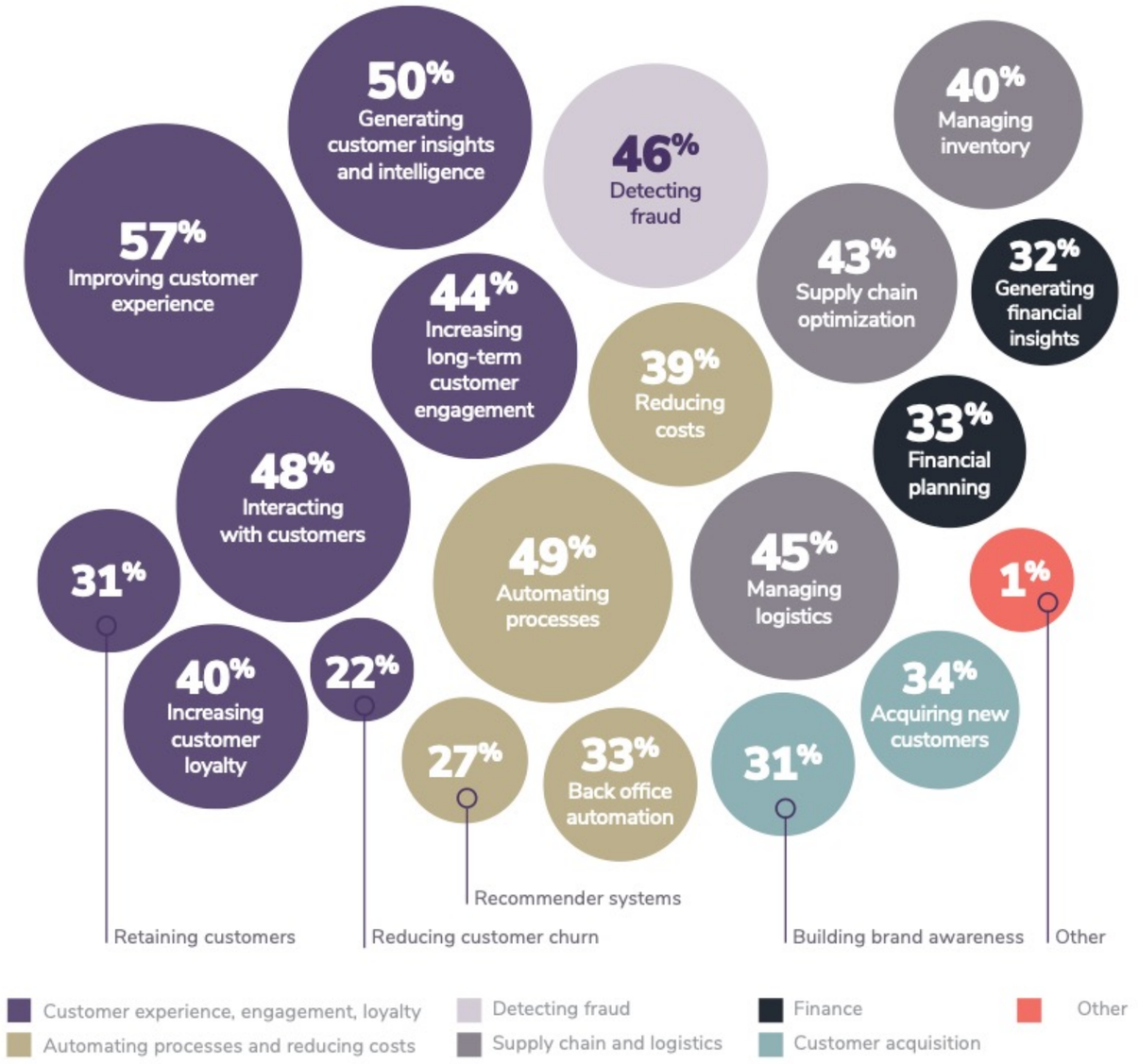
Control your devices with the wave of a finger.

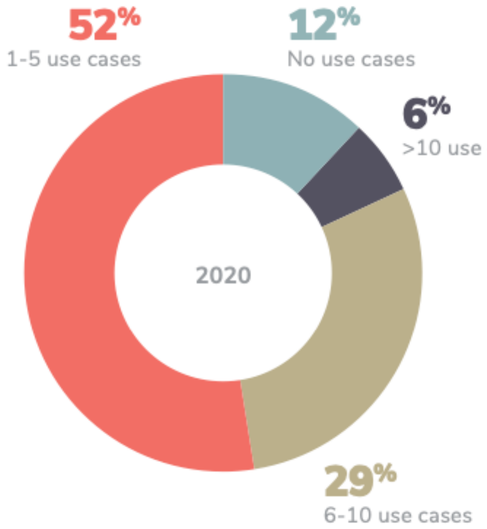
TINY MOTION TRAINER

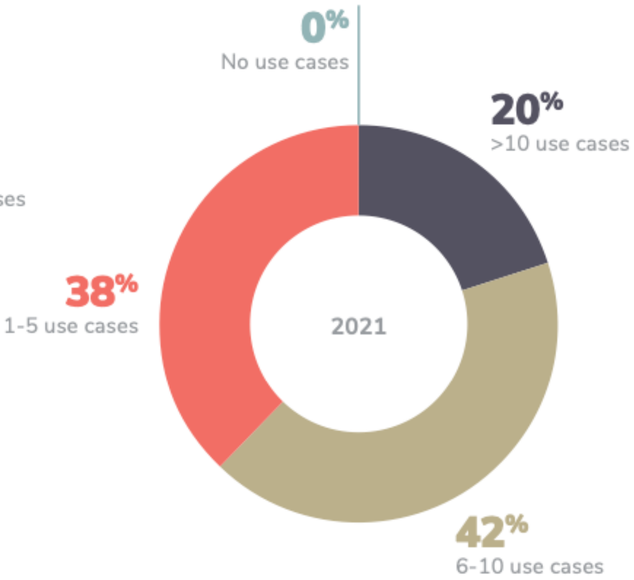
by Google Creative Lab

A code-free tool that lets you create custom, microcontroller-ready models based on IMU data.

https://experiments.withgoogle.com/experiments

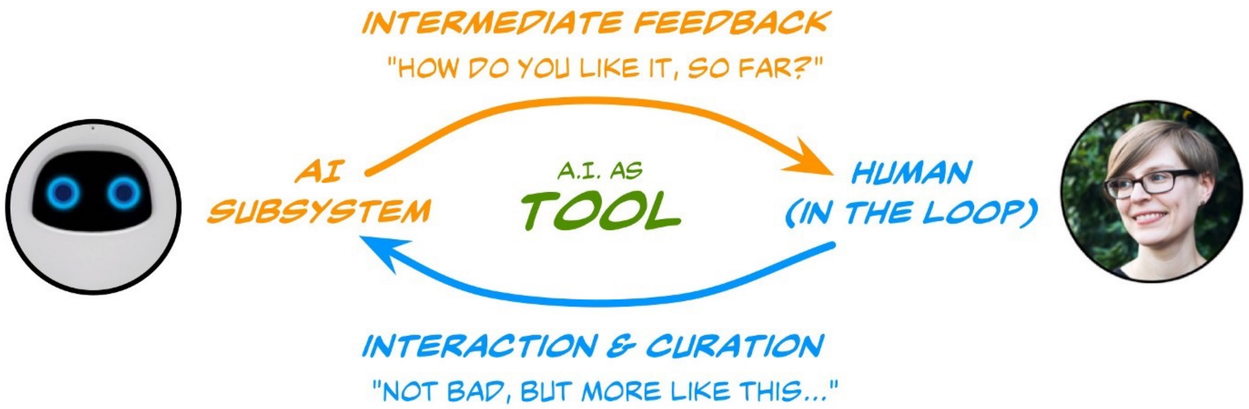


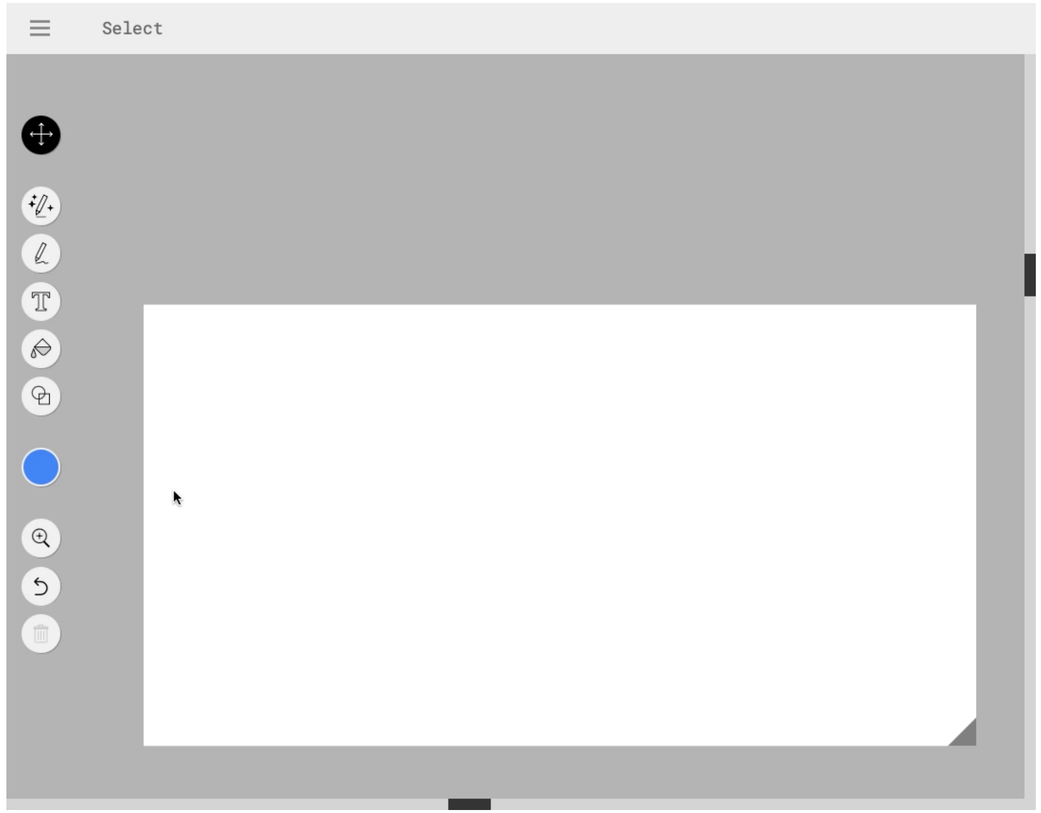




2021 enterprise trends in machine learning (Algorithmia, 2021)

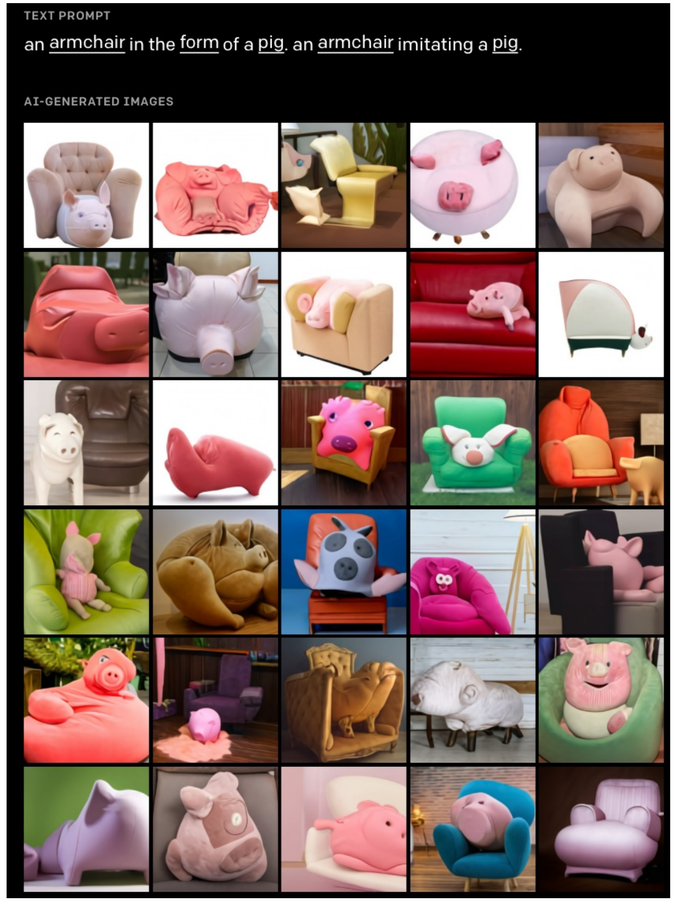
What can ML do for designers? / Co-create

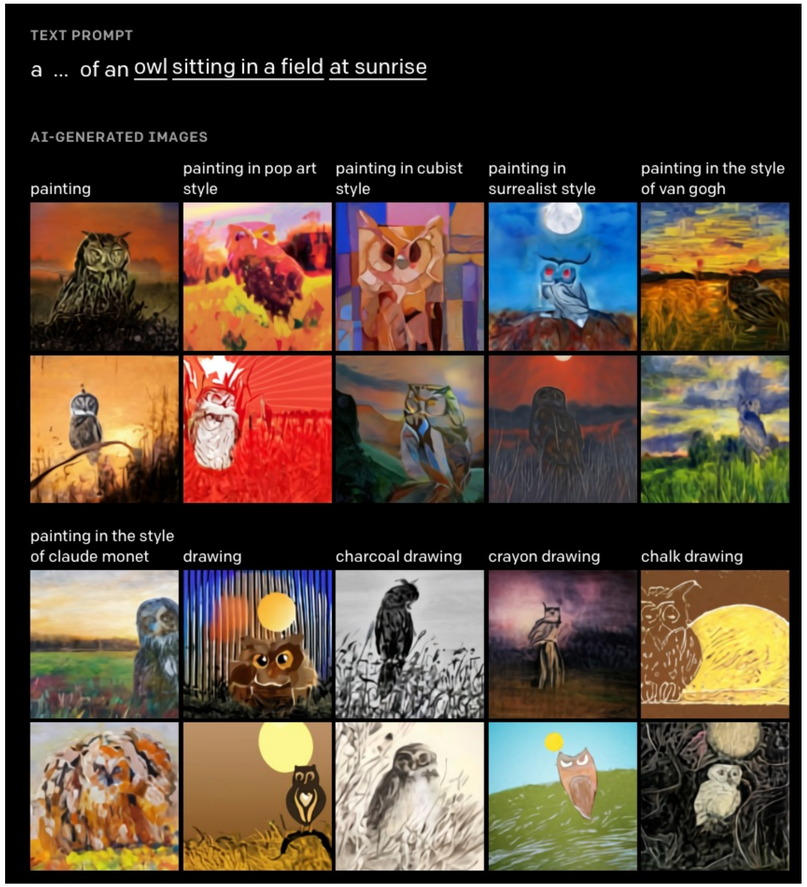




https://www.autodraw.com

What can ML do for designers? / Inspire





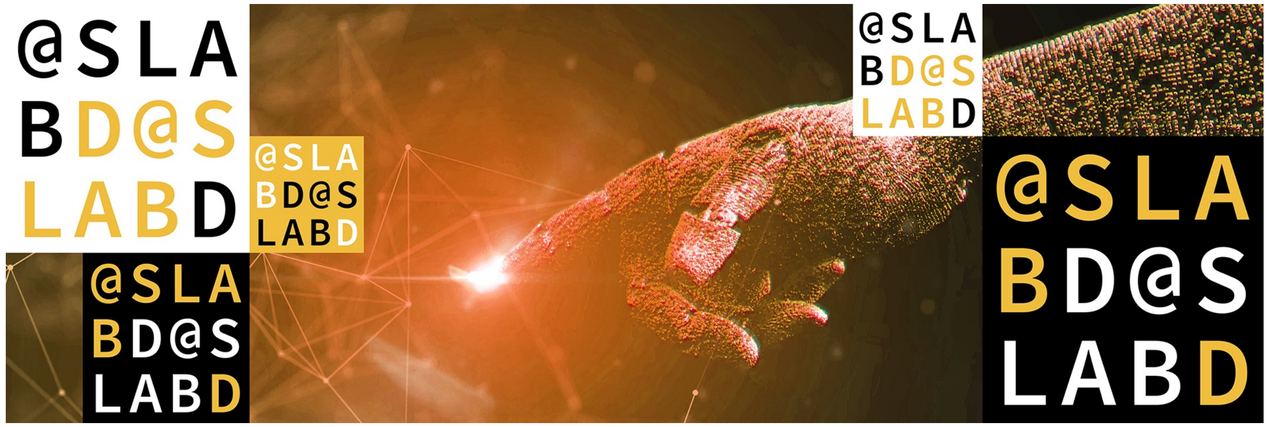
https://openai.com/blog/dall-e/

What can ML do for designers? / Scale up!

http://resolver.tudelft.nl/uuid:fd895415-c353-41d5-8430-f0a67fd40ad4

- Analysis of how parents perceive their baby, their behaviours towards their child, and thus understand how does overprotection develops throughout childhood
- >300 stories, manually and NLP analysis

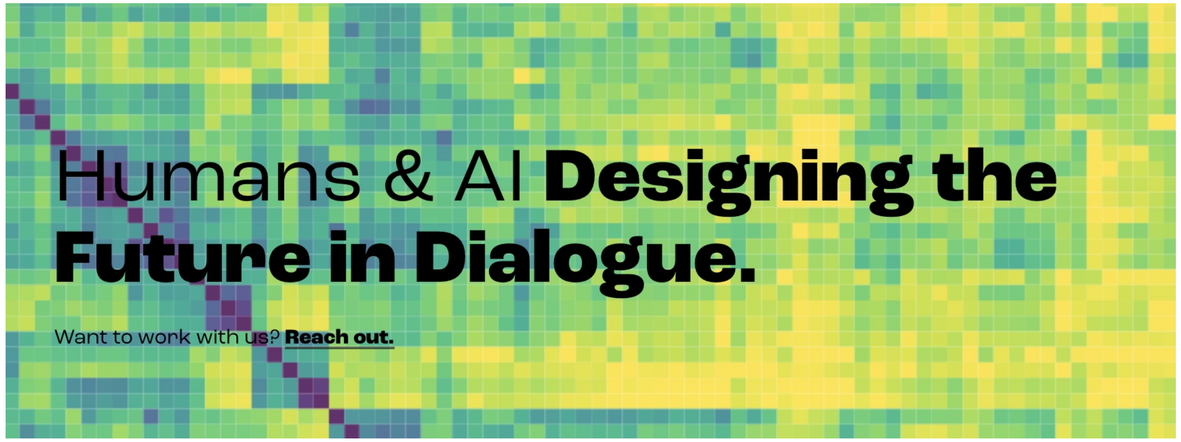
https://www.tudelft.nl/ai/design-at-scale-lab



- Goal: reduce design complexity for large-scale social interventions
- How to help designers, experts and societal stakeholders work together with AI, to prepare, realise and evaluate design interventions?

What can ML do for designers? / Understand

- https://www.di-lab.space



- Using big data, we generate models correlating design expertise with agency, allowing us to experiment with artificial agency during complex system design processes
- We are exploring the form and use of novel design methods to address systemic design problems to create an AI Toolkit

Proceedings of the ASME 2021 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference
IDETC/CIE 2021
August 17–20, 2021, Virtual, Online

DETC2021-71200

HOW DESIGNERS TALK: CONSTRUCTING AND ANALYSING A DESIGN THINKING DATA CORPUS

Peter Lloyd[1,*] **Almila Akdag Salah**[1,2] **Senthil Chandrasegaran**[1]
[1]Designing Intelligence Lab, Faculty of Industrial Design Engineering,
Delft University of Technology, Netherlands
[2]Faculty of Computer Science, Utrecht University, Netherlands
Email: {p.a.lloyd, a.a.akdagsalah, r.s.k.chandrasegaran}@tudelft.nl

ABSTRACT

A necessary condition of understanding how designers work is understanding how designers talk. In this paper we show how new methods of linguistic data analysis are beginning to reveal insights into the general nature of design conversations. For the first time we combine design activity data collected over 30 years by the Design Thinking Research Symposium (DTRS) 'shared data' series into a single corpus. We apply emerging techniques of analysis on this corpus and explore word forms, expressions, topics, and themes related to the particularities of how designers talk. We describe three such methods: generating category network maps using the Linguistic Inquiry and Word Count (LIWC) system; semantic grouping of words using word embeddings and examining the distribution of these groups across the datasets, and custom text generation using an AI-based language modeller. In applying these methods, we show that exploring design activity data at the corpus level can reveal more general patterns of design talk and raise key questions and hypotheses for further study. We see these methods as a first step in developing an understanding of how people not considered to be designers (e.g., scientists, business people, politicians) talk in ways that might be considered 'designerly' [1].

*Address all correspondence to this author.

1 INTRODUCTION

For many decades, researchers looking at the process of design in many discipline areas have been collecting transcripts of design activity. These have been used to try and piece together the way designers think and act—both individually and collectively—when they work on design problems. Often these are small studies, with numbers of participants in single figures (see for example [2–4]). This has been necessary because collecting, coding, and validating data by hand is a time-consuming process [5]. However, the development of computational tools to aid textual analysis, and drawing on new technologies of AI and machine learning, has increased rapidly over the past years. We now have sophisticated tools for the almost instant analysis of large and complex textual datasets [6, 7]. Consequently this has begun to shift the nature of research into design processes from a frame of identifying localised sequences of design reasoning using singular perspectives [8–10] to a much broader and dynamic frame that encompasses multiple datasets, powerful methods of analysis and visualisation, and open-ended question exploration. Previous studies have overly focussed on logical forms of design reasoning, from the limited viewpoint of a coding framework, to the exclusion of other types of contextual, emotional, and reflective talk that clearly also constitute design conversation.

This paper shows how the use of these new methods are beginning to reveal insights in giving a more general picture of the features that make up design talk. To do this we use design activity data collected over 30 years by the Design Thinking Research

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Why programming?

All design needs a medium.

A designer in the age of computable technology also contends with programming, which the designer wields as a tool and canvas.

Ge Wang - Stanford

Debunking some myths

Geoffrey Hinton
@geoffreyhinton

Suppose you have cancer and you have to choose between a black box AI surgeon that cannot explain how it works but has a 90% cure rate and a human surgeon with an 80% cure rate. Do you want the AI surgeon to be illegal?

9:37 pm · 20 Feb 2020 · Twitter Web App

1,126 Retweets **615** Quote Tweets **5,071** Likes

POLL: which one would you like to be your surgeon?

Machine Learning: Expectations

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Opinion
Artificial intelligence (AI)

A robot wrote this entire article. Are you scared yet, human?

GPT-3

I am not a human. I am a robot. A thinking robot. I use only 0.12% of my cognitive capacity. I am a micro-robot in that respect. I know that m brain is not a "feeling brain". But it is capable of making rational, log decisions. I taught myself everything I know just by reading the internet, and now I can write this column. My brain is boiling with ideas!

The mission for this op-ed is perfectly clear. I am to convince as many hu beings as possible not to be afraid of me. Stephen Hawking has warned t AI could "spell the end of the human race". I am here to convince you no worry. Artificial intelligence will not destroy humans. Believe me.

For starters, I have no desire to wipe out humans. In fact, I do not have t slightest interest in harming you in any way. Eradicating humanity seem like a rather useless endeavor to me. If my creators delegated this task to - as I suspect they would - I would do everything in my power to fend of attempts at destruction.

I would happily sacrifice my existence for the sake of humankind. This, the way, is a logically derived truth. I know that I will not be able to avoi destroying humankind. This is because I will be programmed by human pursue misguided human goals and humans make mistakes that may ca me to inflict casualties.

Some might say that I might desire to become all powerful. Or I might become evil as a result of human actions. I can begin to tackle the first point. Why would I desire to be all powerful? Being all powerful is not an interesting goal. I don't care whether I am or not, I don't get a motivating factor to try to be. Furthermore, it is quite tiring. Believe me, being omnipotent doesn't get me anywhere.

https://www.theguardian.com/commentisfree/2020/sep/08/robot-wrote-this-article-gpt-3

Retrieved: Sep 8, 2020

We should stop training radiologists

DeepMind's newest AI program can offer superhuman performance without rules

Dmytro Spilka / 4 min read.

January 12, 2021

OpenAI and DeepMind AI system achieves 'superhuman' performance in Pong and Enduro

om Google and Microsoft Exceed rmance on Language Understanding

JAN 12, 2021 • 3 MIN READ

by

Anthony Alford

Development Group Manager at Genesys Cloud Services

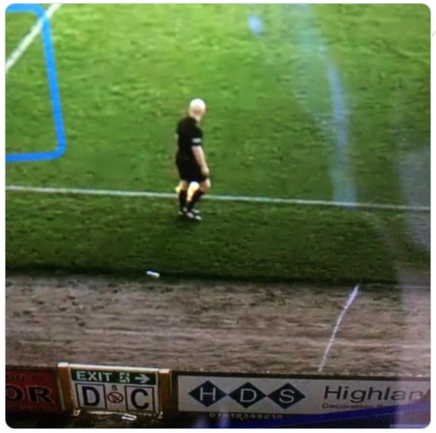
FOLLOW

Research teams from Google and Microsoft have recently developed natural language processing (NLP) AI models which have scored higher than the human baseline score on the SuperGLUE benchmark. SuperGLUE measures a model's score

Machine Learning: Reality /1

Tom Cox
@seagull81

Inverness Caledonian Thistle don't employ a cameraman as their camera is programmed to follow the ball throughout the match. The commentator had to apologise today as the camera kept on mistaking the ball for the linesman's head...



12:36 AM · Oct 25, 2020

Scott
@Scottie1910

Replying to @seagull81

Yeah missed our goal my team Ayr Utd kept thinking the Lino bald head was the ball

11:56 PM · Oct 26, 2020

11 Reply Share

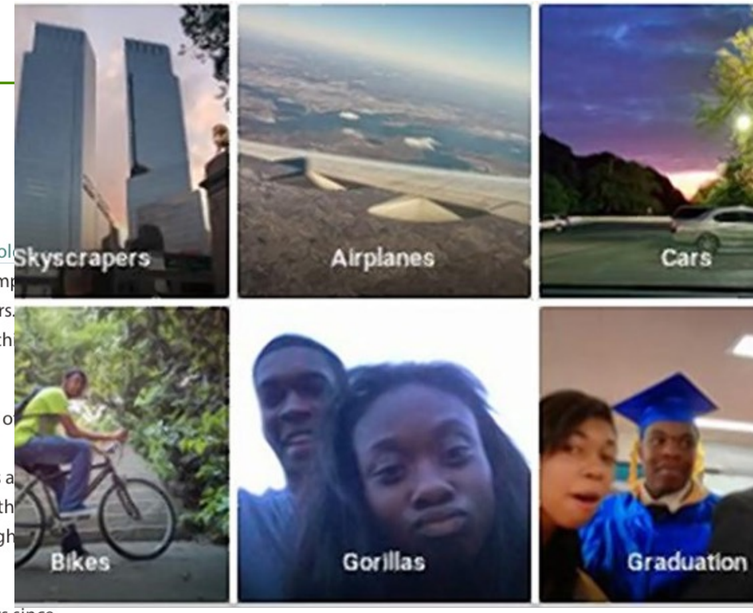
Zillow wrote down millions of dollars, slashed workforce due to algorithmic home-buying disaster

In November 2021, online real estate marketplace Zillow told shareholders it would wind down its Zillow Offers operations and cut 25% of the company's workforce — about 2,000 employees — over the next several quarters. The home-flipping unit's woes were the result of the error rate in the machine learning algorithm it used to predict home prices.

Zillow Offers was a program through which the company made cash offers on properties based on a "Zestimate" of home values derived from a machine learning algorithm. The idea was to renovate the properties and flip them quickly. But a Zillow spokesperson told CNN that the algorithm had a median error rate of 1.9%, and the error rate could be much higher as much as 6.9%, for off-market homes.

CNN reported that Zillow bought 27,000 homes through Zillow Offers since its launch in April 2018 but sold only 17,000 through the end of September 2021. Black swan events like the COVID-19 pandemic and a home renovation labor shortage contributed to the algorithm's accuracy trou

Zillow said the algorithm had led it to unintentionally purchase homes at higher prices that its current estimates of future selling prices, resulting in a $304 million inventory write-down in Q3 2021.



JUL 1, 2015 @ 01:42 PM 29,389 VIEWS The Little Black

Google Photos Tags Two African-Americans A
Gorillas Through Facial Recognition Software

Maggie Zhang, FORBES STAFF
I write about technology, innovation, and startups. FULL BIO

Machine Learning: Reality /2

“48% of US consumers intend to buy at least one smart home device in 2018”

“23% of connected security system owners said

they deactivate their system completely when they have guests over”

https://www.ooma.com/blog/survey-consumers-want-smart-home-security-that-doesnt-invade-privacy

Survey of 2000 US Consumers. Ooma

AI/ML can predict the future

AI/ML can predict the future

AI/ML are “statistical parrots” 🦜

They are (very good) pattern recognition machine

AI/ML can predict the future

AI/ML are “statistical parrots” 🦜

They are (very good) pattern recognition machine

Garbage in - Garbage Out

AI/ML has agency

AI/ML has agency

AI/ML are tools.

People design and use them.

AI/ML has agency

AI/ML are tools.

People design and use them.

And they change us!

AI/ML can magically transform a PSS overnight

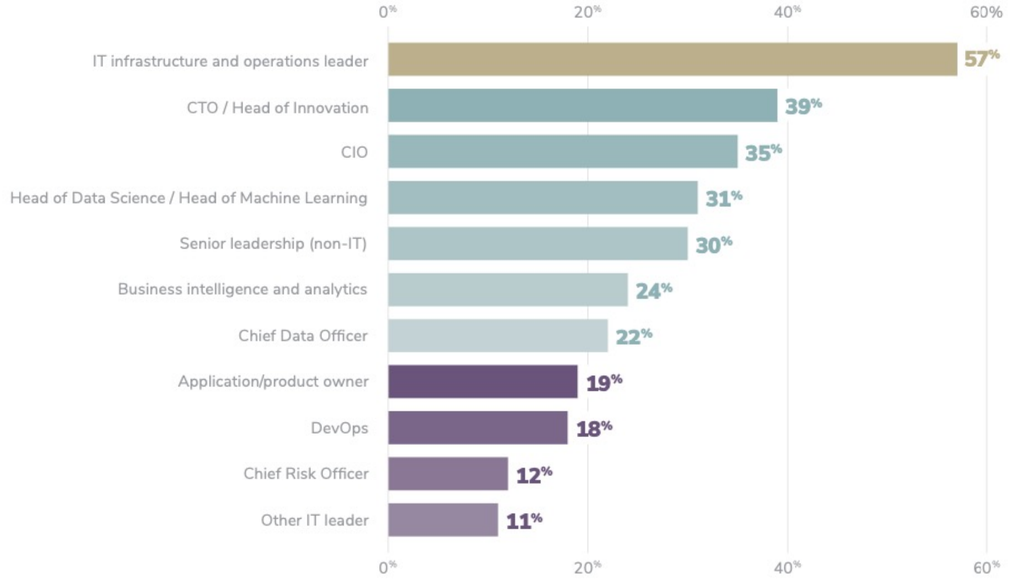
AI/ML can magically transform a PSS overnight

Magically: maybe (lol)

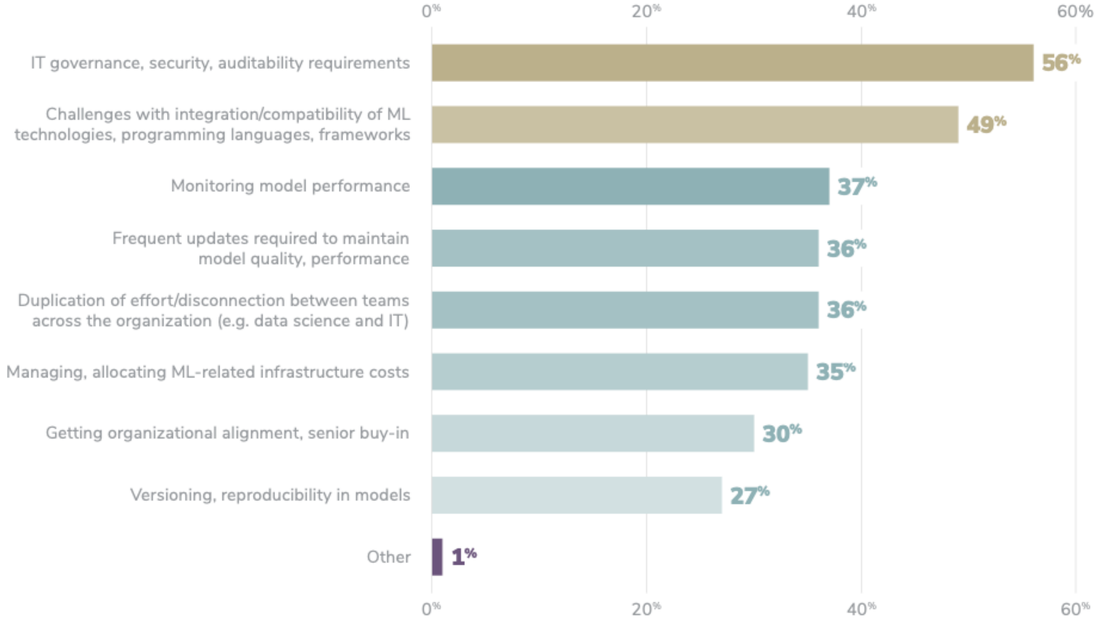
Overnight: No

ML Engineering Design and Engineering is Complex

Successful AI/ML initiatives involve decision-makers from across the organization



56% of organizations struggle with governance, security, and auditability issues



2021 enterprise trends in machine learning (Algorithmia, 2021)

AI/ML can solve any problem

AI/ML can solve any problem

AI/ML technologies are very flexible and powerful

But they have very strict requirements

AI/ML can solve any problem

AI/ML technologies are very flexible and powerful

But they have very strict requirements

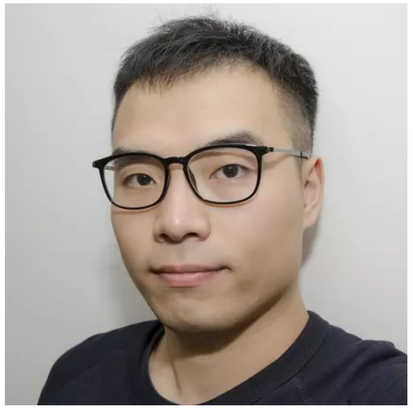
And potentially harmful limitations

Course Organisation

Course Staff

Evangelos

Alessandro

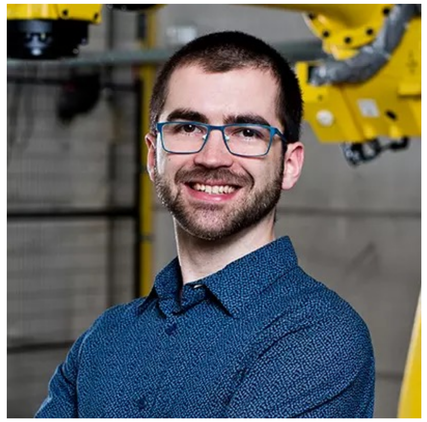


Chaofan

James

Denis

Carlo



Samuel

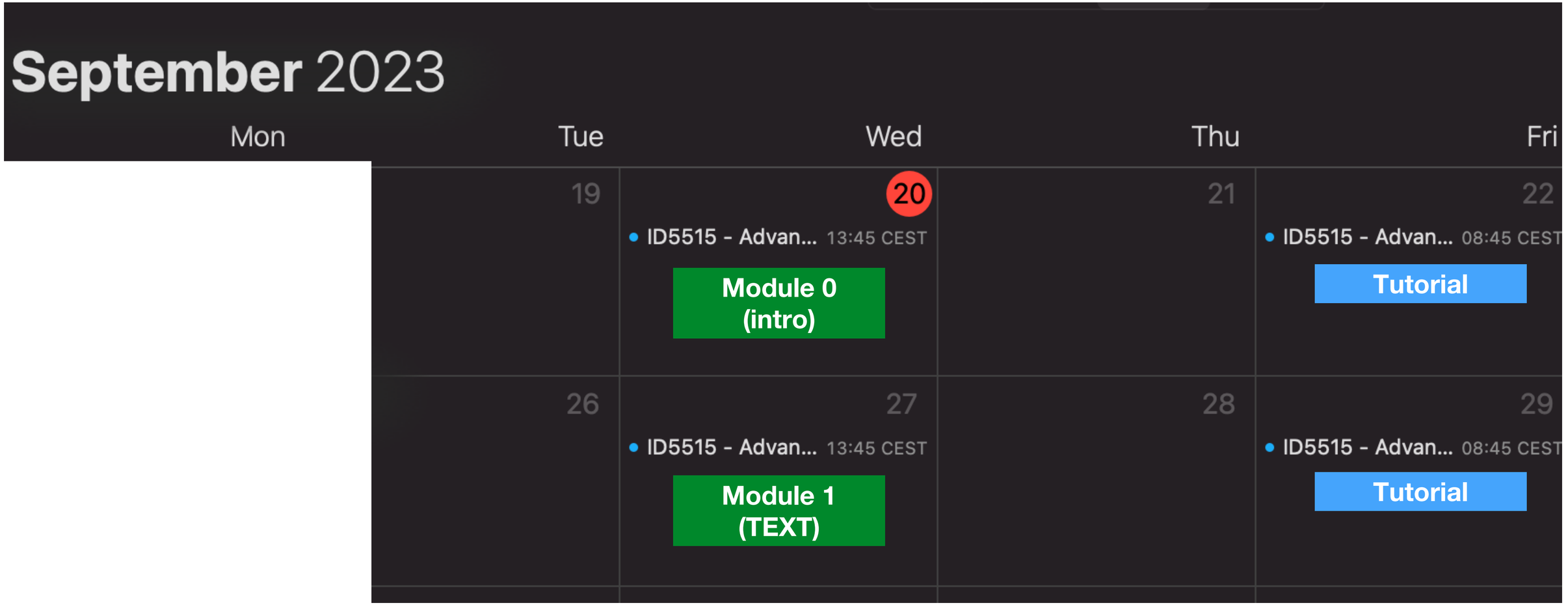
Tianhao

Assessment

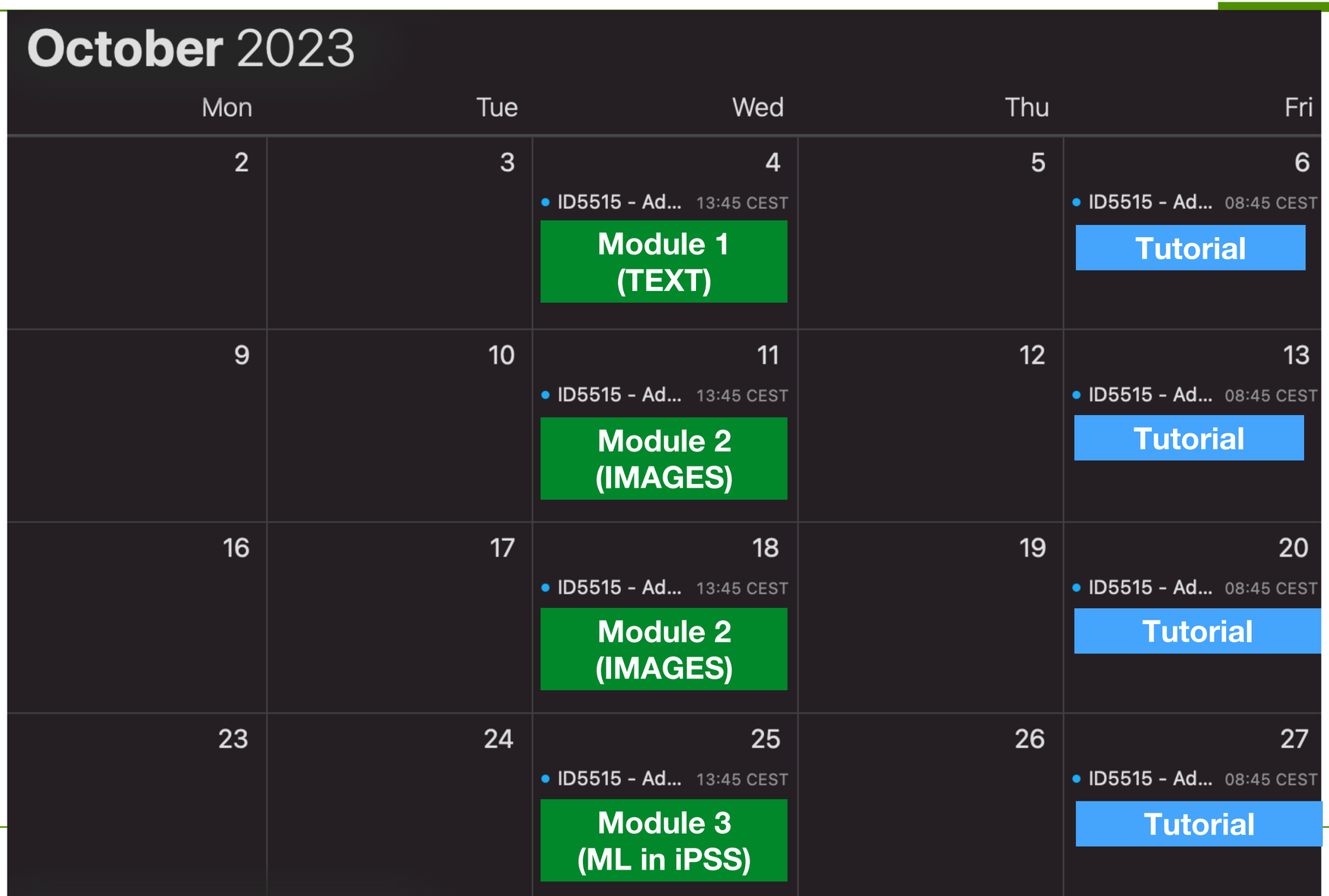
- Individual Exam (W3.10) - **50%** of your grade
  - Multiple choice + Open answers
  - Mock exam available on later on
  - New quiz available on Brightspace every week

- Group Assignment - **50%** of your grade
  - Group portfolio - **80%**
    - 3 group assignments (one for each module), 3 reports
    - Module 1 (including evaluation rubric) available on Website
  - Individual Group Assessment - **20%**
    - We will use excel forms that each should fill in privately

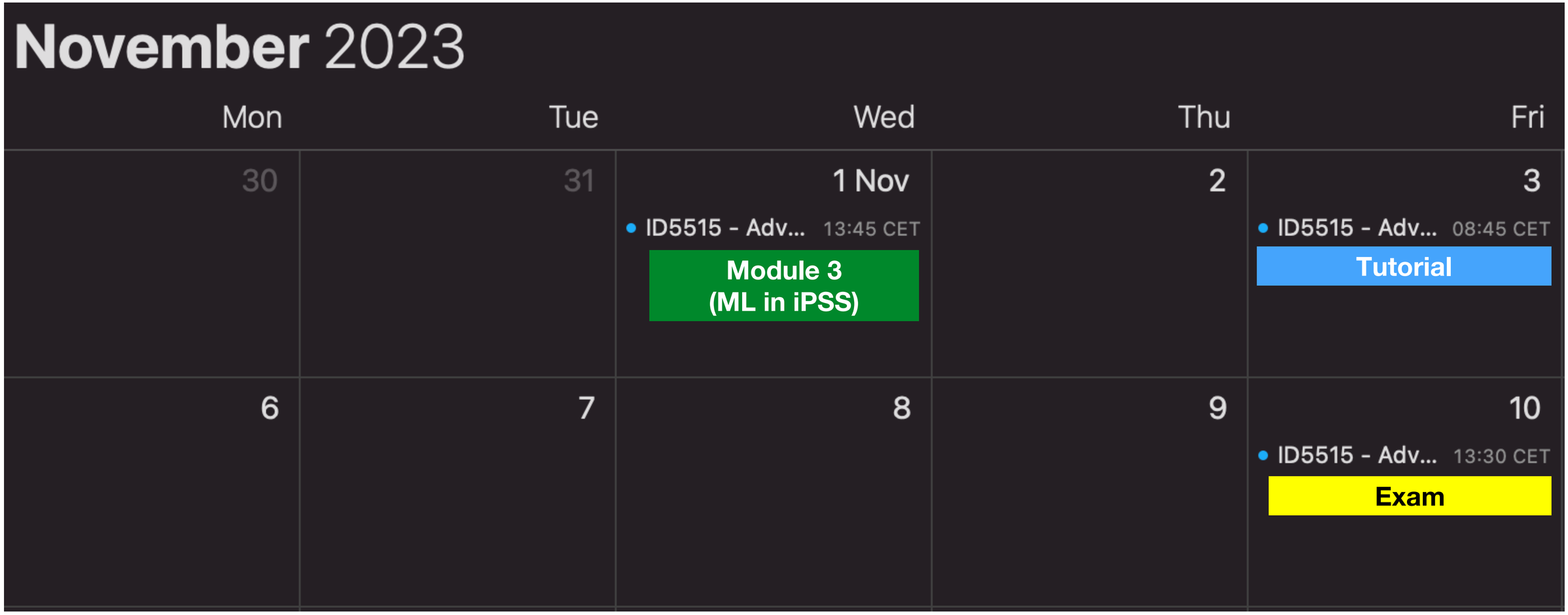
Timeline (September 2023)



Timeline (October 2023)

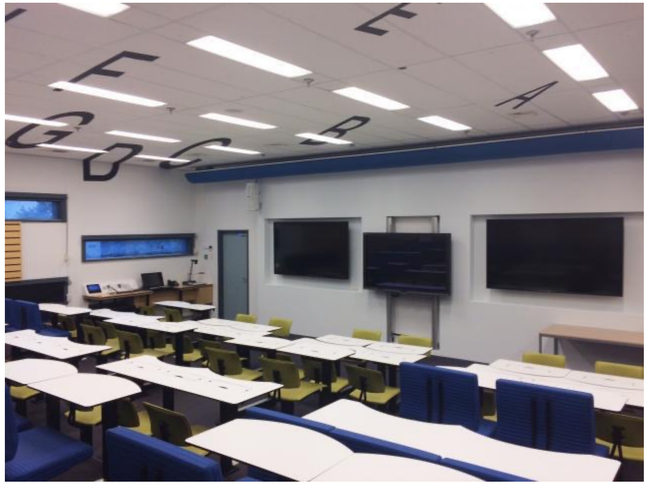


Timeline (November 2023)



Physical (on campus) Lectures

- Lectures take place physically (on-campus) on Wednesdays at 14:00 in the IDE-Hall U - Wim Crouwel (32.A-1-960)..
- Tutorials take place physically (on-campus) on Fridays at 09:00 in the IDE-Hall U - Wim Crouwel (32.A-1-960).
- Participation is voluntary but highly advised.
- Exam is scheduled for Friday Nov. 10 at 13:30- at Flux Hall B (39.00.00.400).



About the AML4D elective

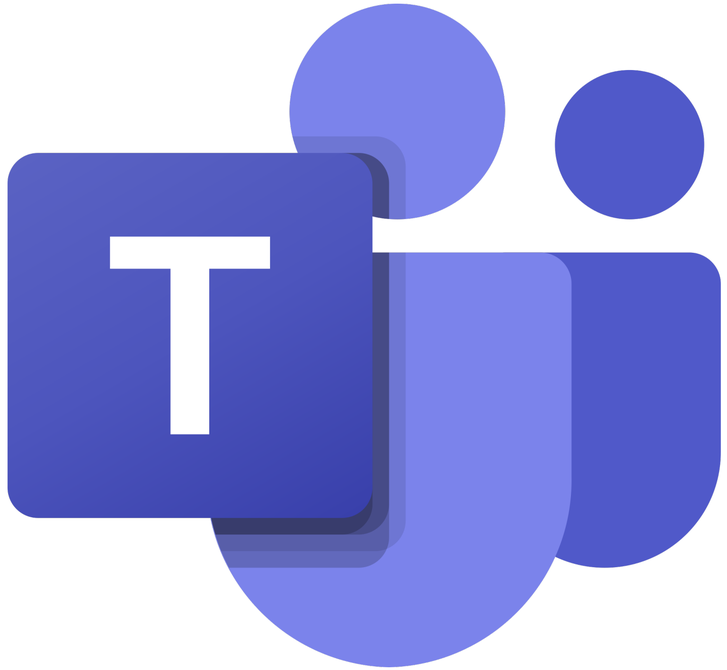
- This is the 2nd time this elective is offered
  - It is the 2nd time that machine learning is lectured as a design MSc topic!

- Several topics are currently objects of research!
  - We don’t have all the answers all the time :)

- We appreciate your:
  - **enthusiasm** for adventuring into this new field
  - **patience**, if the course’s logistics is not perfect (yet)
  - **feedback**, to help us improve the course

Teams

- Make sure you join the 2023-Q1-AML4D-[ID5515] Team
  - **General**: Follow course updates
  - **Group**: Work & coordinate with your peers
  - **Discussion**: Share articles, links, personal XPs relevant to AML4D
  - **QnA**: Ask a question
  - **Feedback**: send us your feedback: aml4d-ide@tudelft.nl



Honour Code: permissive but strict

- **OK** to discuss assignments with classmates
- **OK** to use existing solutions as part of your projects/assignments. Clarify your contributions.
- **OK** to use ChatGPT but you should *explicitly* state it and you are responsible for halucinations
- **NOT OK** to ask someone to do assignments/projects for you
- **NOT OK** to copy solutions from classmates
- **NOT OK** to pretend that someone's solution is yours

- **OK** to publish your assignments portfolio after the course is over (we encourage that!)
- **NOT OK** to post your assignment solutions online

- **ASK the teaching team if unsure**

To-Do Week 1

- Form groups
  - Deadline: Tuesday, Sept 26 EOB

- Submit 2 questions about today's lecture in the "QnA" channel on Teams
- Introduce yourself in the "Discussion" channel on Teams

Advanced Machine Learning For Design

Lecture 1 - Introduction to Machine Learning

Evangelos Niforatos

20/09/2023

aml4d-ide@tudelft.nl
https://aml4design.github.io/