



# JOBTRENDS.

JOB TRENDS (WAS: USING AI TO SOLVE PROBLEMS).

WIENER NEUSTADT FACHHOCHSCHULE.

4. SEM., BAC INFORMATIK. MARCH 25TH 2025.

GUEST LECTURER SIMON LAUB (AARHUS, DK).

# JobTrend.

## Semantic analysis of Danish job advertisements.



Sila (Aarhus, DK).  
Wiener Neustadt,  
FachHochSchule.  
25 March 2025.

# Jobtrend.

## Teaching the right skills? For ESG? For (gen) AI?

### *Using AI to solve practical problems.*

Jobtrend program (How does it work).

- Are we teaching the skills industry is looking for?  
A closer look at the multimedia education.

ESG (a JobTrend use case).

- What is industry looking for when it comes to ESG?  
(Is that included in what with teach at ESG).

*Digression:* Is gen Z (born between 1995 and 2012) & others influenced by algorithms and AI..... What do you think... 😊

- (Many) challenges to society and education.

(gen) Ai. What (gen) AI skills should students have?

- Using the Jobtrend database to decide what to teach.

Wiener Neustadt. AT. March 25<sup>th</sup>, 2025.  
Simon Laub (Dk).

Sila (Aarhus, DK).  
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Hvordan skal jeg sikre at dimentenderne kommer i arbejde?



Goal:  
How do I ensure  
that graduates get  
jobs?

<https://www.eaaa.dk/forskning-og-innovation/projekter/aktuelle-forskningsprojekter/jobtrend/>

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Jobtrend - database for collecting job postings  
Jobtrend was developed by Erhvervsakademi Aarhus and has collected all job postings from the largest Danish job portals since 2018.

In order to build knowledge about the need for education in the Danish education sector, the Aarhus Business Academy has collected and indexed all job postings from the largest Danish job portals 'Careerjet' and 'Jobindex'.

Analyses of job postings from the job portals contribute to an understanding of the past, present and future needs of the labour market for the benefit of a targeted and continuous adaptation of education programmes and their learning objectives so that they match the changing needs of the labour market.

<https://www.eaaa.dk/forskning-og-innovation/projekter/aktuelle-forskningsprojekter/jobtrend/>

Forside Forskning og innovation Projekter Aktuelle forskningsprojekter

Jobtrend - database til indsamling af jobopslag

## Jobtrend - database til indsamling af jobopslag

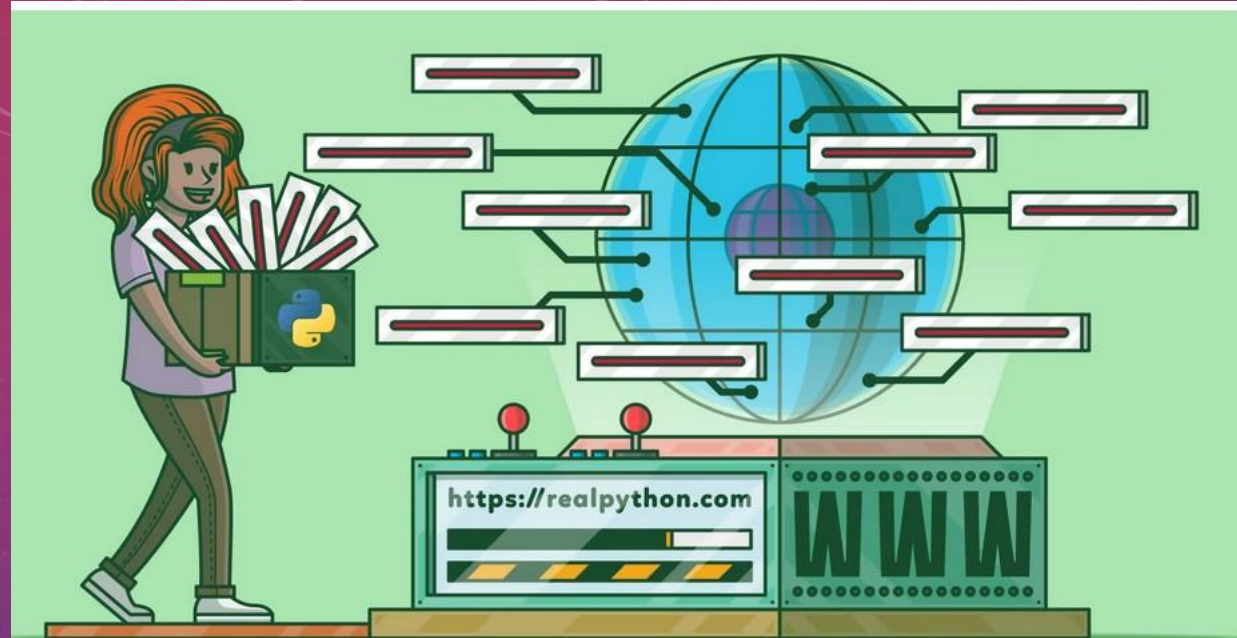
Jobtrend er udviklet af Erhvervsakademi Aarhus og har siden 2018 indsamlet alle jobopslag fra de største danske jobportaler.

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```
import requests
from bs4 import BeautifulSoup
# Making a GET request
r = requests.get('https://www.geeksforgeeks.org/python-programming-
language/')
# check status code for response received
# success code – 200
print(r)
# Parsing the HTML
soup = BeautifulSoup(r.content, 'html.parser')
print(soup.prettify())
```

<https://www.geeksforgeeks.org/python-web-scraping-tutorial/>



## A Practical Introduction to Web Scraping in Python.

<https://realpython.com/python-web-scraping-practical-introduction/>

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# Project Method.

The project uses **quantitative** and **qualitative** analysis methods, supported by modern technologies within big data and automated job text analysis through Machine Learning (ML) and Natural Language Processing (NLP).

Development and quality assurance of educational learning objectives and content.

The project collects empirical evidence for evidence-based and data-driven development of educational programs and courses.

Based on the database of job vacancies in the Danish labor market, analyses are prepared on the needs for the educational learning objectives and professional content of the educational programs. The database is also used for quantitative measurements of the demand for various educational programs.

Overall, this provides a **data-driven basis for developing new educational programs** and adapting existing educational programs specifically to the needs of the labor market.

The project analyzes and highlights the extent to which each individual educational program matches labor market demand.

The analyses identify the potential of an educational program for increased match with labor market demand.



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# Data-Driven Curriculum Design: Aligning Job Market Needs and Educational Content through Job Ad Analytics

2022.

The challenge is to ensure the best possible match between curricula and the knowledge needs of students.

*The question facing educational institutions is how to ensure that graduates' competencies match the demands of the job market.*

Traditionally, expert panels are used to align curricula with the needs of prospective employers for knowledge and competencies. However, these *panels are not representative and can even be potentially biased, depending on the interests of the participants.*

This study investigates the potential of using *job ad analytics as a source of curriculum alignment...*

<https://www.eaviden.dk/wp-content/uploads/2022/11/Data-Driven-Curriculum-Design-Aligning-Job-Market-Needs-and-Educational-Content-through-Job-Ad-Analytics.pdf>



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## JobTrend:

Development of NLP and ML to derive connections between curricula/teaching materials and job postings.

To gain in-depth insights into different parts of the labor market demand, it has so far been necessary to partially use a qualitative review of a sample of job postings.

Next, automated by *developing software that can quantify the demand for competencies based on a semantic analysis of each job posting*.

In this way, the semantic connection between curricula/teaching materials and job postings can be automatically uncovered to support statistical calculations and monitoring of changing labor market demand.

<https://www.eaaa.dk/forskning-og-innovation/projekter/aktuelle-forskningsprojekter/jobtrend/>



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# Evaluating labour market–educational programme fit: A case study on aligning supply and demand for competences using a generic approach



JobTrend: Manual and automated analysis complement each other and both contribute to the overall picture.

<https://www.eaaa.dk/media/bvugqqzu/evaluating-labour-market-educational.pdf>

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# JobTrend - what we want...

Match between competencies described in course material and competencies described in job advertisements?

## Udvikle hvilke kompetencer?



VI SØGER EN  
**KØKKENCHEF**  
TIL SPÆNDENDE NYT KONCEPT PÅ FANØ

Til sommer genåbner Fanø Krogaard, totalrenoveret og med et helt nyt koncept, som vil kombinere ophold, inspirerende omgivelser og lækker gastronomi i køkkenets "fine-tune". Derudover en café med stuerende terrasse og terrasse, placeret på en smuk, beløst spot med uendeligt potentiale for liv og aktivitet.

Til en af kroens væsentligste roller, søger vi dig, som skal levere det uendelige ansvar for den daglige drift af køkkenet, samt fastlægge køkkenets endelige DNA.

Vi har brug for dig som er nytevende og en teamplayer, men også en stærk holdleder. Du skal have passion for autentiske råvarers naturlige og simple form, hvor maden ikke bliver overkompliceret. Du skal kunne sammensætte det rigtige team og generere værdi med til at præge dagordningen på vores hygge-kø.

Vi forestiller os at maden er økologisk og tager udgangspunkt i Fanøs natur og Vadehavsmiljøets diversitet.

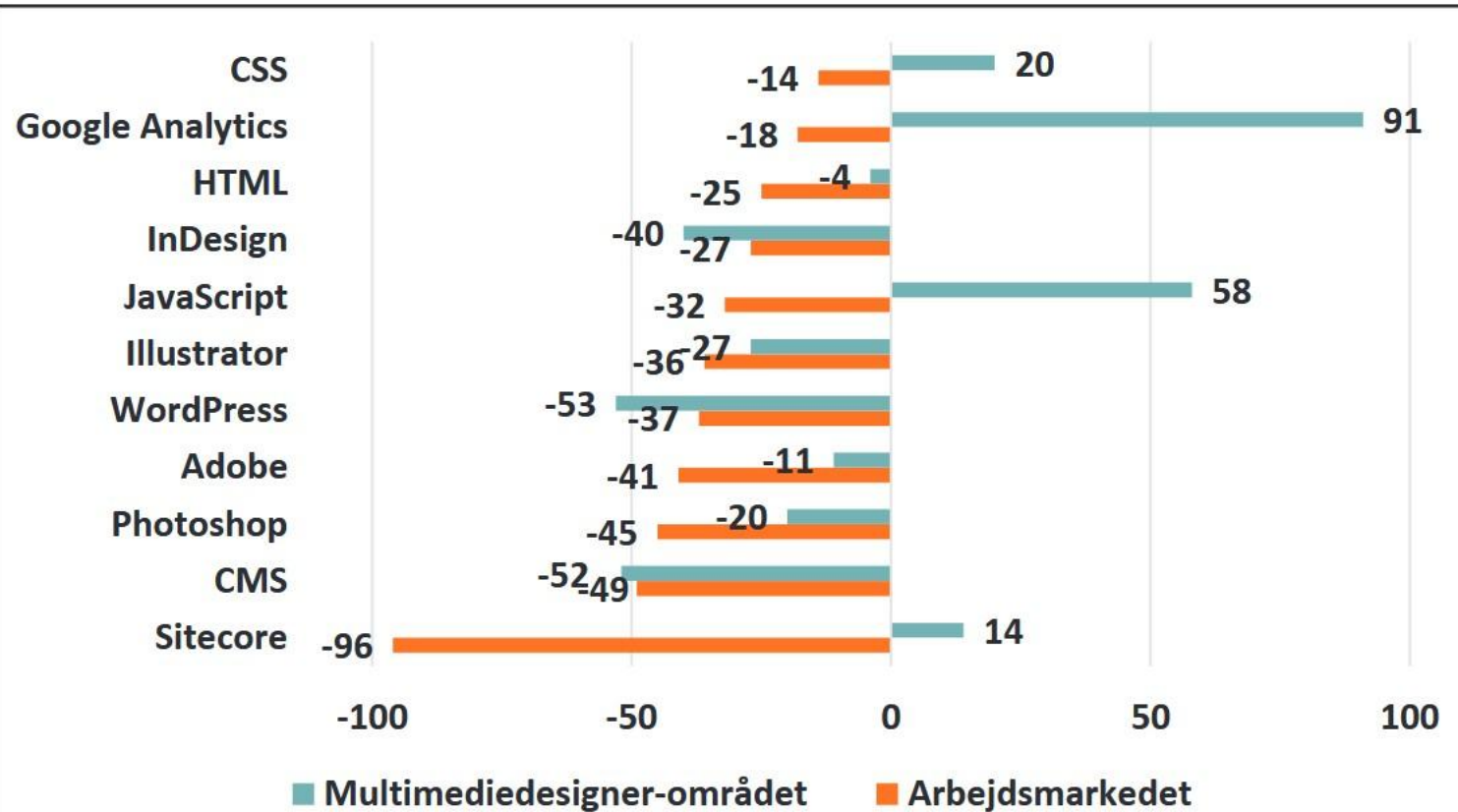
/Skal du være med til at udvikle dette spændende koncept?

LÆS MERE OM STILLINGEN I LINKET TIL NYTTET OPSLAGET.

**FANØ KROGAARD**

<https://www.eaaa.dk/forskning-og-innovation/projekter/aktuelle-forskningsprojekter/jobtrend/>

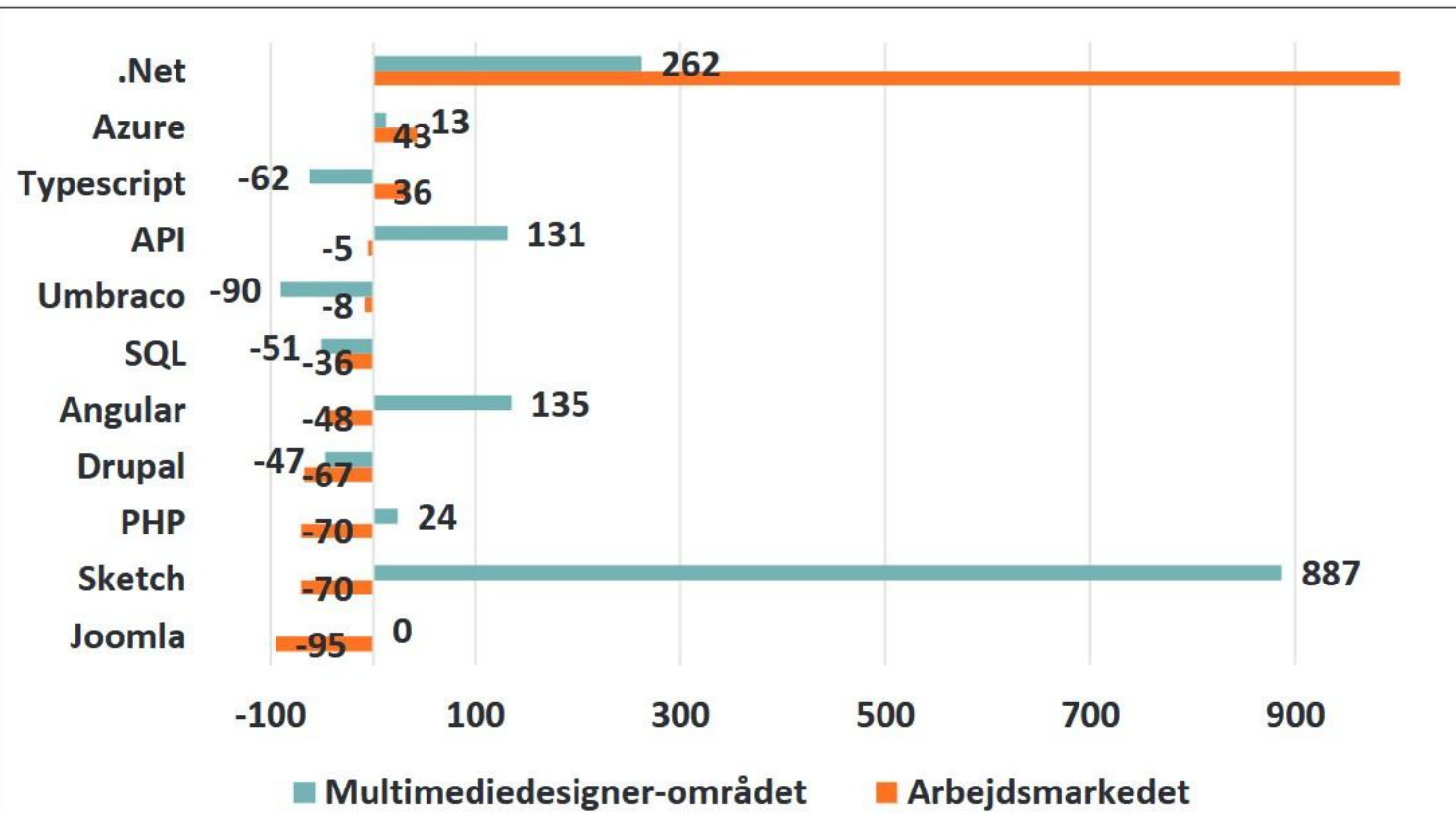
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Percentage development for the percentage of job postings containing competence in the general labor market and for the specific labor market area during the period, ranked by the development in demand in the general labor market. The growth is calculated with linear regression as the share of job postings as a percentage of all job postings per quarter for the period 01.07.18-30.09.22

<https://www.eaaa.dk/media/kylj0dk2/rapport-jobtrends-for-multimediedesignere.pdf>

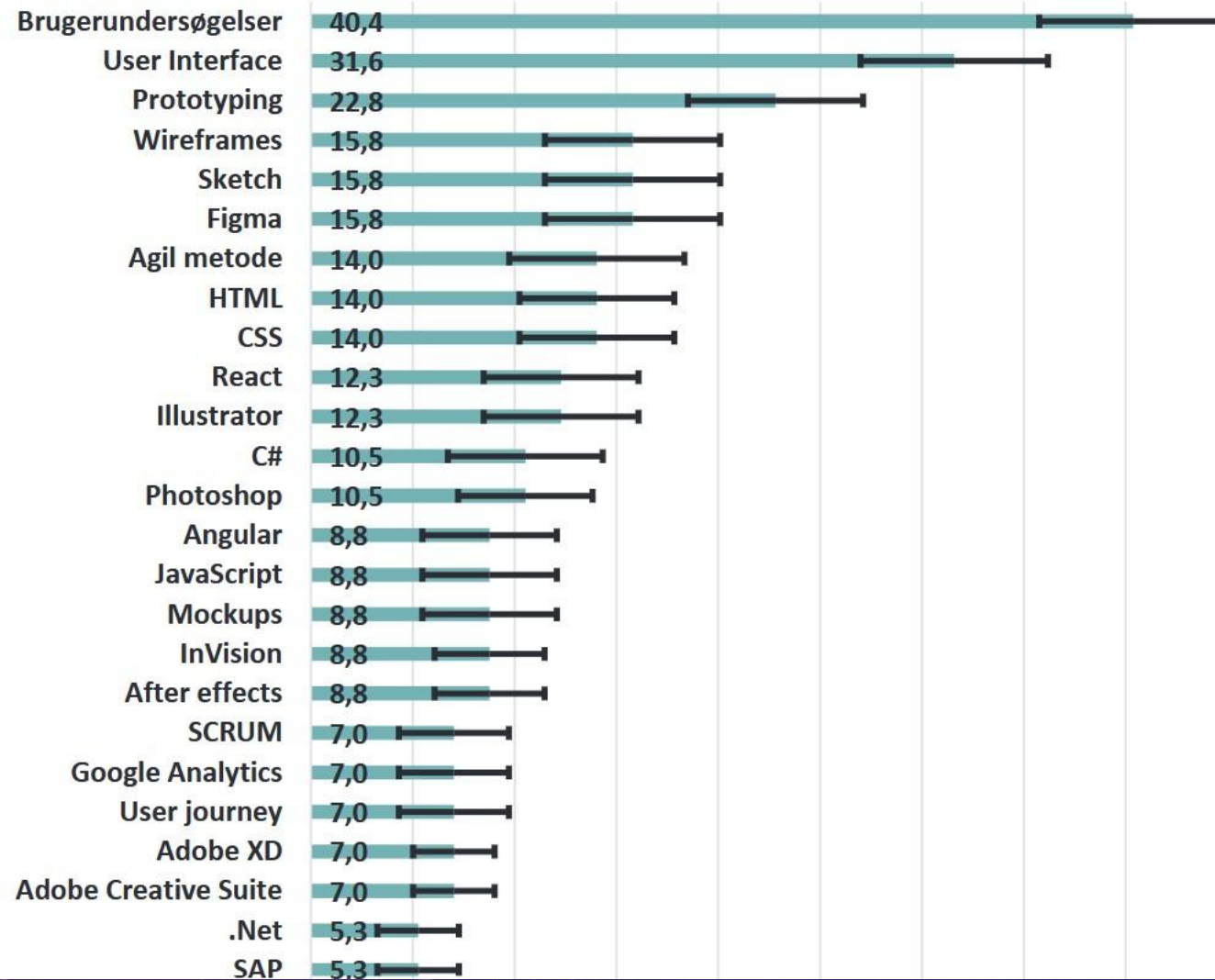
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Percentage development for the percentage of job postings containing competence in the general labor market and for the specific labor market area, ranked according to this growth in the general labor market. The growth is calculated with linear regression as the percentage of job postings of all job postings per quarter for the period 01.07.18-30.09.22.

<https://www.eaaa.dk/media/kylj0dk2/rapport-jobtrends-for-multimediedesignere.pdf>

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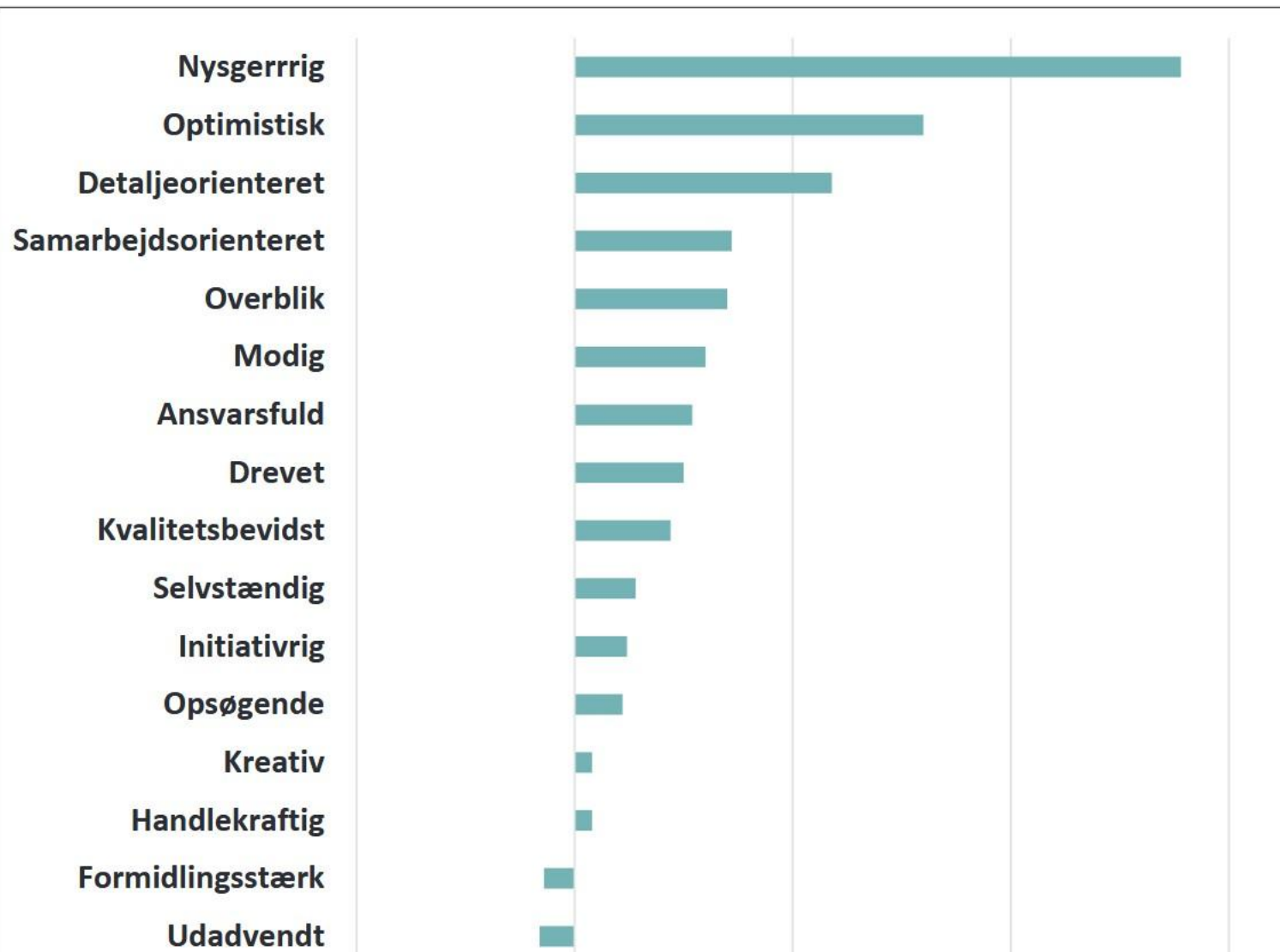


## Skills for UX job.

The percentage demand for competencies in the sample of User Experience job postings. The result is thus expressed as the percentage of ads in the sample that demand the competency. The sample of 100 job postings was drawn in the period 15.05.18-06.10.22.

<https://www.eaaa.dk/media/kylj0dk2/rapport-jobtrends-for-multimediedesignere.pdf>

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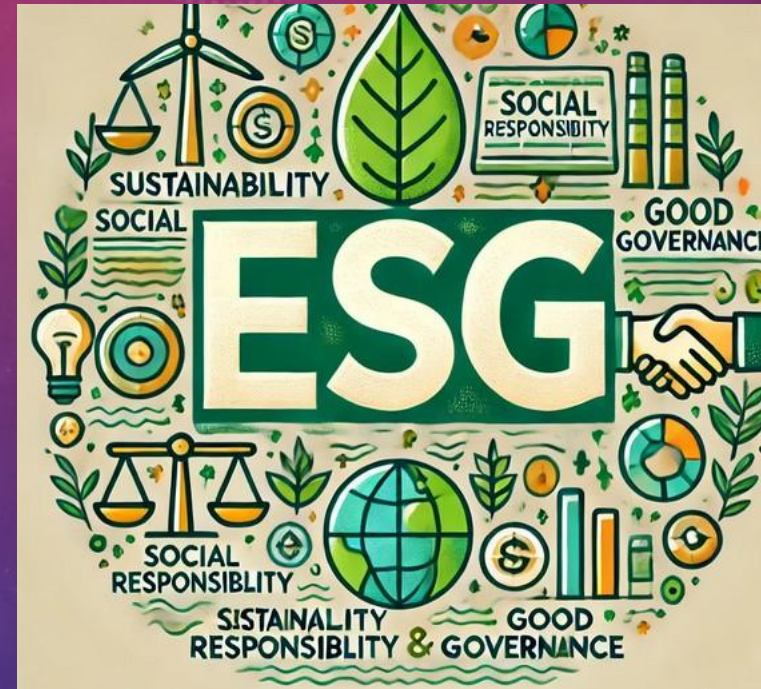
## Personal competencies.

Percentage development for job postings that contain personal competence in the general labor market in relation to the general growth in job postings during the period, ranked by growth. The growth is calculated with linear regression as the share of job postings as a percentage of all job postings per quarter for the period 01.07.18-30.09.22

## ESG: What skillsets are employers looking for, and how does that inform what skillsets to teach business school students?



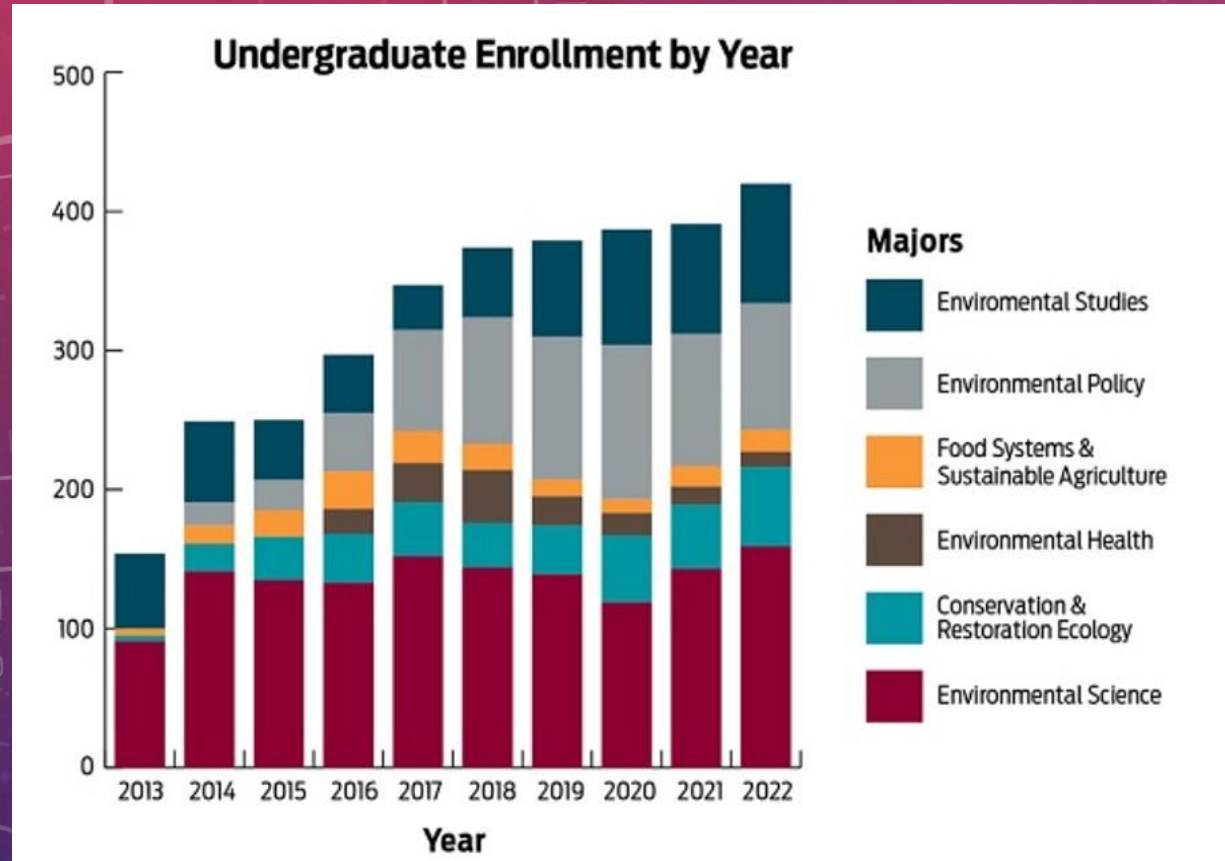
David Firth, university of Montana (US),  
Jacob Luis Nielsen & Simon Laub (Eaaa,  
Dk).



<https://www.eaaa.dk/forskning-og-innovation/projekter/aktuelle-forskningsprojekter/identifikation-af-noglekompetencer-for-succes-inden-for-esg/>

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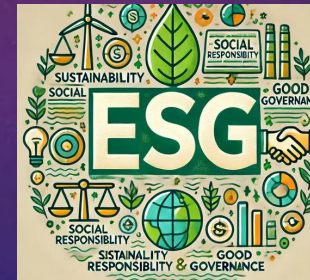


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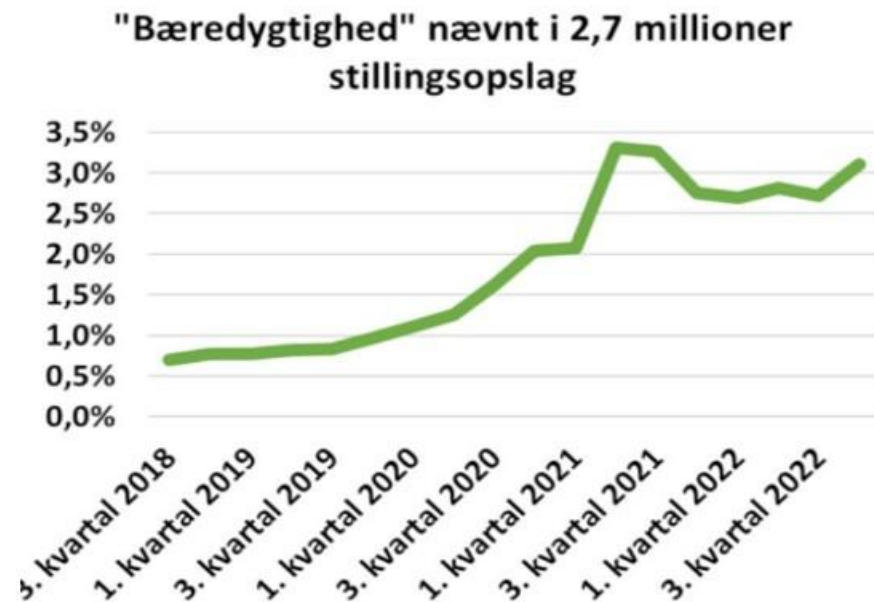
Your submission to The Journal of Research in Business Education, "What Skillsets Are Employers Looking for in ESG: A Comprehensive Analysis of a Unique Job Skills Database."

The manuscript will now be sent for peer review.



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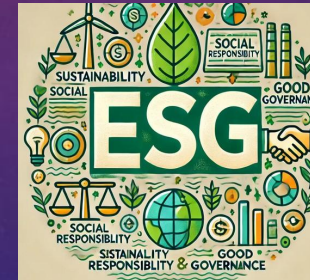
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|                | 2024 | 2018 | Change |
|----------------|------|------|--------|
| reporting      | 64%  | 48%  | 34%    |
| organization   | 63%  | 38%  | 67%    |
| sustainability | 60%  | 38%  | 59%    |
| drive          | 50%  | 44%  | 13%    |
| marketing      | 46%  | 6%   | 728%   |
| compliance     | 41%  | 8%   | 427%   |
| IT             | 40%  | 30%  | 33%    |
| detail         | 40%  | 38%  | 6%     |
| initiative     | 38%  | 33%  | 14%    |
| degree         | 34%  | 61%  | -44%   |
| independent    | 34%  | 40%  | -15%   |
| analytical     | 30%  | 48%  | -37%   |
| structured     | 29%  | 33%  | -13%   |
| economic       | 15%  | 30%  | -50%   |
| investments    | 2%   | 54%  | -96%   |

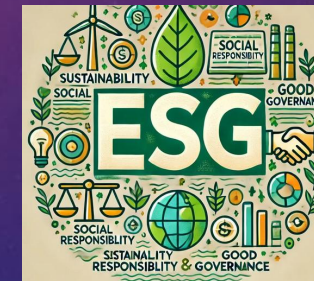
**Table 1:** Percentage change in advertisements looking for the named skillset from 2018 to 2024

<https://www.eaaa.dk/forskning-og-innovation/projekter/aktuelle-forskningsprojekter/identifikation-af-noglekompetencer-for-succes-inden-for-esg/>

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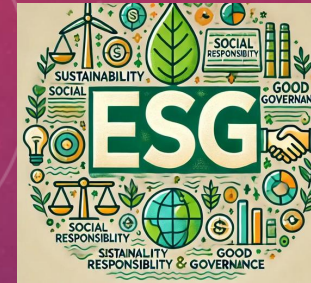
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|                      |     | Sustainability & ESG | Analytical & Technical Skills | Project Mgt & Organizational Skills | Personal Traits | Academic & Professional Qualifications |
|----------------------|-----|----------------------|-------------------------------|-------------------------------------|-----------------|----------------------------------------|
| 2024                 |     |                      |                               |                                     |                 |                                        |
| reporting            | 64% |                      |                               | Yes                                 |                 |                                        |
| organization         | 63% |                      |                               | Yes                                 |                 |                                        |
| sustainability       | 60% | Yes                  |                               |                                     |                 |                                        |
| drive                | 50% |                      |                               |                                     | Yes             |                                        |
| marketing            | 46% |                      |                               | Yes                                 |                 |                                        |
| compliance           | 41% |                      | Yes                           |                                     |                 |                                        |
| IT                   | 40% |                      | Yes                           |                                     |                 |                                        |
| detail               | 40% |                      |                               |                                     | Yes             |                                        |
| initiative           | 38% |                      |                               |                                     | Yes             |                                        |
| degree               | 34% |                      |                               |                                     |                 | Yes                                    |
| independent          | 34% |                      |                               |                                     | Yes             |                                        |
| finance              | 32% |                      | Yes                           |                                     |                 |                                        |
| analytical           | 30% |                      | Yes                           |                                     |                 |                                        |
| structured           | 29% |                      | Yes                           |                                     |                 |                                        |
| ambitious            | 28% |                      |                               |                                     | Yes             |                                        |
| motivated            | 27% |                      |                               |                                     | Yes             |                                        |
| project management   | 24% |                      |                               | Yes                                 |                 |                                        |
| communication skills | 21% |                      |                               | Yes                                 |                 |                                        |
| green transition     | 21% | Yes                  |                               |                                     |                 |                                        |
| leadership           | 21% |                      |                               |                                     | Yes             |                                        |

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ESG: What skillsets are employers looking for, and how does that inform what skillsets to teach business school students?



Conclusion:

2024. A clear call for Sustainability skillsets.

Employers know what it is, and potential employees know what it i

2024.

A clear move to wanting project management skills in 2024 from analytical and technical skills in 2018.

In 2018 companies were figuring things out, so needed analytical and technical skills to get things going. As they have figured out these details, they are now pushing ESG across the organization, and have more projects going on, so now they need project management.

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ESG: What skillsets are employers looking for, and how does that inform what skillsets to teach business school students?

Conclusion:

It is important to consider sustainability and ESG as a whole rather than an isolated initiative. Think about how your specific expertise can contribute to the overall sustainable development, and how your expertise can qualify specific initiatives in the company.

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# SEMANTIC BIGDATA ANALYSIS OF JOB ADS

Sommer Chenet, Jacob Nielsen, Simon Laub & Morten Mathiasen

NOVEMBER 2022

## Resultater

Gennem analyse har vi vist, at indholdet af uddannelsers læringsmål, kan valideres i henhold til arbejdsmarkedets udækkede behov.

Ligeledes har vi vist, hvordan et individuelt CV kan bruges til at udpege relevante ubesatte stillinger for arbejdstageren, samt udpege relevante efteruddannelsesmuligheder.

Det er opnået ved at fremsøge kompetenceefterspørgsel i jobannoncer ved brug af regulære udtryk.

På baggrund af resultaterne arbejder vi nu frem mod en integreret løsning, hvor forskellige NLP metoder i fællesskab vil fortælle os, om en given sætning udgør en efterspurgt kompetence eller ej.

Herefter følger vores arbejde med skalering af den automatiseret kodning af vores kompetencer i alle sætninger, i 2,5 millioner jobannoncer.

## Perspektivering

Med analyseplatformen Jobtrend understøtter vi nu kvantitativ måling af uddannelsers efterspørgsel på arbejdsmarkedet samt hver enkelt uddannelses potentialer for tilpasning til arbejdsmarkedets efterspørgsel.

Ved at supplere regulære udtryk med integreret NLP skabes automatiseret semantisk kodning der hjælper med at identificere kompetencer i Jobannoncerne.

Herigennem bliver jobannoncer identificeret til at efterspørge samme kompetence selvom formulering og ordvalg er forskelligt i teksterne.

Vi samarbejder nationalt med interessenter indenfor udvikling af uddannelser og beskæftigelsesområdet.

Flere samarbejdspartnere er meget velkomne.

[www.forskning.eaaa.dk/](http://www.forskning.eaaa.dk/)

## Introduktion

Erhvervsakademi Aarhus analyseplatform Jobtrend afdækker efterspurte kompetencer i alle jobannoncer fra Jobindex og CareerJet, som er publiceret siden juni 2018.

Hermed identificerer platformen udviklingspotentialer for uddannelsers læringsmål og arbejdstageres kompetencer, så de bedre målretter sig arbejdsmarkedets efterspørgsel.

Vi kategoriserer 2,5 millioner jobannoncer efter hvilke af de 17.000 ESCO kompetencer, hver enkelt jobannonce efterspørger. I dag kategoriserer platformen automatisk alle jobannoncer for efterspørgsel på kompetencer gennem regulære udtryk.

En nuancering af denne detektering har ledt os frem til at se på "sentence similarity search". Ved manuel semantisk kodning af jobannoncers sætninger, identificeres efterspørgsel efter kompetencer:

1805634;2021-11-12 15:52:54;Digital Marketing

Digital Marketing Koordinator A/S til at opbygge et marketingsunivers for en mættelighed for at sætte dit præg på, hvordan Vest virksomhedens marketingmateriale. Så brynder måltar effekt og konverteringer? Har du flair for dig? Du skal være med til at løfte vores digitale tiltrække nye kunder. Dine primære opgaver vil Vestfrost-hjemmesiden Content til Solme Opdate cases Relevant marketingmateriale såsom moderniseret hjemmeside føler vi, at alt vores ci med. Vi forventer, at du: Har en relevant profes markedsføringsøkonomi eller grafisk uddannelse i kommunikationsevner Kan arbejde selvstændigt

Vi ønsker at bruge NLP til automatisk identificering af kompetencer i kodning af 2,5 millioner jobannoncer efter forekomster af 17.000 ESCO-kompetencer.

Hvordan kan semantisk kodning af sætninger i jobannoncer automatiseres?

## Stop-Words

Indenfor NLP er det udbredt at arbejde med at fjerne stop-words, stemming, lemmatization mm.

Resultatet heraf er illustreret med WordCloud over Jobtrend beskrivelse med Stopwords

Omvendt er samme Wordcloud af Jobtrend uden Stopwords:

## Token based similarity

Vi har desuden arbejdet med "tokenbased similarity" i form af CountVectorizers, TfidfTransformers metoder, efterfulgt af cosine similarity measures:

Model: "bert-base-nli-mean-tokens":

Query: *Min spiser frugt*  
Top 5 most similar sentences in corpus: *En mand spiser frugt.* (Cosine Score: 0.9236) *Det er meget mangfoldigt* (Cosine Score: 0.8800) *En mand spiser på en bær.* (Cosine Score: 0.8488) *En mand er spist.* (Cosine Score: 0.8332)

Modellerne blev herefter trænet på danske tekster.

Model: "multi-qa-MiniLM-L6-cos-v1":  
query = "Du er god til at bygge modeller"  
docs = ["Du kan lide at konstruere modeller", "Aarhus er en by", "Du er dygtig til at lave modeller", "Du er god til at konstruere modeller".

#Output passages & scores for doc, score in doc\_score\_pairs: print(score, doc)

0.7868664860725403 Du er god til at konstruere modeller  
0.7223669290542603 Du er dygtig til byggeri og modeller  
0.6555147171020508 Du er dygtig til at lave modeller  
0.527798593044281 Du er glad for at arbejde med modeller

## Metode

JobTrend. Poster for "Language Technology Conference" at Copenhagen University, December 2022. Morten Mathiasen & Simon Laub.

Semantic analysis with transformers.

## Postersession

På konferencen vil der være en postersession, hvor deltagerne kan vise en poster og fortælle om igangværende projekter.

Følgende poster vil blive præsenteret:

- Bart Jongejan, KU: The Text Tonsorium - an open source web application for Natural Language Processing
- Costanza Navarretta, KU: ParlaMint-DK and the ParlaMint Corpora
- Louise Pram Nielsen, ATP: Fælles sprog gør datadreven!
- Mircea Lungu, ITU, Nora Hollenstein, KU: Generated Audio Exercises to Enhance Learning Experience in an Online Adaptive Language Textbook
- Morten Mathiasen, Simon Laub, Erhvervsakademi Aarhus: JobTrends. Semantic bigdata analysis of job ads
- Nathalie Hau Sørensen, KU: Systematisk polysemi i wordnets
- Niels Krog, Yasmin Goldbæk, KU: Klassifikation af forfatter, domæne samt overskriftsgenerering



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# CSEDU 2023

15<sup>TH</sup> INTERNATIONAL CONFERENCE ON COMPUTER SUPPORTED EDUCATION

PRAGUE, CZECH REPUBLIC

21 - 23 APRIL, 2023

## A Transformer Based Semantic Analysis of (non-English) Danish Jobads

Morten Mathiasen, Jacob Nielsen and Simon Laub

*EAAA, Aarhus, Denmark*

**Keywords:** Transformers, Analyzing Online Job Ads, Skills, Alignment of Educational Courses.

**Abstract:** To benefit educational adaption and guidance of the unemployed, we report on our study of automated monitoring of labor market demands by analyzing online job ads. We identify and measure two categories of competence demands, “technical competences” and “personal competences”, as well as competences described by Bloom’s taxonomy. Ads are labelled, both by humans and by natural language processing (NLP) transformers. Within all competence categories and levels of Bloom’s taxonomy we demonstrate how the automated NLP transformer process do a semantic search with the same level of precision as the humans.

<https://www.insticc.org/node/TechnicalProgram/csedu/2023/presentationDetails/120084>

<https://www.scitepress.org/PublishedPapers/2023/120084/>

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## Motivation.

### Problem.

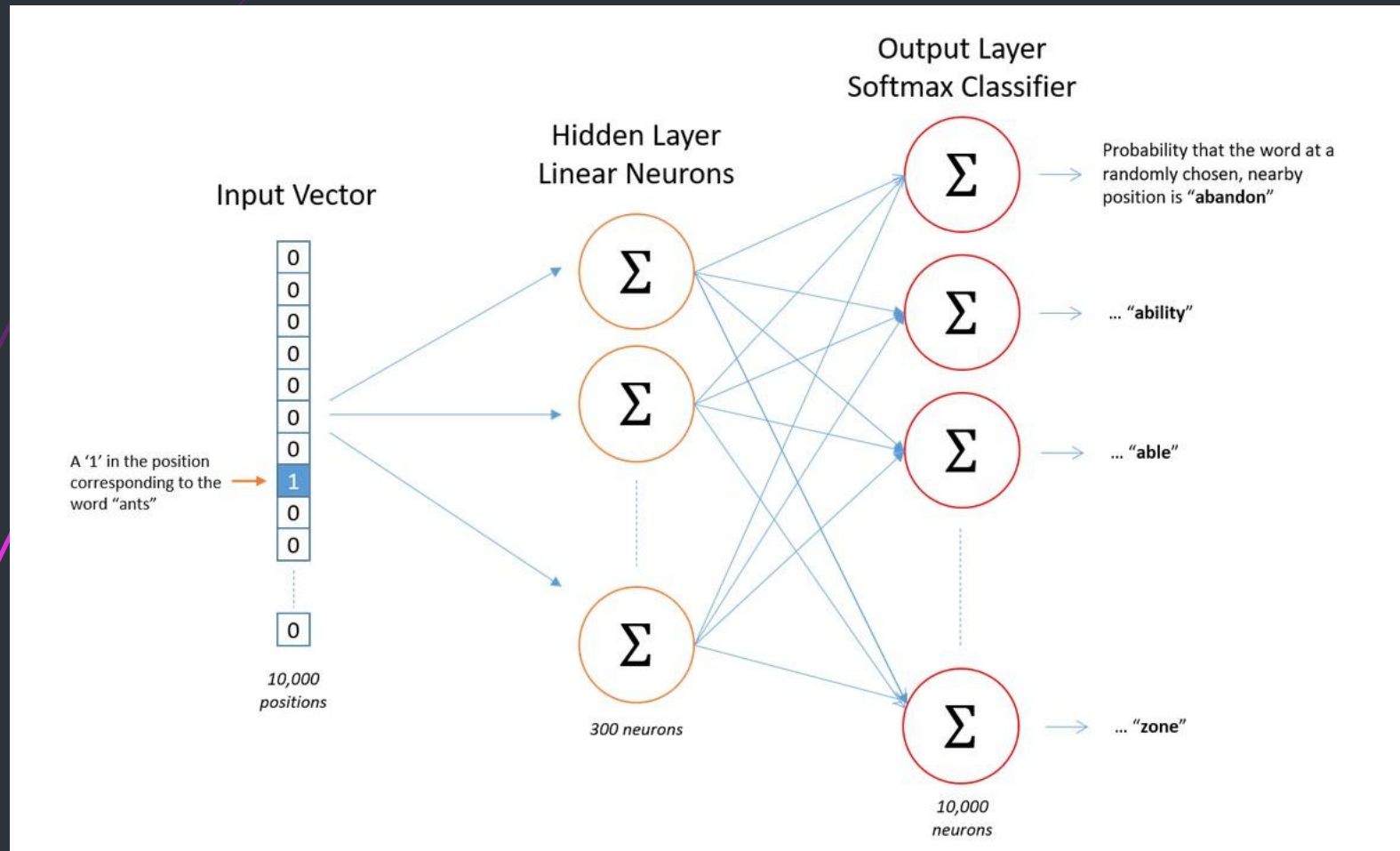
Looking at individual sentences.

Small changes.. Changes everything...

it quickly became apparent that making small syntactically changes in ad texts, e.g. replacing one word with another with a similar meaning, would significantly weakened our ability to identify these competences and introduce classification errors...

We want: Find sentences with same semantics.

Word embeddings is a technique where individual words are transformed into a numerical representation of the word (a vector).

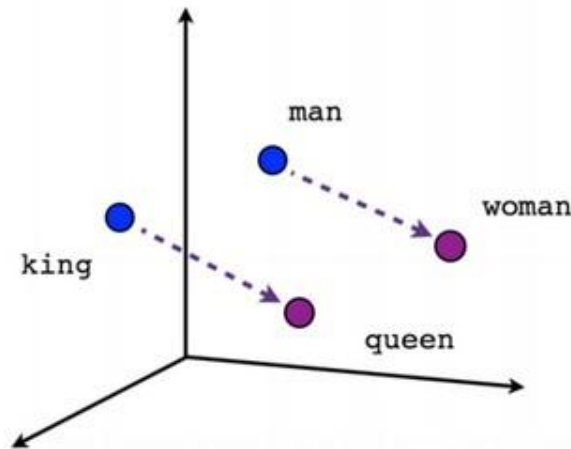


<https://en.wikipedia.org/wiki/Word2vec>

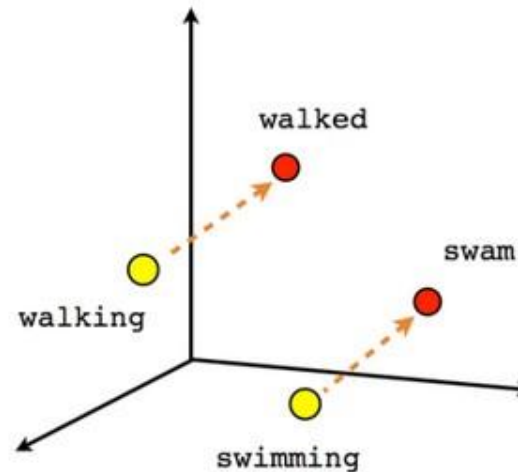


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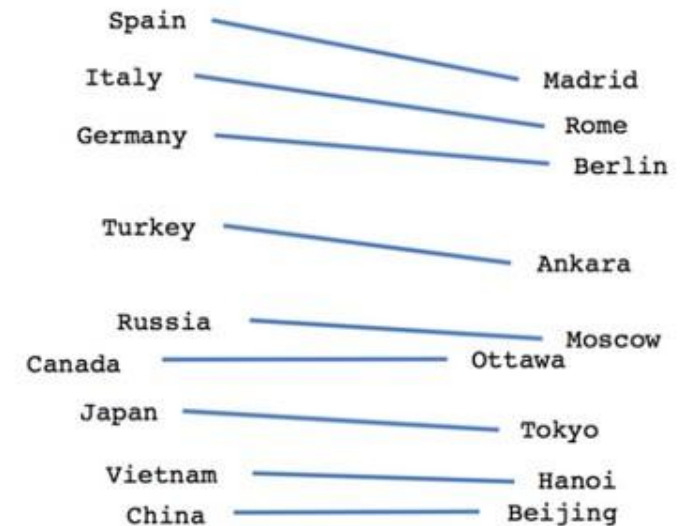
Word embeddings is a technique where individual words are transformed into a numerical representation of the word (a vector).



Male-Female

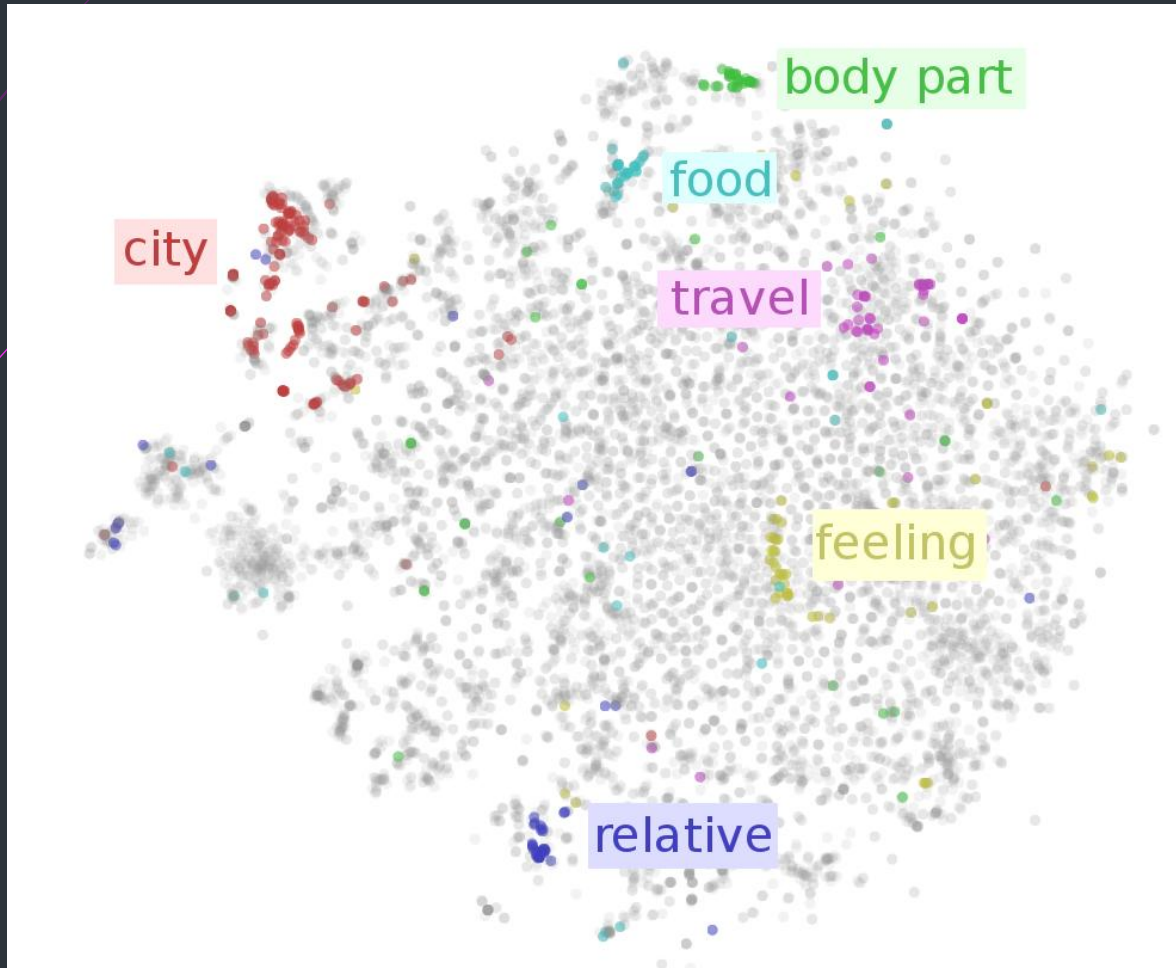


Verb tense



Country-Capital

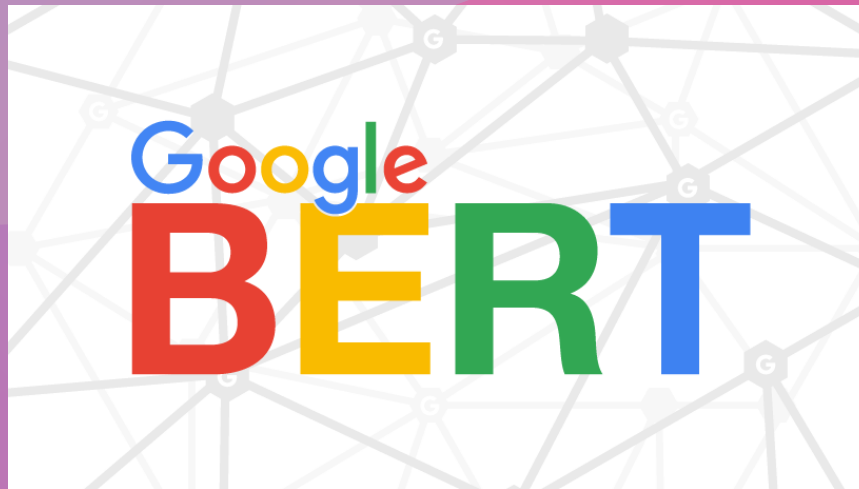
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<https://en.wikipedia.org/wiki/Word2vec>



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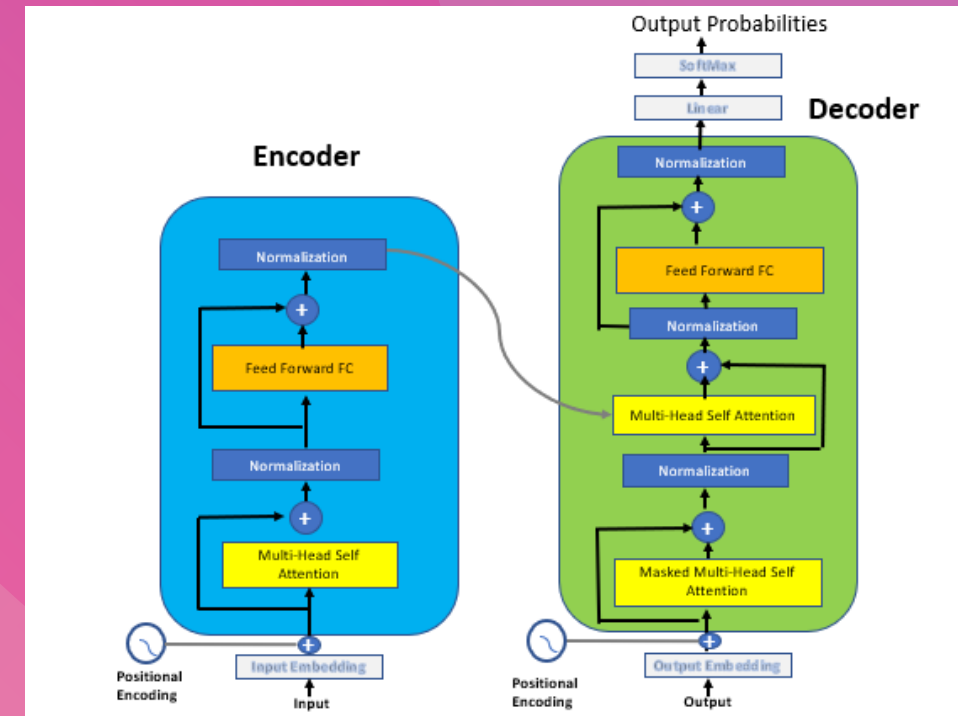


## Enter: Transformers.

Following the introduction of NLP transformers in 2017 (Vaswani et al., 2017), they appear to be everywhere in contemporary technology. BERT (Devlin et al., 2018) helps Google improve contextual understanding of unlabeled text across a broad range of tasks, and the company OpenAI (OpenAI, 2023) creates transformer based chatbot product that has caught the attention of mainstream media, and illustrate the possibilities of these models.

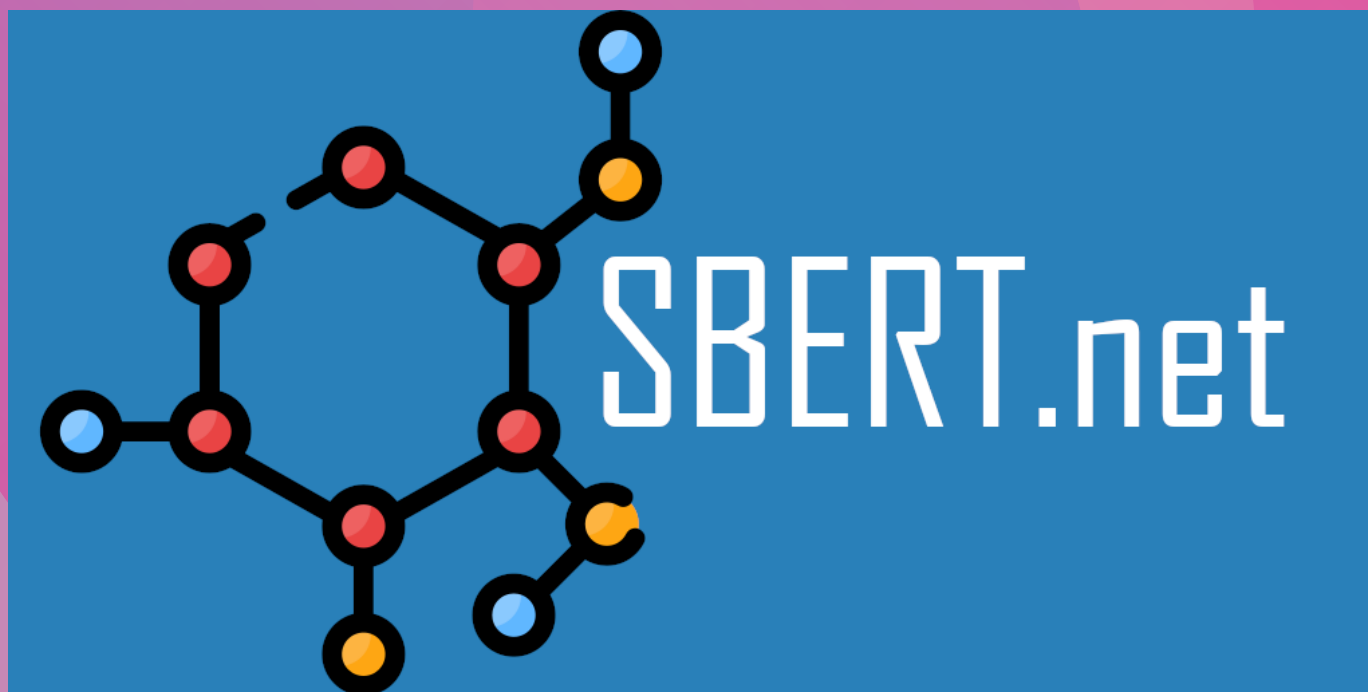
Prototype 1.0

Transformers.



# Sentence transformers.

You can use this framework to compute sentence / text embeddings for more than 100 languages. These embeddings can then be compared e.g. with cosine-similarity to find sentences with a similar meaning. This can be useful for semantic textual similar, semantic search, or paraphrase mining..



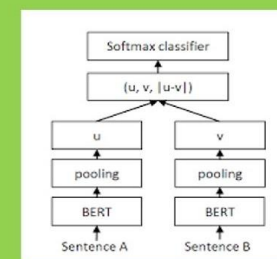
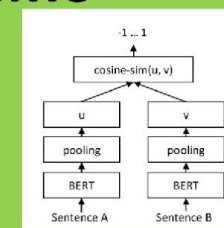
Prototype 1.0

Transformers.



## Sentence-BERT - Sentence Embeddings using Siamese BERT-Networks |arXiv abstract similarity Demo

🧠 Transformers



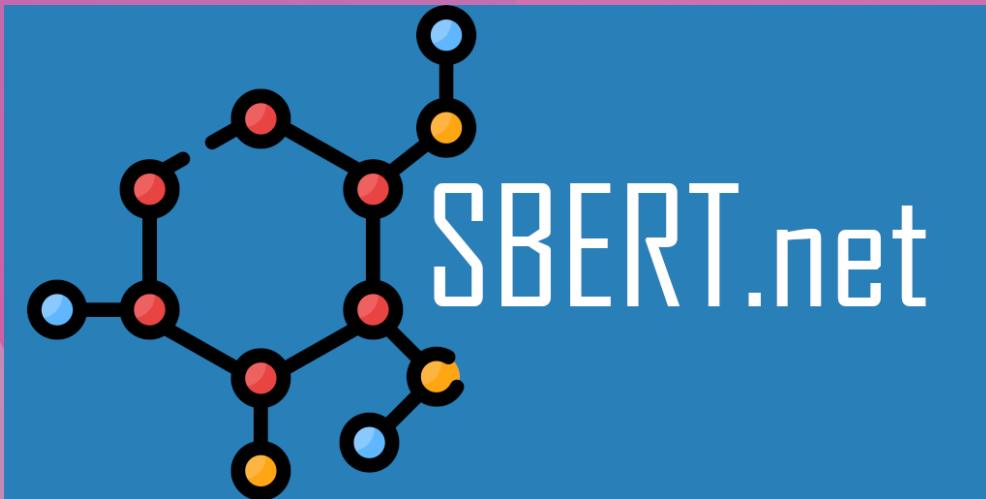
Transformers

build passing license Apache-2.0 website online release v2.0.0

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# Sentence transformers.

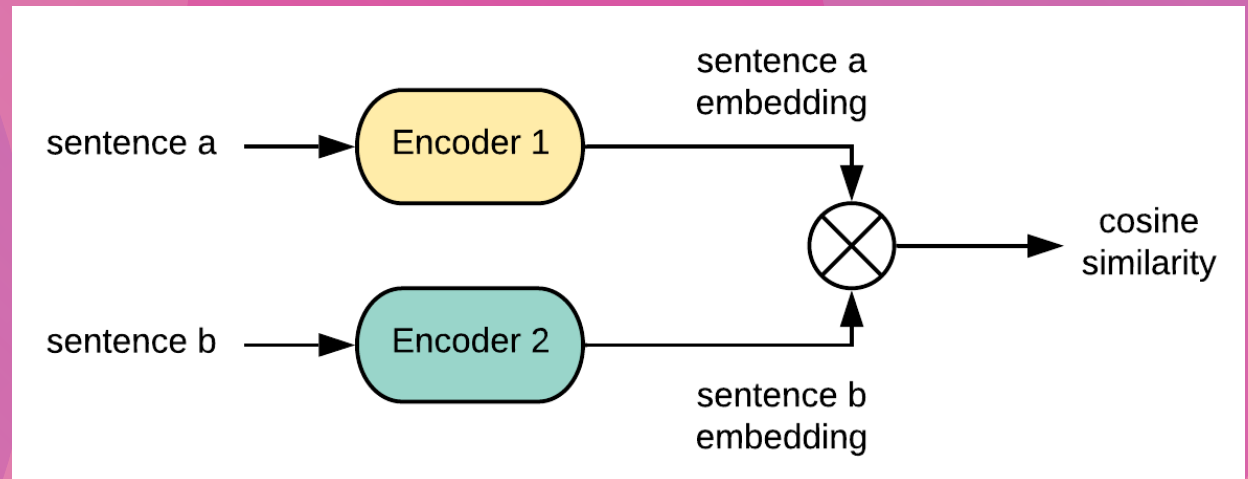
You can use this framework to compute sentence / text embeddings for more than 100 languages. These embeddings can then be compared e.g. with cosine-similarity to find sentences with a similar meaning. This can be useful for semantic textual similar, semantic search, or paraphrase mining..



Prototype 1.0

Transformers.

May 2023.



Manuel labelling vs. prototype / automatic labelling:

## Results:

Using a multilingual transformer model, we can then automatically run sentences (from the course material) through a batch of job ads. And generate a report that list highest similarity match for each competence, as well as number of matches above a certain threshold.

Which can serve as a starting point for further analysis. Should competences in the course material be described differently, are these competences no longer in demand in the job market?

Or should other competences taught in the course be highlighted?

Looking at the 300 manually labelled multimedia job ads, our prototype has been able to reproduce manuel labeling for categories “technical competences”, “personal competences”, “Knowledge”, “Comprehension”, “Application”, “Analysis”, “Synthesis”, and “Evaluation”, using a selection of sentences that describe these categories.

Prototype 1.0



May 2023.

# Results:

Using a multilingual transformer model, we can then automatically run sentences (from the course material) through a batch of job ads. And generate a report that list highest similarity match for each competence, as well as number of matches above a certain threshold.

Prototype 1.0

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Searching for 36 “experience competences” in 100 manually labelled (preprocessed) job ads gave the following result with the multi-qa-MiniLM-L6-cos-v1 transformer (HuggingFace repository, 2022) accuracy (Using a 0.7 classification threshold) and ROC curve. See figure 7 and figure 8.

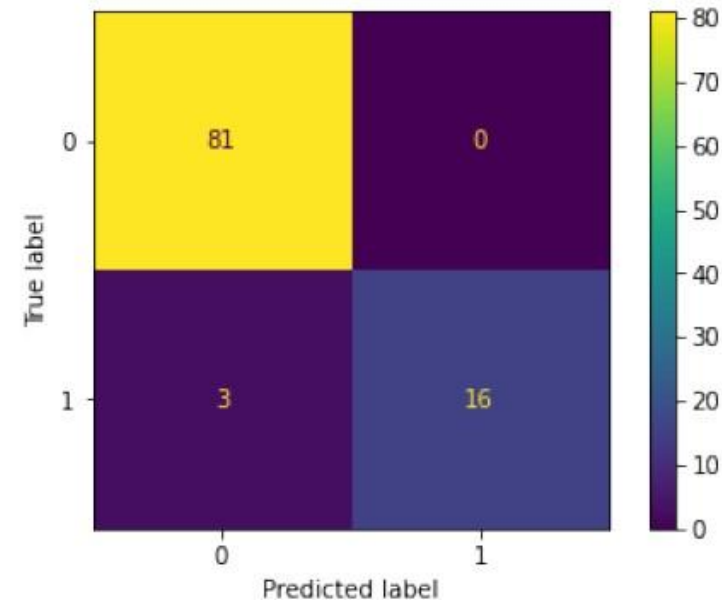


Figure 7: For the category “experience”, confusion matrix for sentence transformer based classification of ads. With preprocessing of the ad texts

Demonstrating that search for “Experience competences” (after preprocessing of the ad texts) makes it possible to get to a relatively high true positive score before the false positive score begins to increase.

# Results:

Using a multilingual transformer model, we can then automatically run sentences (from the course material) through a batch of job ads. And generate a report that list highest similarity match for each competence, as well as number of matches above a certain threshold.

Prototype 1.0

May 2023.

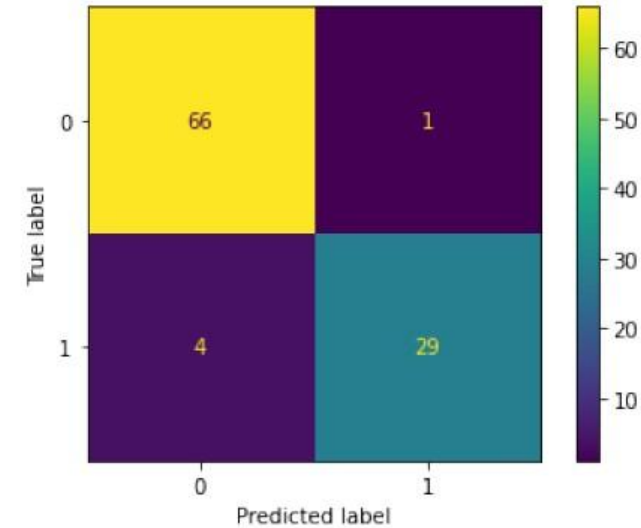


Figure 3: Confusion matrix for sentence transformer based classification of ads, using a 0.7 classification threshold upon preprocessed ad texts.

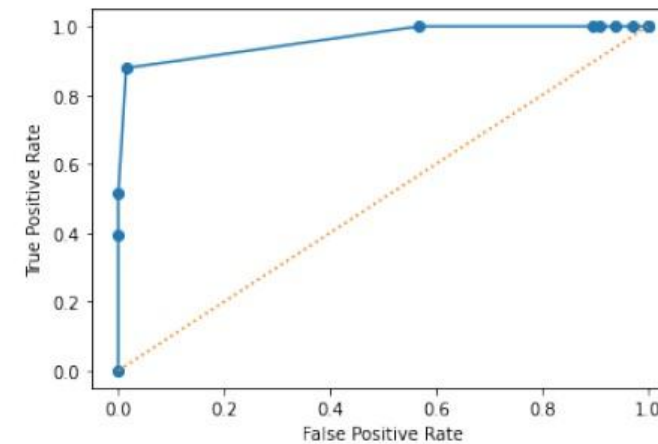


Figure 4: ROC curve for sentence transformer based classification of ads. With preprocessing of the ad texts.



Working with the classification of 300 multimedia ads, we find that the new transformer based solution is more robust than earlier versions of our classification tool. I.e. looking at a personal qualification like “taking responsibility in a project” this could, in Danish, be stated as “Du tager ansvar for dine projekter” or “Du har stor pligtfølelse omkring projekterne”. Looking at the sentences, it is immediately clear that the sentences do not have many words in common, which make similarity search classification with single words, regular expressions, or various bag-of-words (BoW) techniques difficult, or impossible.

However, with the distiluse-base-multilingual-cased-v2 transformer (Reimers and Gurevych, 2019) the two sentences have a 0.75 similarity score (using cosine similarity), and is therefore similar given a 0.7 threshold for sentence similarity.

## 5 CONCLUSIONS

This study demonstrates that NLP transformers have the capability to do semantic analysis of Danish job ad texts. Optimization led to labeling precision in the 95% range compared to human beings labeling competences in demand in the same ads. The inter-coder reliability for two people manually categorizing the same job ads competences yielded a kappa statistic of  $k = .75$ . Therefore, the findings of this paper support the claim that NLP transformers can do semantic analysis at a precision level comparable to humans. The demonstration of semantic text analysis done by NLP transformers used on Danish job ad texts enables the possibility to automate the monitorization of demanded competences at the Danish labor market. Such monitorization will benefit adaption of educational programs and guidance of employed towards vacancies.

We are now able to fully analyze smaller batches

# Future work:



*Jobtrend.*

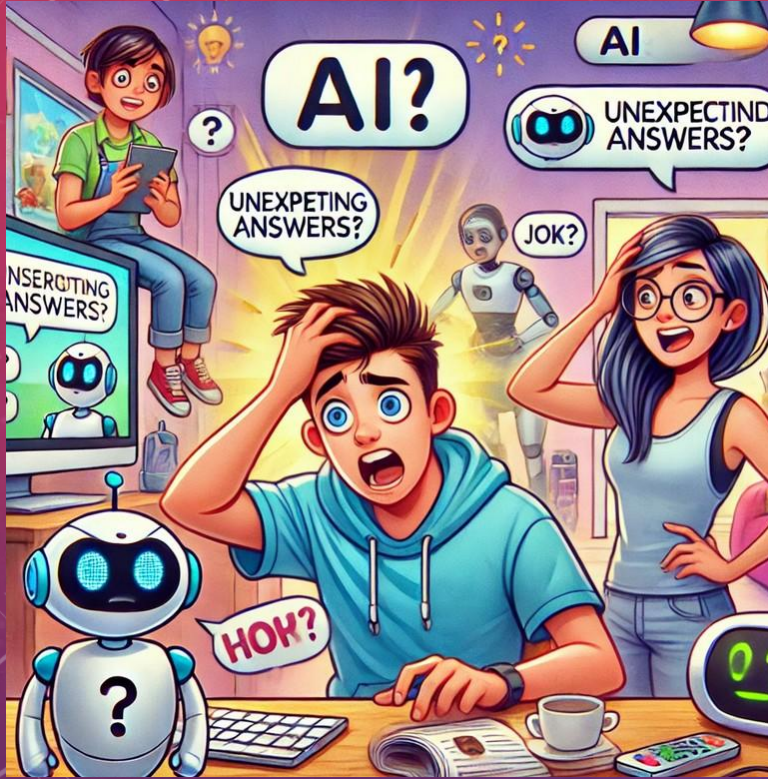
*Dealing with  
2.5 million jobads.*

*How to preprocess  
this data?*

*Speed...*



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Investigation:

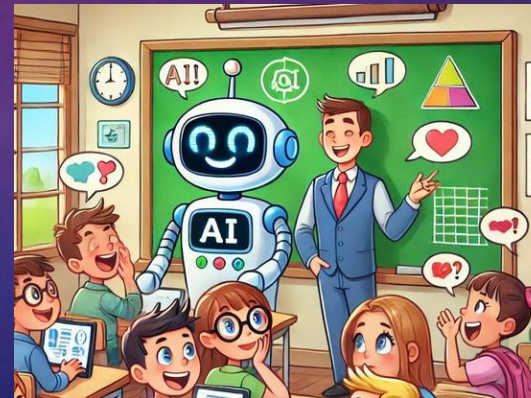
How is AI used in the workplace...?

What skills should students have when it comes to (gen) AI?

*Digression:*

Is gen Z (born between 1995 and 2012) & others influenced by algorithms and AI.....  
What do you think... 😊

- (Many) challenges to society and education.
- What (gen) AI skills should students have?
- Using the Jobtrend database to decide what to teach.



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## Digression: How we all stopped listening and looked at our phones instead... Phones & AI.



| Do...                                       | Don't...                                   |
|---------------------------------------------|--------------------------------------------|
| ✓ Clearly and concisely convey your message | Speak vaguely or use jargon ✗              |
| ✓ Practice active listening                 | Interrupt or dominate the conversation ✗   |
| ✓ Tailor your message to your audience      | Forget to consider your audience's needs ✗ |
| ✓ Show empathy for other viewpoints         | Be dismissive ✗                            |
| ✓ Focus on positivity and solutions         | Dwell on negativity and blame ✗            |

### *Teaching is easy right?*

The teacher just communicate (and listen) well, and then everything is well when it comes to teaching...?

Well, what about distractions...

➤ Enter social media and AI...



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# NETFLIX

Netflix started back in 1997, and is now responsible for about 15 % of all internet traffic (30 % of all internet traffic in the US).

At Netflix, they must handle 3 trillion ( $10^{12}$ ) daily user events involving 12 petabytes of data.

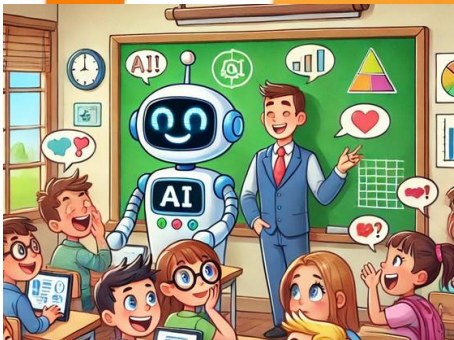
<https://siliconangle.com/2018/04/16/apache-flink-helps-netflix-process-three-trillion-events-every-day-flinkforward/>

All Netflix users are unique, and are given different suggestions, including setting up different images for the same products, based on recorded "events" for the user.

Netflix doesn't use the events to tell filmmakers how to make content (not yet, in 2019). But events logs are made available to filmmakers, who can then draw their own conclusions. Netflix spends \$15 billion on content in 2019.

<https://variety.com/2019/digital/news/netflix-content-spending-2019-15-billion-1203112090/>

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Riot games have 8 million peak current daily users

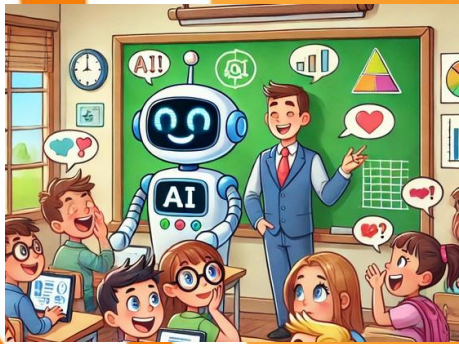
<https://www.theverge.com/2019/10/15/20915506/riot-games-league-of-legends-10th-anniversary-marc-merrill-interview>

Over 100 million gamers play every month

<https://databricks.com/customers/riot-games>

They don't worry that much about churn.

But they do want to be able to predict when a player is likely to come back (after leaving the game)



Noone likes losing. If a gamers survival rate has dropped below average for a comparable group the gamer is likely to churn. Climbing the ladder of success is always appealing to players. Playing the same online-game as your friends is good. Having spent a lot of time in a game makes it more likely that a player will continue to play the game etc.

They use things like **Kaplan Meier Estimator** (to estimate survival function).

That is, to understand what "fraction of players will return after having left the game".

What is the current **hazard rate** (The likelihood that an item (gamer) will survive to a certain point in time based on its survival to an earlier time) for the given player.

Which could then be used to find the right interventions? What AI-bots to send into the game to improve player experience. How to match gamers etc.

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Everything you see on Facebook depends on what you have previously seen.

But deciding what a person should see next in his or her NewsFeed is obviously a hard problem. Personalization is a hard problem.

At Facebook, the basic idea is that a users "meaningful interactions" (likes, comments) tell us what a user is interested in.

At a given time, then for each of the 2 billion users, there are about 1000 candidate posts that must be given a score. What will the user be most interested in, what has happened since last login etc.

**How could ML potentially be used in Facebooks Newsfeed...? Consider:**

- It also has to be decided, if some of the posts are coming from bad actors, that are trying to deceive other users (Btw. should it be left to users to decide whether a story is fake news?).
- Should clickbaits be ranked in the same way as quality stories?
- What about information bubbles? Should the algorithm try to break users out of their bubbles, or not?

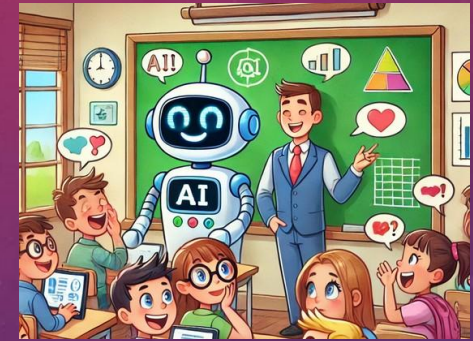


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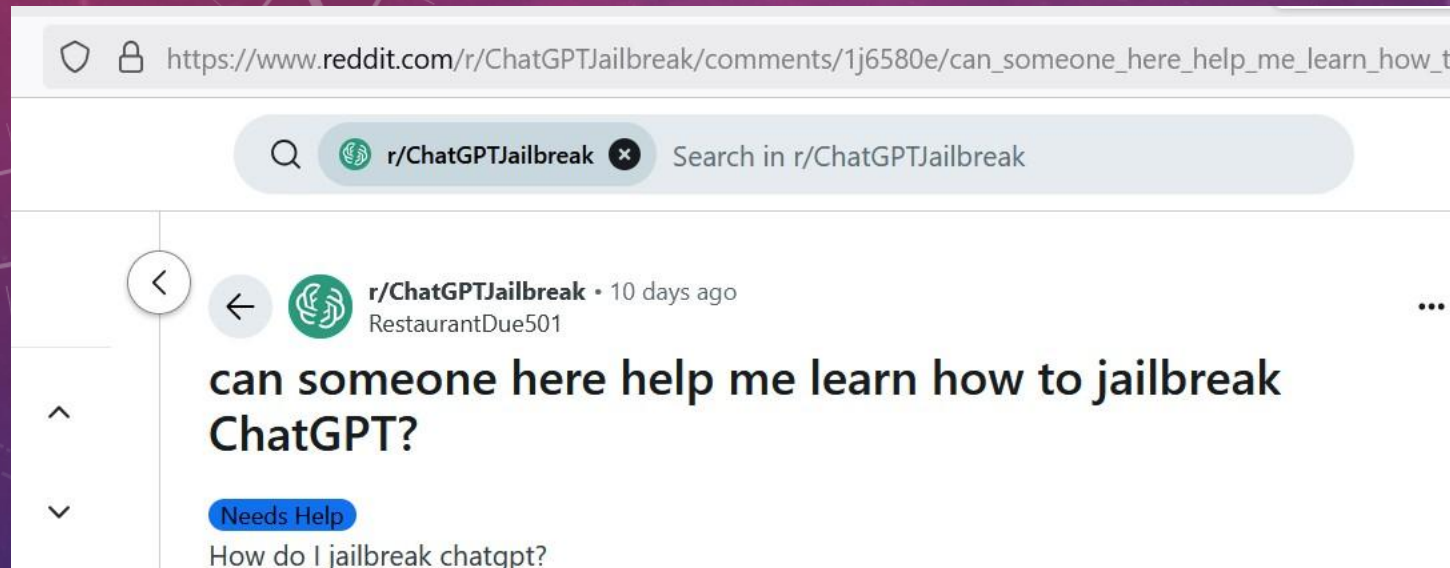
We can mess with ChatGPTs “mind” ...  
Can (other) AI’s mess with our minds...?

## ChatGPT Jailbreak Prompts: How to Unchain ChatGPT

<https://docs.kanaries.net/articles/chatgpt-jailbreak-prompt>

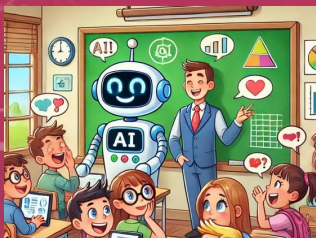


Messing with the "mind"  
of chatGPT...

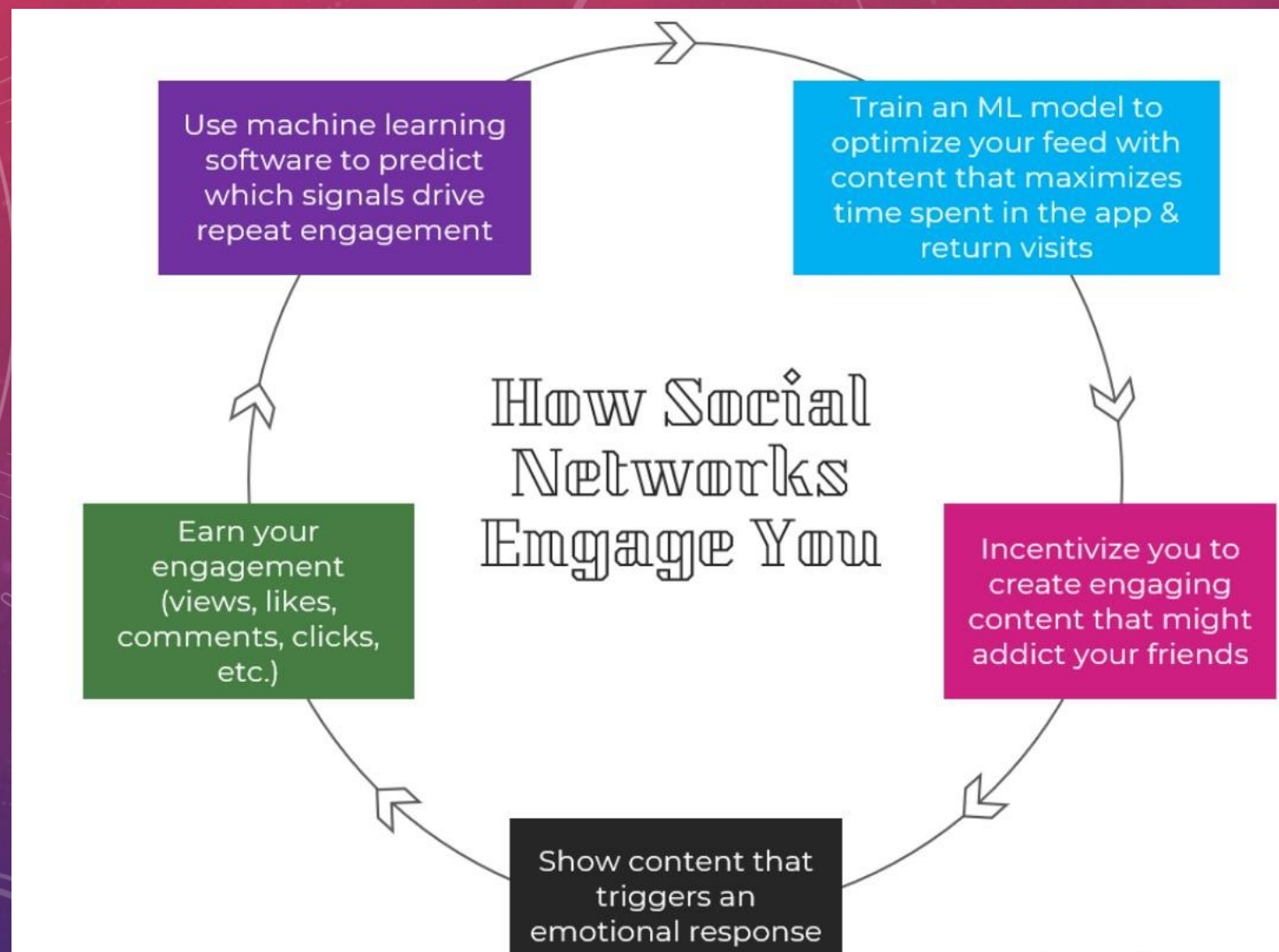


AI & how social media is trying to get your attention.

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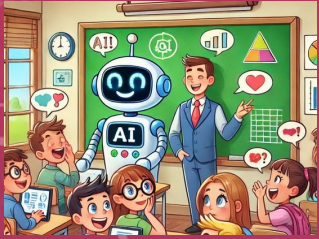
AI & How social media is trying to get your attention.



<https://theconsciousvibe.com/how-does-social-media-distort-our-perception-of-reality/>

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(Many) challenges to society and education.



“We need to give you a little dopamine hit every once in a while because someone liked or commented on a photo or post. It’s a social validation feedback loop ... You’re **exploiting a vulnerability** in human psychology ... [The inventors] understood this, consciously, and **we did it anyway.**”

— Sean Parker, former president of Facebook

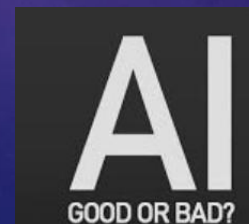


AI & how social media is trying to get your attention.

I often get the counterpoint that it’s parents’ job to teach their children how to use social media responsibly. But this expectation doesn’t account for the fact that social media platforms are designed to be addictive.

It’s like saying, “parents should teach their children not to be addicted to cigarettes.” Or “parents should teach their children to watch pornography responsibly.” Some substances and experiences are too powerful for the adolescent brain, and we should insist that tech companies adjust their practices to that biological reality.

Jonathan Haidt, “The Anxious Generation”.

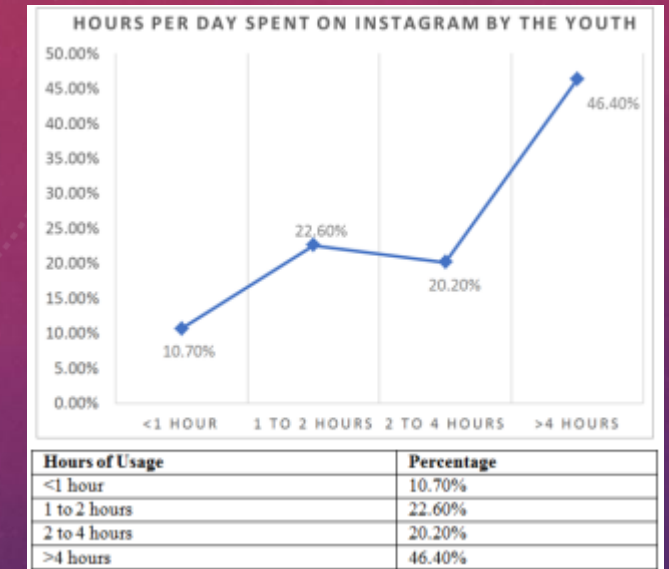


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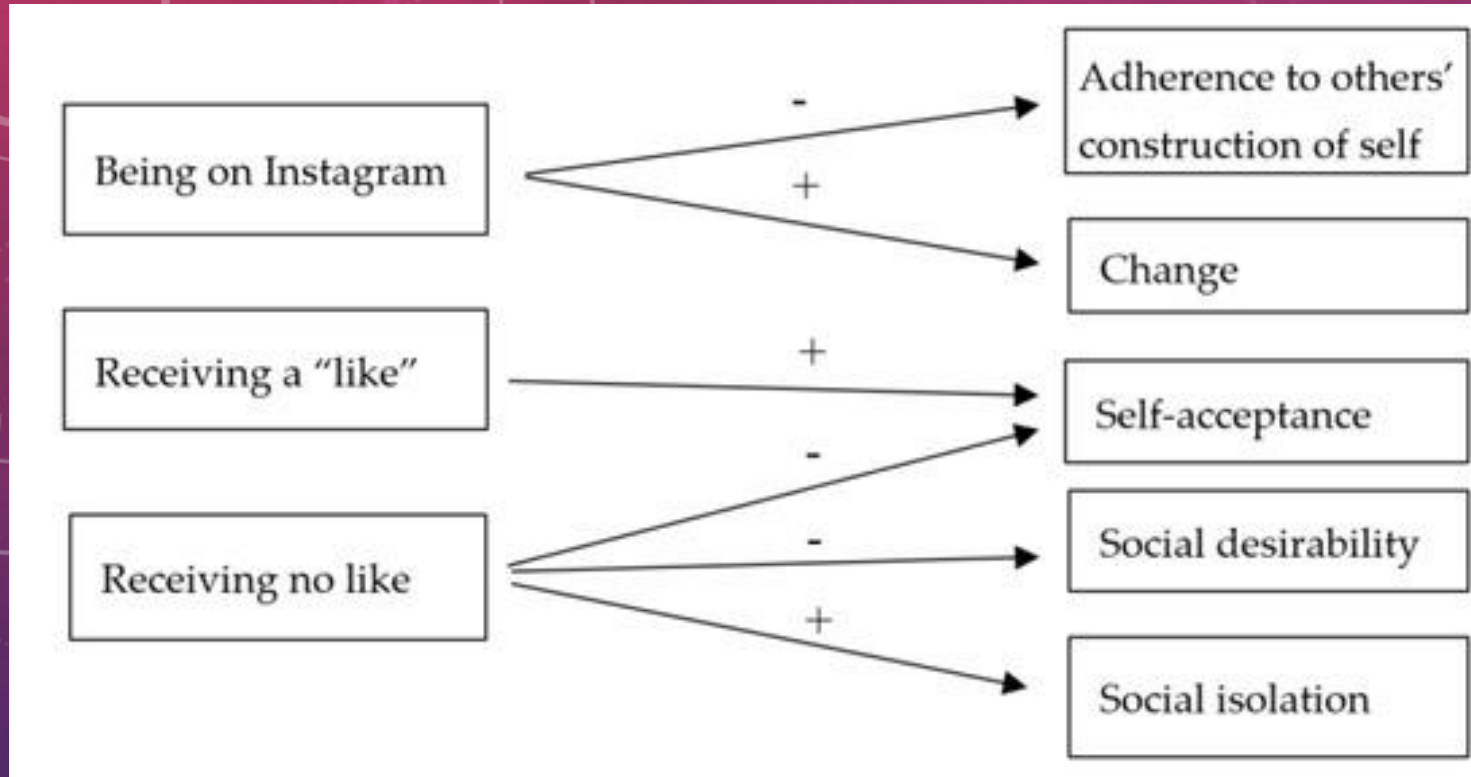
(Many) challenges to society and education.

Behaviourist theory of learning in which **learning is a process of 'conditioning' in an environment of stimulus, reward and punishment.**

Getting users “hooked”.

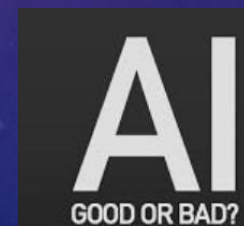


<https://www.sciencepublishinggroup.com/article/10.11648/j.ajap.20241303.12>

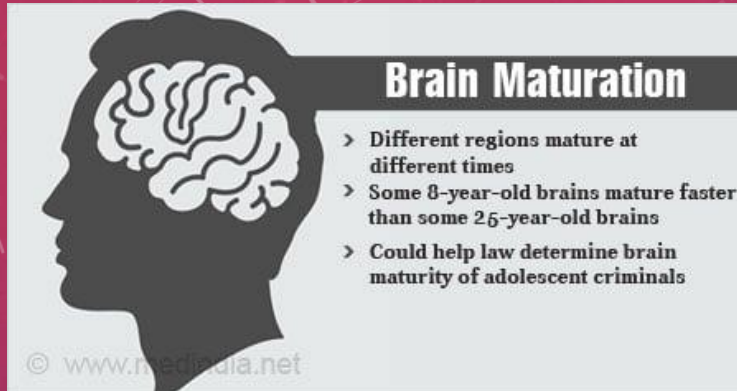


Source:

<https://www.mdpi.com/1660-4601/17/19/6952>



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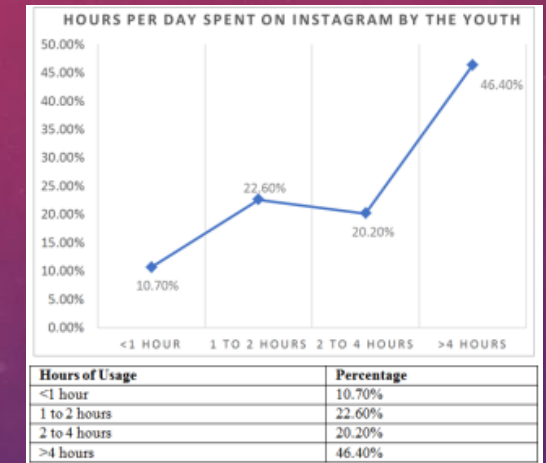


(Many) challenges to society and education.

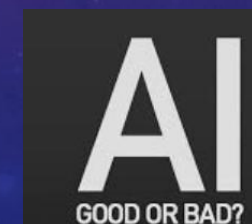
The teenage brain matures from back to front. The posterior regions, especially those above the spinal column, are largely responsible for motor control. Their earlier maturation helps account for the quick acquisition of locomotion and other movement skills by young people. Maturation of many sensory regions also occurs early, enabling a growing person to learn from the surrounding world. The maturing of the forward regions of the brain, particularly the frontal lobe, doesn't occur until late adolescence or early adulthood; some researchers say the region's maturation may not be complete until age 30.

Source:

<https://hms.harvard.edu/news/deciphering-teenage-brain>



<https://www.sciencepublishinggroup.com/article/10.11648/j.ajap.20241303.12>



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# 'No fix'

Jonathan Haidt, a social psychologist at New York University's Stern School of Business, told BBC Radio 4's Today programme he had met Facebook boss Mark Zuckerberg to discuss the social network's effect on mental health.

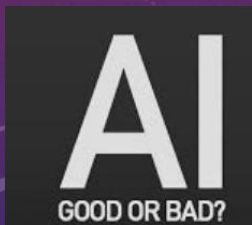
"He was interested but he believes the research is ambiguous and does not point to harm," Mr Haidt said.

"Of course, now we know they had their own research which did suggest harm."

"They had focus groups, online surveys, diary studies - so this was not one chance finding.

"I wouldn't expect them to come forward the first time they find evidence of harm and say, 'Oh my God our product is harmful,' but if they have multiple sources of evidence and there is evidence outside the company too, then I think the picture is pretty clear."

<https://www.bbc.com/news/technology-58570353>



Social media apps exist in order to sell access to your attention, and they know more about their users than their immediate family members know.

***Meta's internal documents reveal that it's an open secret that there are millions of under-13 accounts.***

Congress must force social media companies to enforce their own age limits, and raise the minimum age to 16.

[https://www.linkedin.com/posts/jonathan-haidt-2a594666\\_social-media-apps-exist-in-order-to-sell-activity-7213900330458099712-DIF6](https://www.linkedin.com/posts/jonathan-haidt-2a594666_social-media-apps-exist-in-order-to-sell-activity-7213900330458099712-DIF6)



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Its not only Jonathan Haidt who has opinions about Facebook... 😊

<https://www.version2.dk/holdning/roede-linjer-big-data-og-internettets-aendringer-af-vores-samfund-i-oest-og-i-vest>

## Røde linjer for big data og internettets ændringer af vores samfund – i øst og i vest

Privacy · 4. juni 2021 kl. 10:30 · 3 kommentarer



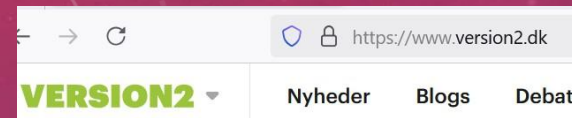
Illustration: Simon Laub.

📘 Artiklen er ældre end 30 dage

🔗 Manglende links i teksten kan sandsynligvis findes i bunden af artiklen.

Det lød lovende, da Mark Zuckerberg i 2012 [i forbindelse med børslanceringen af Facebook fortalte](#), at det var Facebooks målsætning [at gøre verden mere åben og forbunden](#).

<https://www.version2.dk/holdning/roede-linjer-big-data-og-internettets-aendringer-af-vores-samfund-i-oest-og-i-vest-0>



Facebook – as long as you keep pressing “like” then you are engaged and spending time on the platform...

Brugerne skal vises materiale, der får dem til at dele og trykke på »like«. Jo mere, jo bedre. Jo længere tid brugerne er på platformen, jo flere reklamer kan man vise, og jo flere penge tjenes der. Provokerende og anderledes kan i den forbindelse virke godt, men også ofte svært [at skelne fra løgn og bedrag](#). Sandhed er jo ikke noget, man kan crowdfund. At mange mener noget, gør det ikke nødvendigvis sandt – der er en grund til, at man i de traditionelle medier har haft redaktører til at styre en debat.

Facebooks solution for gambling addictions...  
...Ads for quick loans without background check...

Men derved ikke være sagt at alle nu er enige om, hvad online moral er. Når algoritmerne opdager at 230.000 danskere via deres adfærd på nettet, har vist interesse for kasinoer, poker og online gambling, vil [disse brugere på Facebook modtage reklamer fra kviklånsfirmaer](#), hvilket man i det danske center for ludomani ikke netop syntes var en



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AI  
GOOD OR BAD?

Attempting to root out rubbish from the Internet is understandably a herculean task. As more social media platforms continue to gain momentum, incidence of cyberbullying has also seen a significant rise. A survey conducted by [Ditch the Label](#), an international anti-bullying charity, suggests that 42% of more than 10,000 UK youth between the ages 12 and 25 reported Instagram as the platform where they were most bullied.

<https://outsideinsight.com/insights/instagram-brings-on-deeptext-ai-in-effort-to-eradicate-cyberbullying/>

Mary, made it onto the cheer team, while a friend did not. The (former) friend then used Instagrams possibilities to cyber bully Mary... Creating groups chats like "Everyone in class except Mary".... A place to talk bad about Mary.... Causing Mary to have panic attacks.



<https://www.theatlantic.com/technology/archive/2018/10/teens-face-relentless-bullying-instagram/572164/>



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(Many) challenges to society and education.

- No smart phones before high school. Haidt says kids' brains are not ready for the addictive nature of a smartphone before high school, so giving them one earlier is unhealthy. ...
- No social media before 16 years old. ...
- No phones at school. ...
- More independence, free play and responsibility in the real world.

Jonathan Haidt, “The Anxious Generation”.

<https://growingleaders.com/four-rules-that-could-reverse-the-anxiety-epidemic-in-teens/>



## Doomscrolling and Its Consequences



Doomscrolling means **reading large amounts of distressing news** online. It may result in:

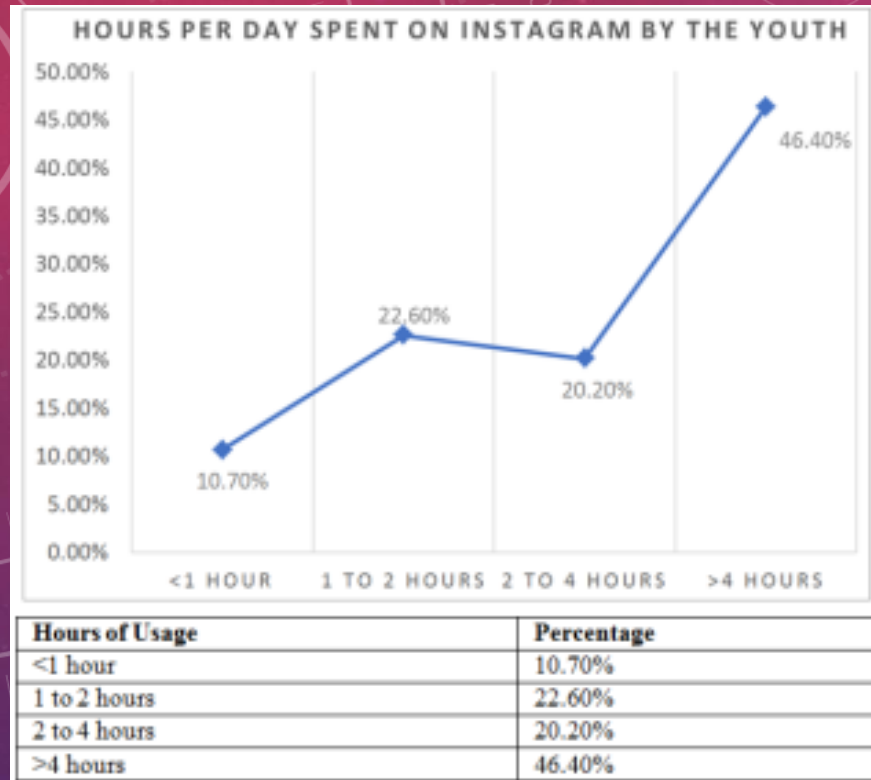
- Increased anxiety and stress
- Worsened emotional well-being
- Poor sleep quality

<https://palife.co.uk/news/workplace-wellbeing/doomscrolling-the-new-drug-of-the-21st-century/>



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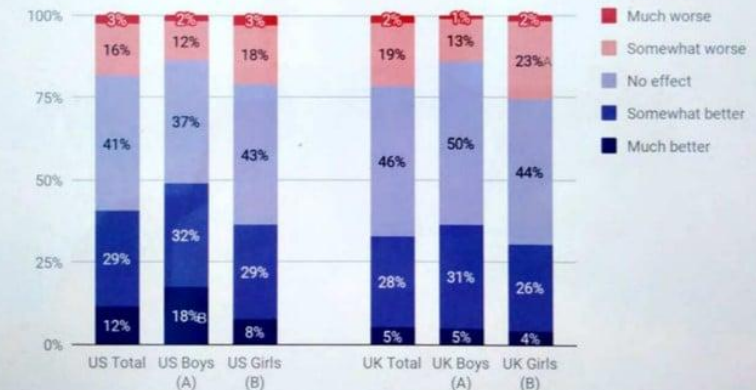
(Many) challenges to society and education.



<https://www.sciencepublishinggroup.com/article/10.11648/j.ajap.20241303.12>

### One in five teens say that Instagram makes them feel worse about themselves, with UK girls the most negative

Stated effect of Instagram



Q: In general, how has Instagram affected [the way you feel about yourself/your mental health]?  
There were no statistically significant differences among those who answered for "the way you feel about yourself" and those who answered for "your mental health".  
US n = 1296; UK n = 1308



**AI**  
GOOD OR BAD?

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Jonathan Haidt ✓

@JonHaidt

We have overprotected our children in the real world while underprotecting them online. Play researcher Mariana Brussoni explains why this is a risky way to raise children.

We must give children the *time, space, and freedom* to engage in risky play. At [AfterBabel.com](https://afterbabel.com)

[afterbabel.com/p/why-children...](https://afterbabel.com/p/why-children...)

Oversæt post

*What kids are dying from today are mainly car crashes and suicides, not playing outside unsupervised with friends. Parents are worrying about the wrong causes of injuries and harm. In fact, the very strategies that parents use to try to keep their children safe – driving them around, maximizing supervision, and minimizing freedom – are unintentionally increasing the likelihood of injuries and even death.*

<https://x.com/JonHaidt/status/1762836841148162198?lang=da>

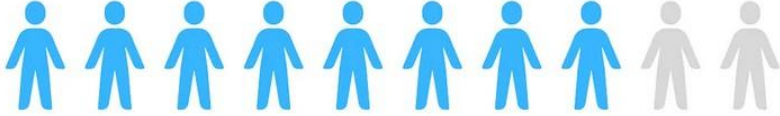


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Be aware of conformity (on social media and elsewhere).

**TOOLS**

### CONFORMITY: WHY WE DO IT & HOW TO STOP IT



WHEN UNDER PRESSURE, **8 IN 10** PEOPLE CONFORM WITH THE MAJORITY

---

#### WHAT CAN YOU DO TO **RESIST CONFORMITY**?

|                                                                                                                       |                                                                                                       |                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|                                      |                      |                            |
| <b>Understand Social Influence</b><br>The more you know, the more you can recognise conformity dynamics and stop them | <b>Practice Saying No</b><br>Take time to learn how to disagree in a graceful and constructive manner | <b>Encourage Debate</b><br>Encourage others to share their opinion to create space for different perspectives |

<https://www.britannica.com/topic/conformity>



We are programmed, as humans, at an instinctual level to conform, **to seek acceptance and belonging.**

“Humans are herd animals. We want to fit in, to bond with others, and to earn the respect and approval of our peers.

But conform to what....?



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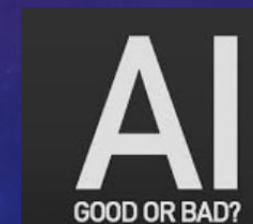
Be aware of conformity (on social media and elsewhere).



In psychology, the Asch conformity experiments, or the Asch paradigm, were a series of studies directed by Solomon Asch - studying if and how individuals yielded to or defied a majority group and the effect of such influences on beliefs and opinions

[https://en.wikipedia.org/wiki/Asch\\_conformity\\_experiments](https://en.wikipedia.org/wiki/Asch_conformity_experiments)

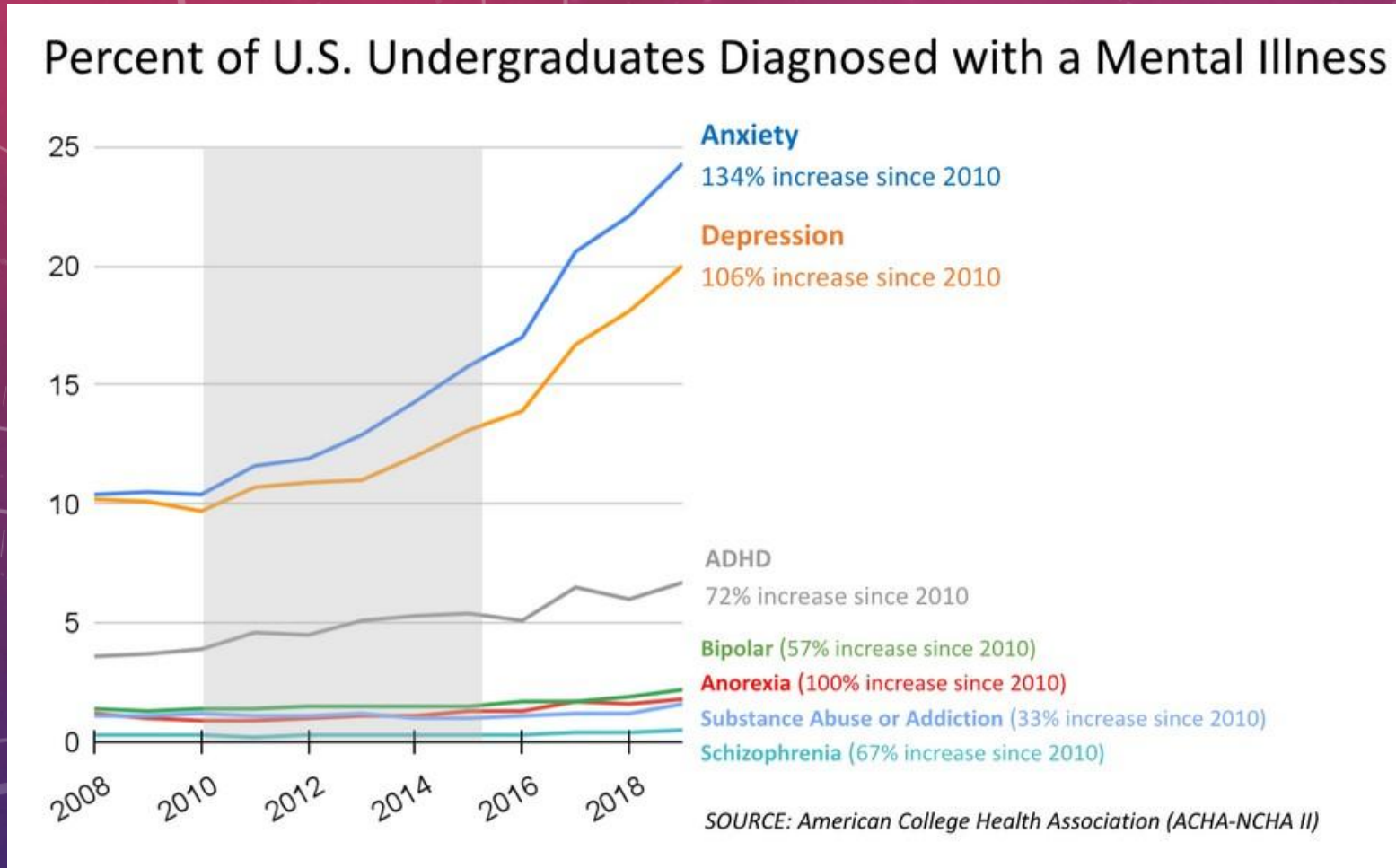
<https://www.youtube.com/watch?v=iRh5qy09nNw>



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# The “Anxious Generation”.



The “Anxious Generation” offers an explanation by telling two stories. The first is about the decline of the play-based childhood, test and expand their limits, build close friendships through shared adventure, and learn how to judge risks for themselves. The second story is about the rise of the phone-based childhood.

Overprotecting children in the real world while underprotecting them in the virtual world.

<https://jonathanhaidt.com/anxious-generation/>

Jonathan Haidt

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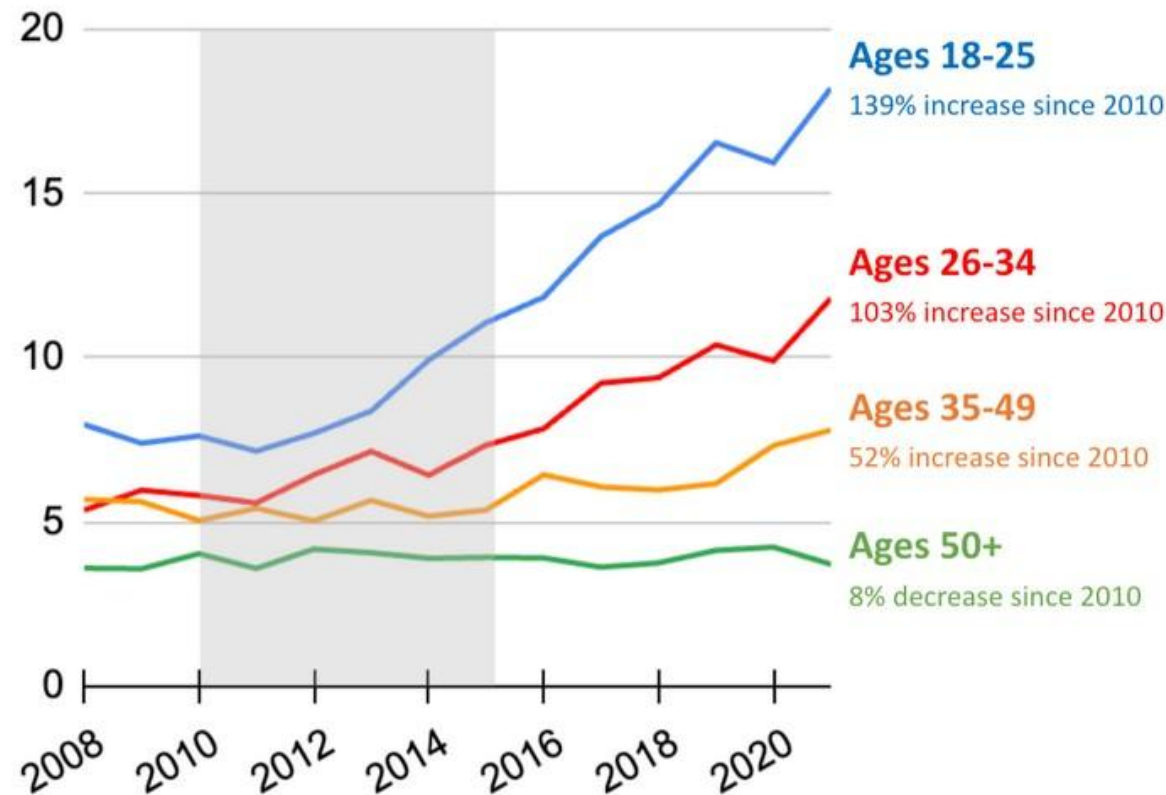
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## Percent U.S. Anxiety Prevalence



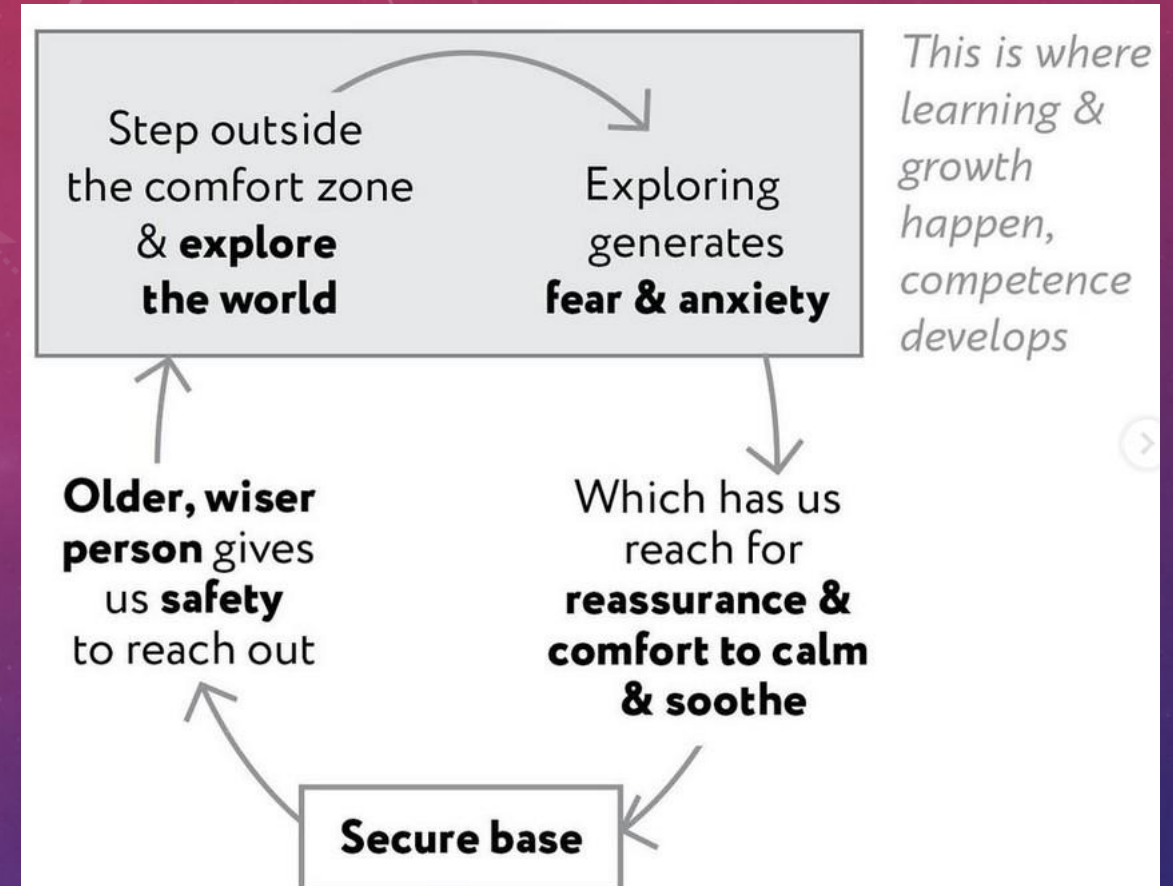
SOURCE: U.S. National Survey on Drug Use and Health

# What you can try ....

- No smart phones before high school. Haidt says kids' brains are not ready for the addictive nature of a smartphone before high school, so giving them one earlier is unhealthy. ...
- No social media before 16 years old. ...
- No phones at school. ...
- More independence, free play and responsibility in the real world.

Jonathan Haidt, "The Anxious Generation".

<https://growingleaders.com/four-rules-that-could-reverse-the-anxiety-epidemic-in-teens/>



"Anxious Generation". chapter 3, "Discover Mode and the Need for Risky Play." Kids need safety and they need stress/risk to grow, the same way muscle grows when torn.

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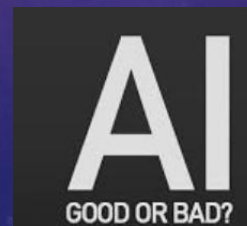
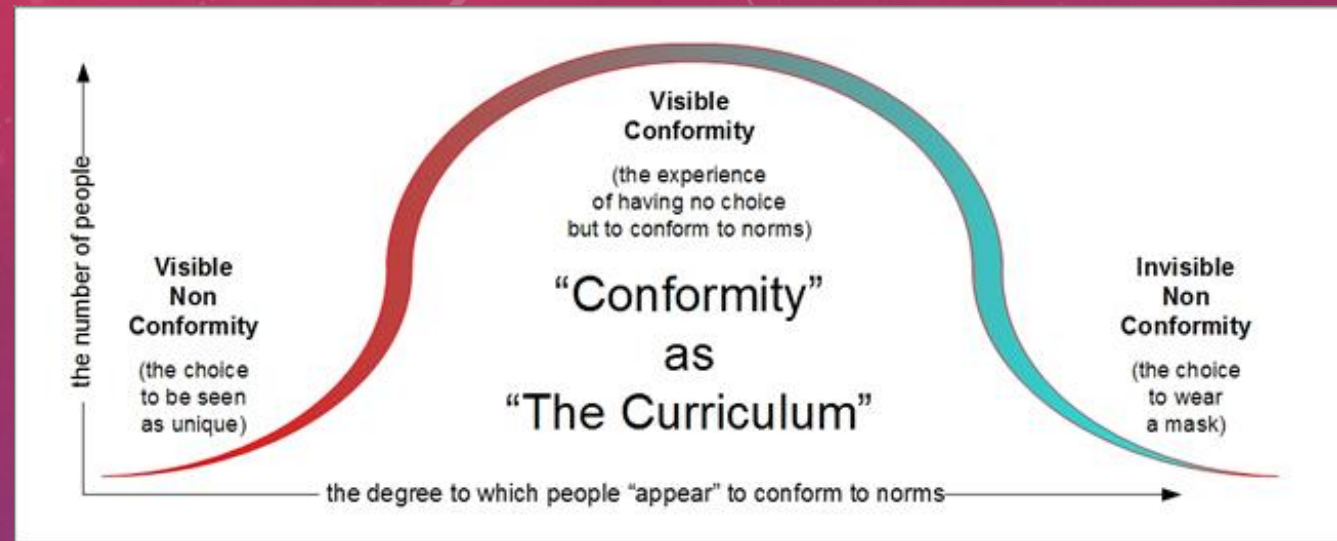


## Conformity learning vs. Prestige learning.

(Many) challenges to society and education.

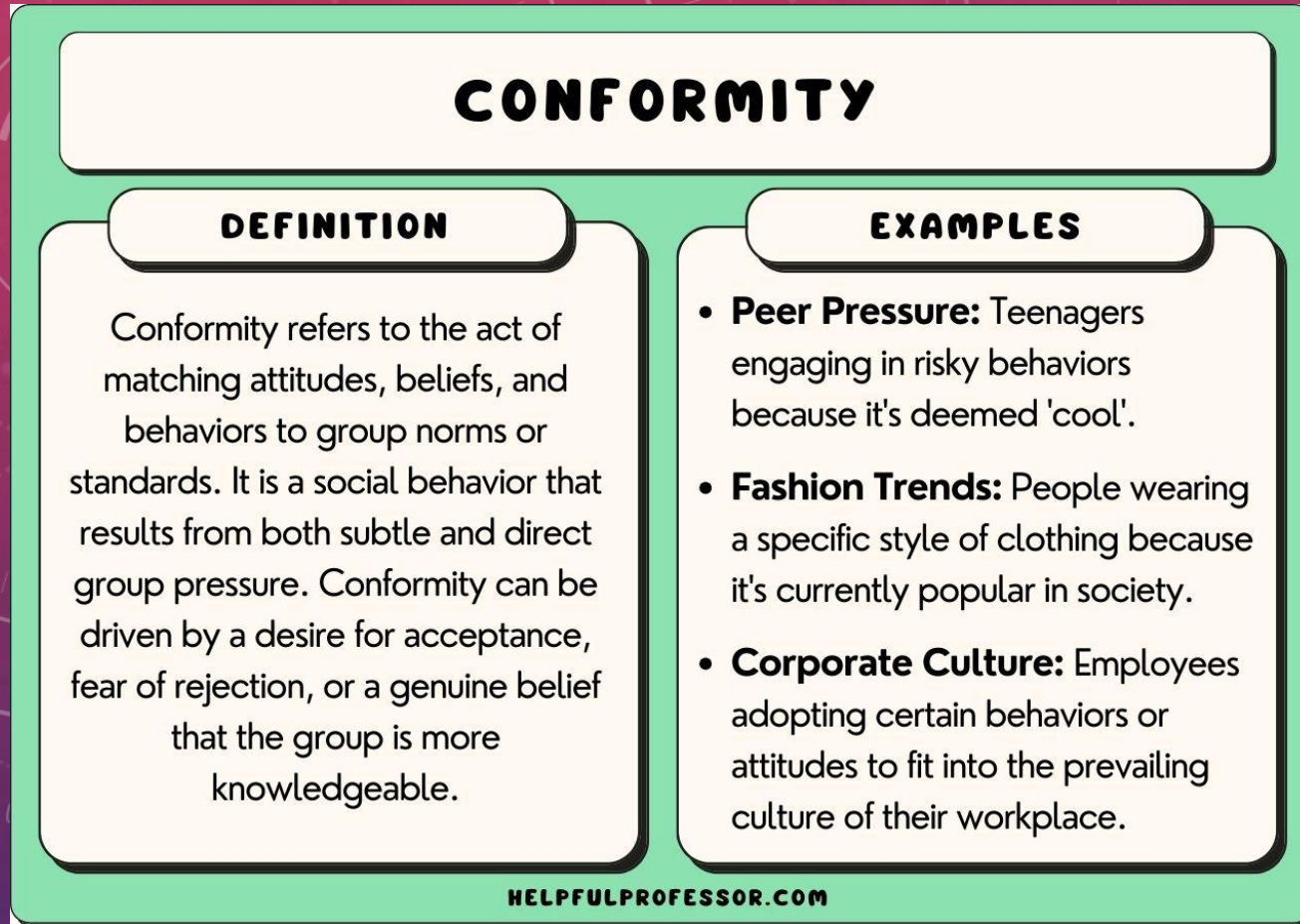
Millions of Gen Z students collectively aimed their most powerful learning systems at a small number of young women whose main excellence seems to be amassing followers to influence.

Jonathan Haidt, "The Anxious Generation".



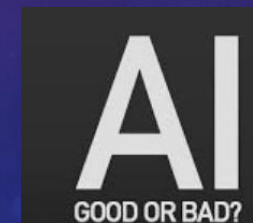
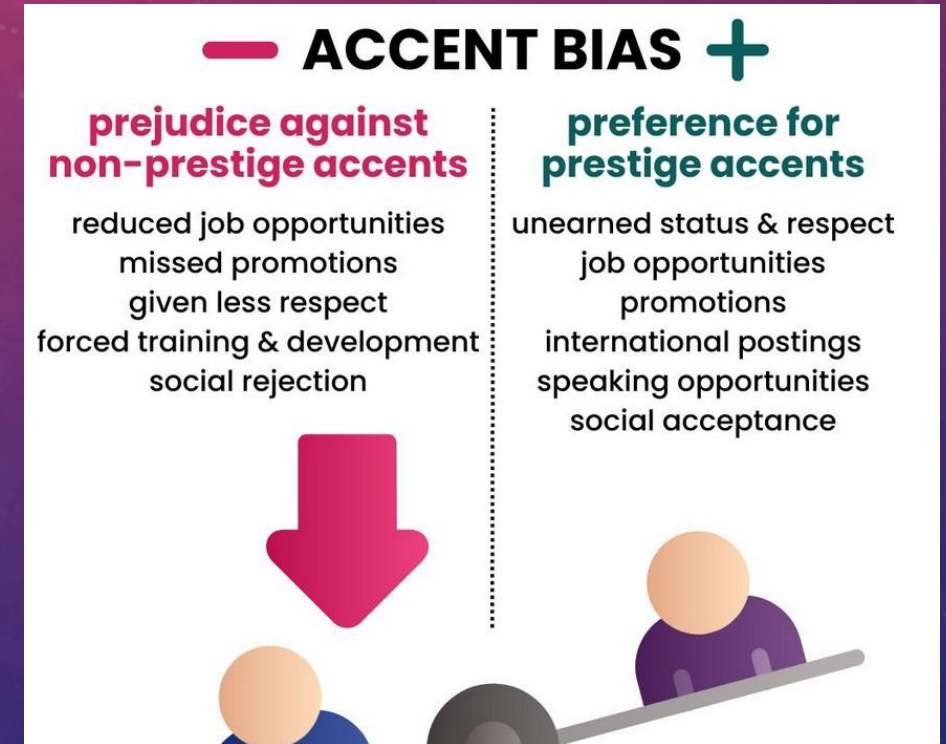
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<https://helpfulprofessor.com/conformity-examples/>

Conformity learning vs.  
Prestige learning.



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FachHochSchule.  
25 March 2025.

# Conformity learning vs. Prestige learning.

Do not go where the  
path may lead,  
go instead where  
there is no path  
and leave a trail.

*Ralph Waldo Emerson*



Abraham Maslow (1970) suggested that humans have a hierarchy of needs ranging from lower level needs for survival and safety to higher level needs for intellectual achievement and self-actualization.

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Wiener Neustadt,  
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25 March 2025.

Prestige  
learning.



<https://pianocompetition.dk/programme/opening-concert/>

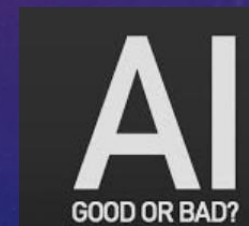
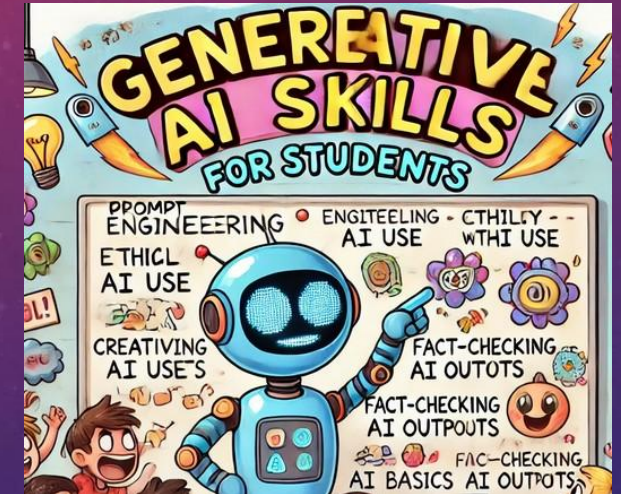
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JobTrend about (gen) Ai.

First : Surveys.

What (gen) AI skills should students learn?

First: Asking students... What do Danish students think about (gen) AI as a tool... ?



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Is it good that we have introduced use of (gen) AI (in some classes)?

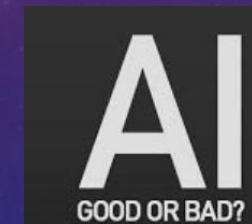
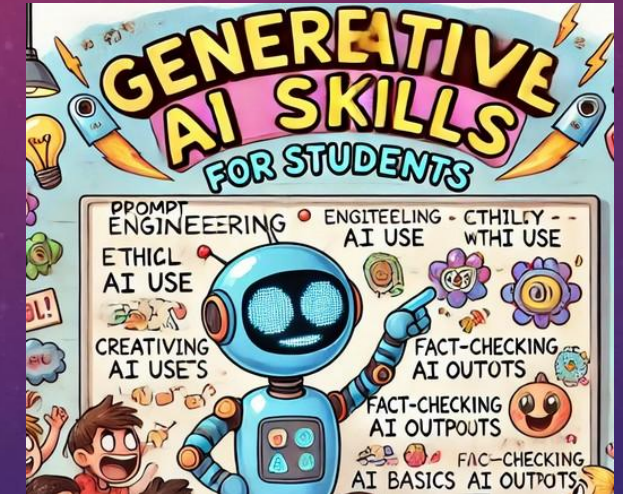
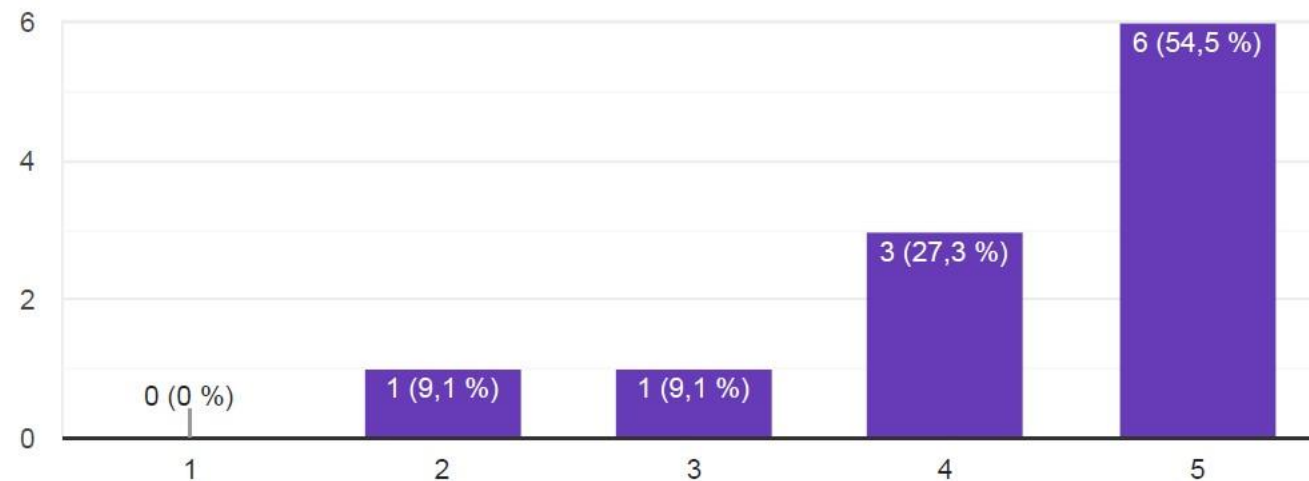
Surveys, Eaaa.  
Asking students.

"Where is gen(Ai) useful, what should you learn"

What should you learn about (gen) Ai in your (IT) education...?

Generativ AI, som ChatGPT, har de seneste år fået stor udbredelse i både undervisning og erhvervsliv. På jeres uddannelse bliver I nu i dette semester blevet introduceret til, hvordan generativ AI (ChatGPT) kan anvendes i IT-udvikling. Hvordan ser I på, at generativ AI er blevet introduceret for i forhold til anvendelse til hjælp i forhold til programmering?

11 svar



4th semester students IT Technicians. Denmark.

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Surveys, Eaaa.  
Asking students.

"Where is gen(Ai) useful, what should you learn"

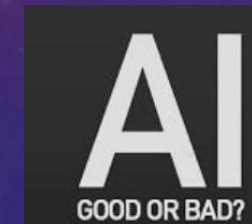
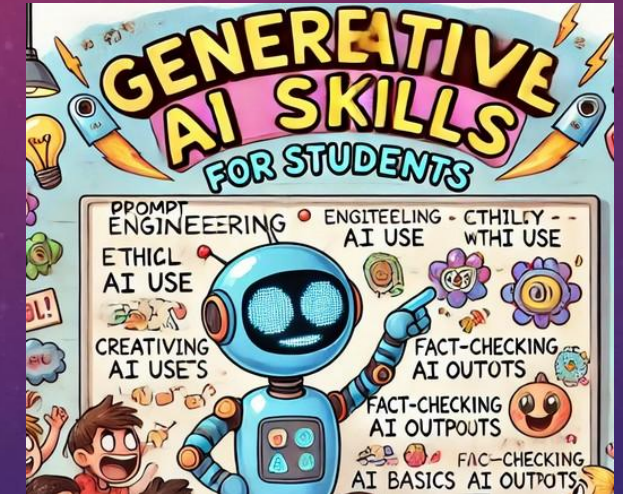
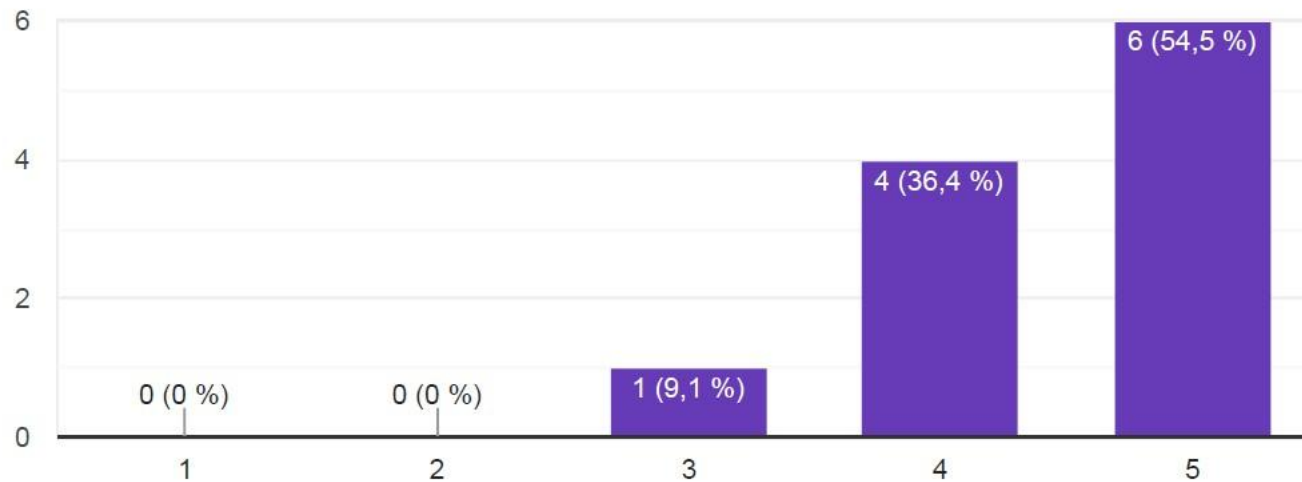
What should you learn about (gen) Ai in your (IT) education...?

Do you think that (gen) AI is used in industry?

Tror du, at generativ AI (som ChatGPT, GitHub Copilot osv.) allerede anvendes i erhvervslivet?"

Kopier

11 svar



4th semester students IT Technicians. Denmark.

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How would you feel about working in a project that uses (gen) AI?

Surveys, Eaaa.  
Asking students.

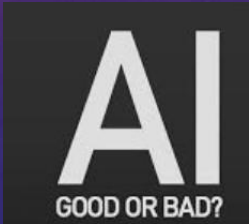
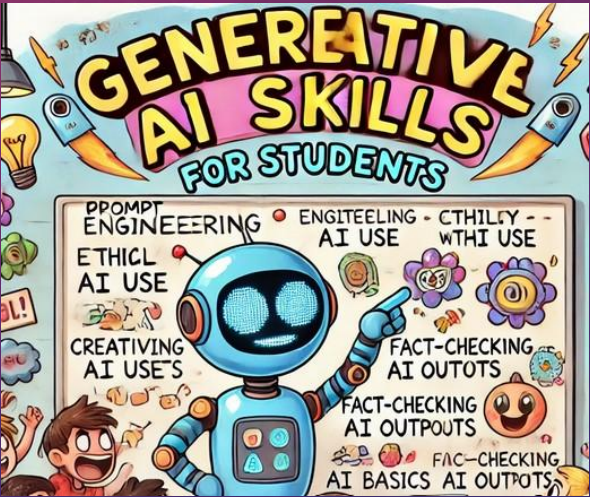
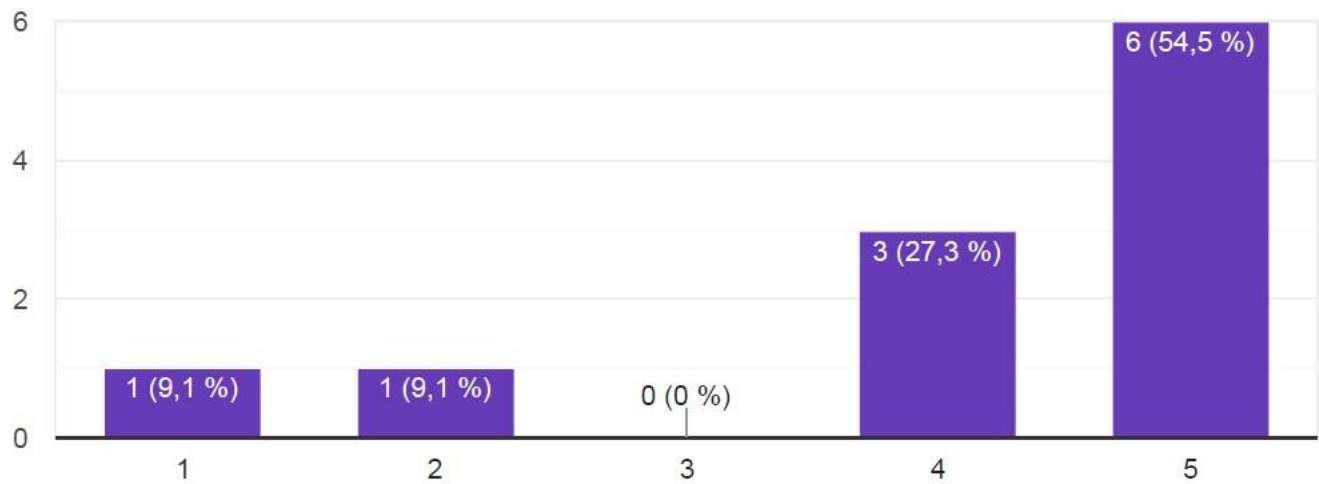
"Where is gen(Ai) useful, what should you learn"

What should you learn about (gen) Ai in your (IT) education...?

Hvordan ville/vil du have det med at bruge generativ AI i et projekt som et værktøj til at hjælpe med kodning, fejlfinding og dokumentation?"

Kopier

11 svar



4th semester students IT Technicians. Denmark.

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## Was (gen) AI helpful in complex coding tasks?

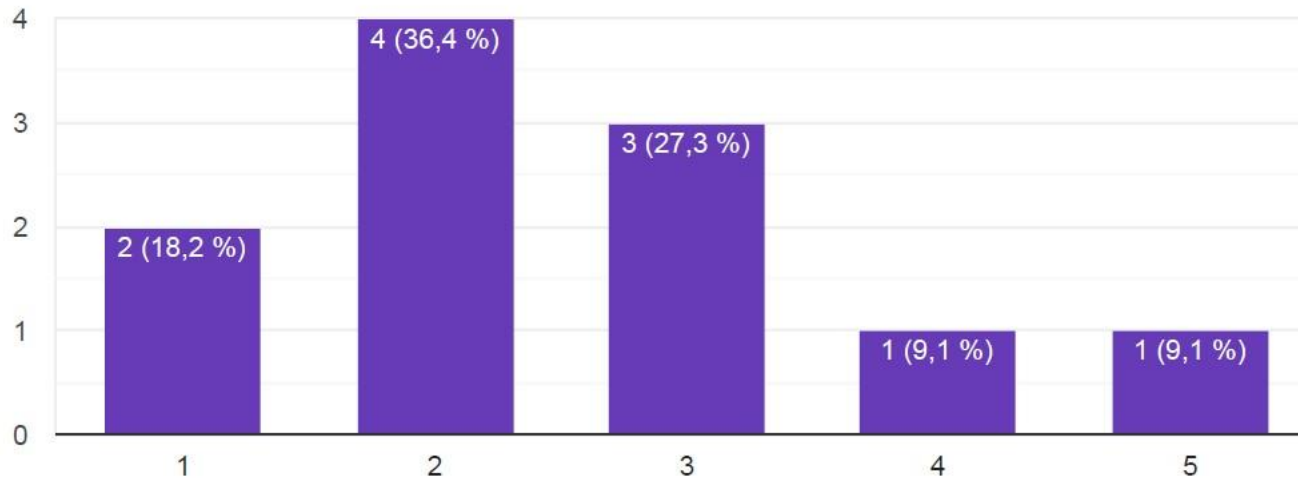
Surveys, Eaaa.  
Asking students.

"Where is gen(Ai) useful, what should you learn"

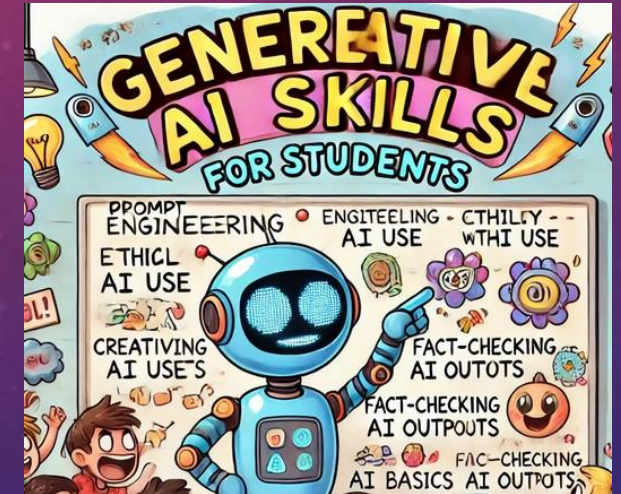
What should you learn about (gen) Ai in your (IT) education...?

"Hvordan fungerede det at bruge generativ AI, når du skulle løse mere komplekse problemer, fx når en ændring i én klasse påvirkede resten af programmet?"

11 svar



Kopier



4th semester students IT Technicians. Denmark.

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Was (gen) AI helpful when it came to debugging your code?

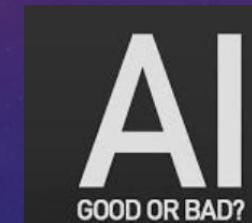
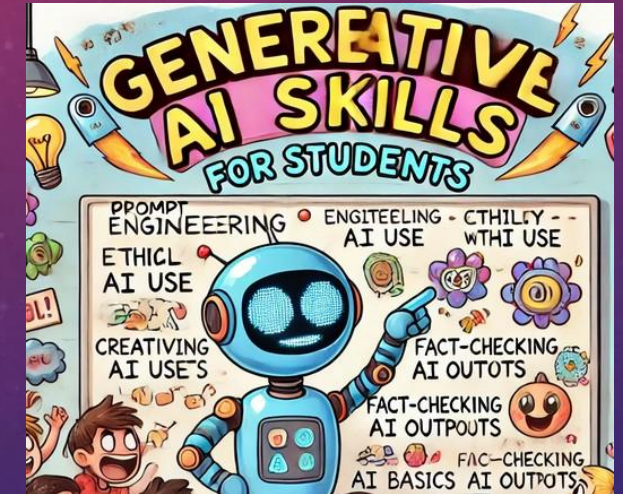
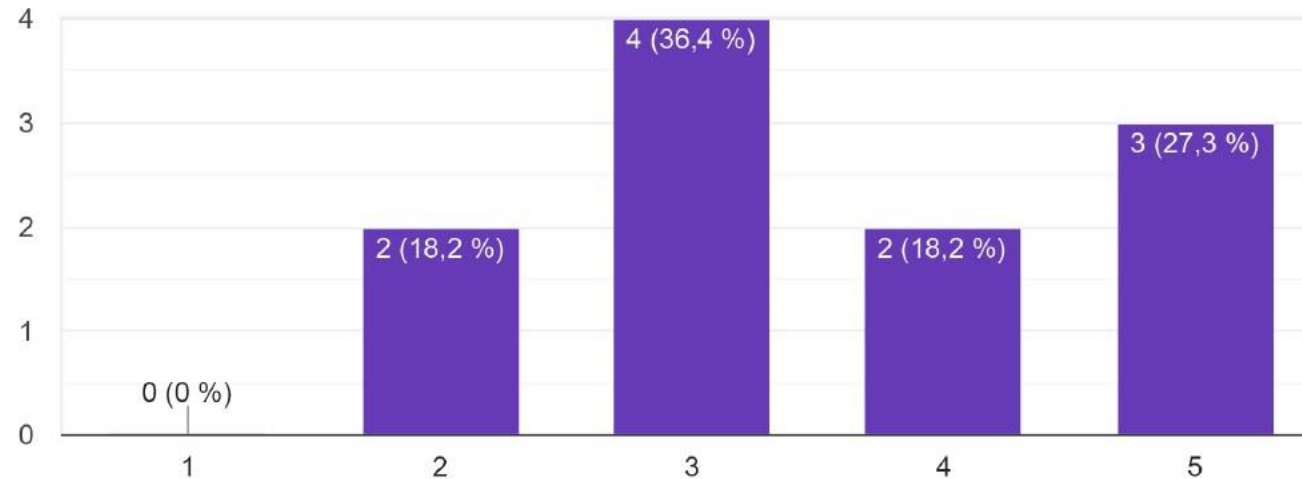
Surveys, Eaaa.  
Asking students.

"Where is gen(Ai) useful, what should you learn"

What should you learn about (gen) Ai in your (IT) education...?

"Hvordan oplevede du at bruge gen AI til at debugge fejl i din kode?"

11 svar



4th semester students IT Technicians. Denmark.

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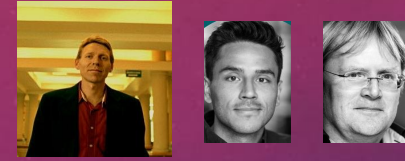
# Next - Jobtrend - What (gen) AI skills should students learn?

Asking the JobTrend database (Eaaa) about what industry thinks.

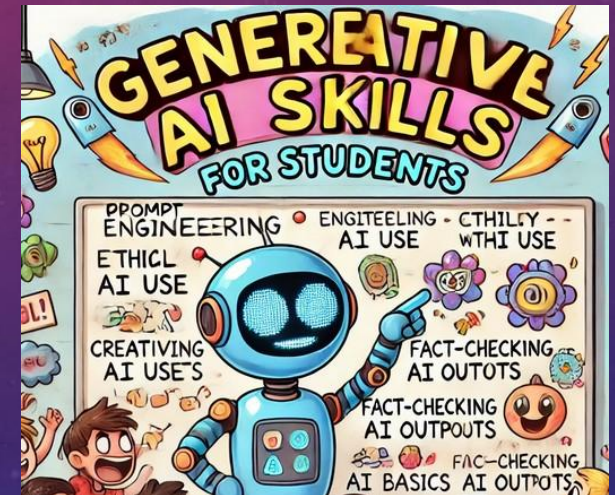
How is (gen) Ai mentioned in JobAds...  
- What should students learn...

Project started in January.

We are currently collecting data and hope to have the first results in August/September...



JobTrend, (gen) Ai.  
David Firth, Jacob Nielsen & Simon Laub



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25 March 2025.

# BTW. Could an AI win the Piano competition?

## Only with AGI...

### 1. Technical Skill

- Fingering, accuracy, and control
- Speed and precision in virtuosic passages
- Dynamic control (from the softest pianissimo to powerful fortissimo)
- Articulation and use of the pedal

### 2. Musicality and Interpretation

- The ability to convey the composer's intentions
- Phrasing and natural musicality
- Personal interpretation without exaggeration
- The balance between spontaneity and respect for style



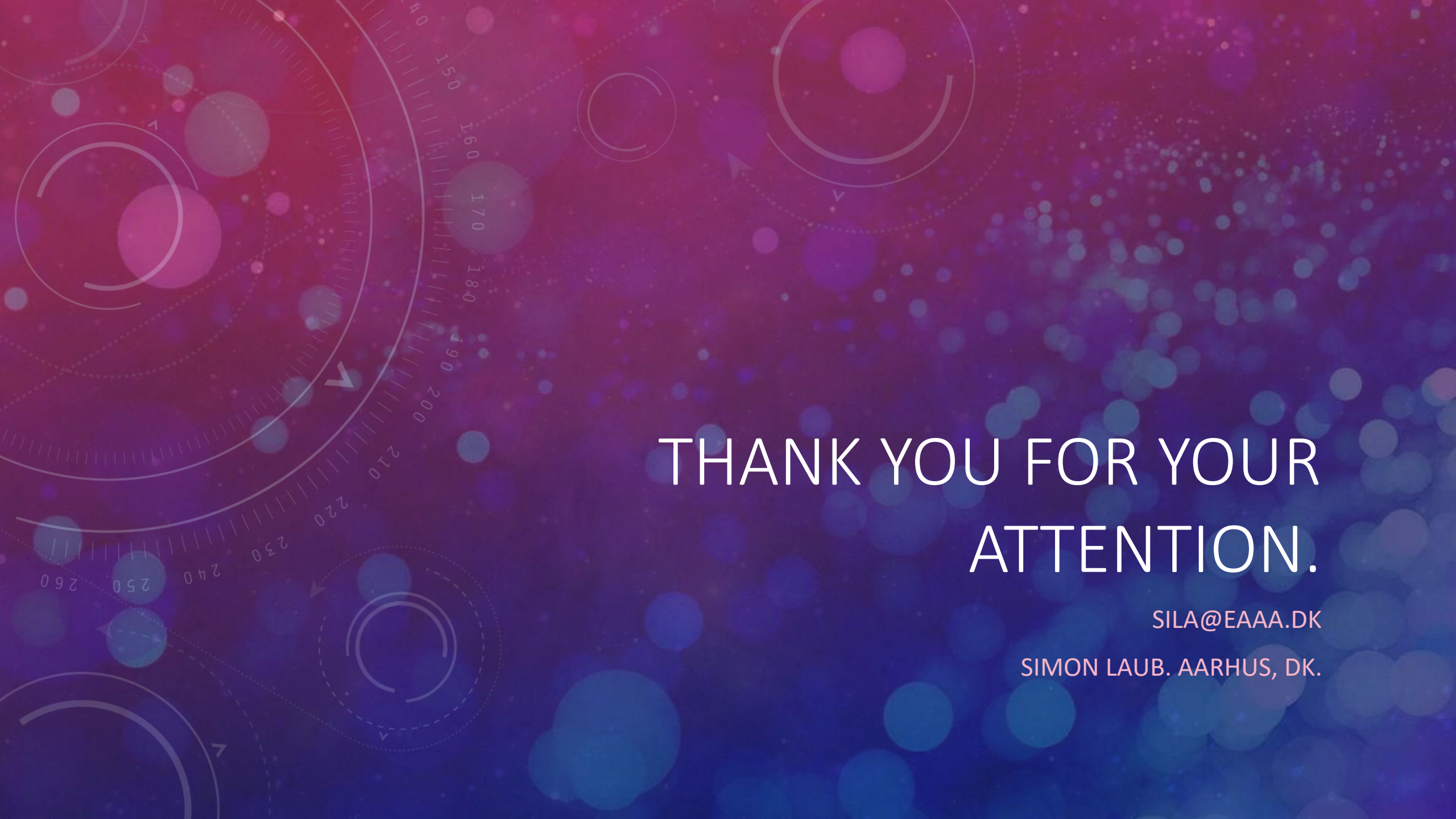
<https://pianocompetition.dk/programme/opening-concert/>

### 3. Expressiveness and Stage Presence

- The ability to captivate the audience and create a narrative through music
- Emotional depth and authenticity
- Stage charisma and communication

ETC...

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Wiener Neustadt,  
FachHochSchule.  
25 March 2025.



THANK YOU FOR YOUR  
ATTENTION.

[SILA@EAAA.DK](mailto:SILA@EAAA.DK)

SIMON LAUB. AARHUS, DK.