

# From Physics to AI: Myths and Truths of a Career in Industry



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# Outline

2

- My Career Path
- What is Artificial Intelligence?
- AI in Medical Imaging
- Searching for a job AI - Common Myths
- Landing a job in AI - Lessons Learned
- Discussion



# Personal Career Journey

3



Defended PhD work on  
“IceCube Neutrino  
Observatory” from Wisconsin in  
2010



Postdoc with UPenn  
working on Sudbury  
Neutrino Observatory  
2011-2014



Lead AI Scientist at Proscia,  
2021 - present

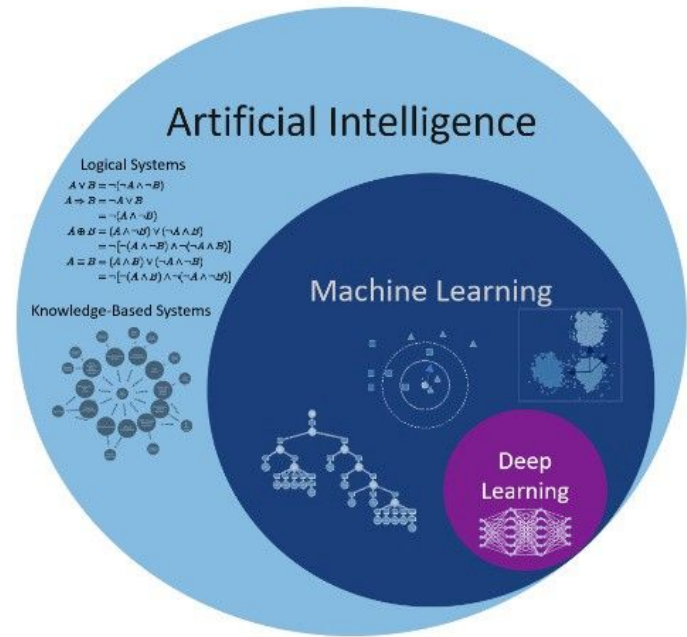
# What is Artificial Intelligence?

4

**Artificial Intelligence** : The field defines itself as the study of “Intelligent Agents”: Any Device (software or hardware) that perceives its environment and takes actions that maximize its chance of success at some goal

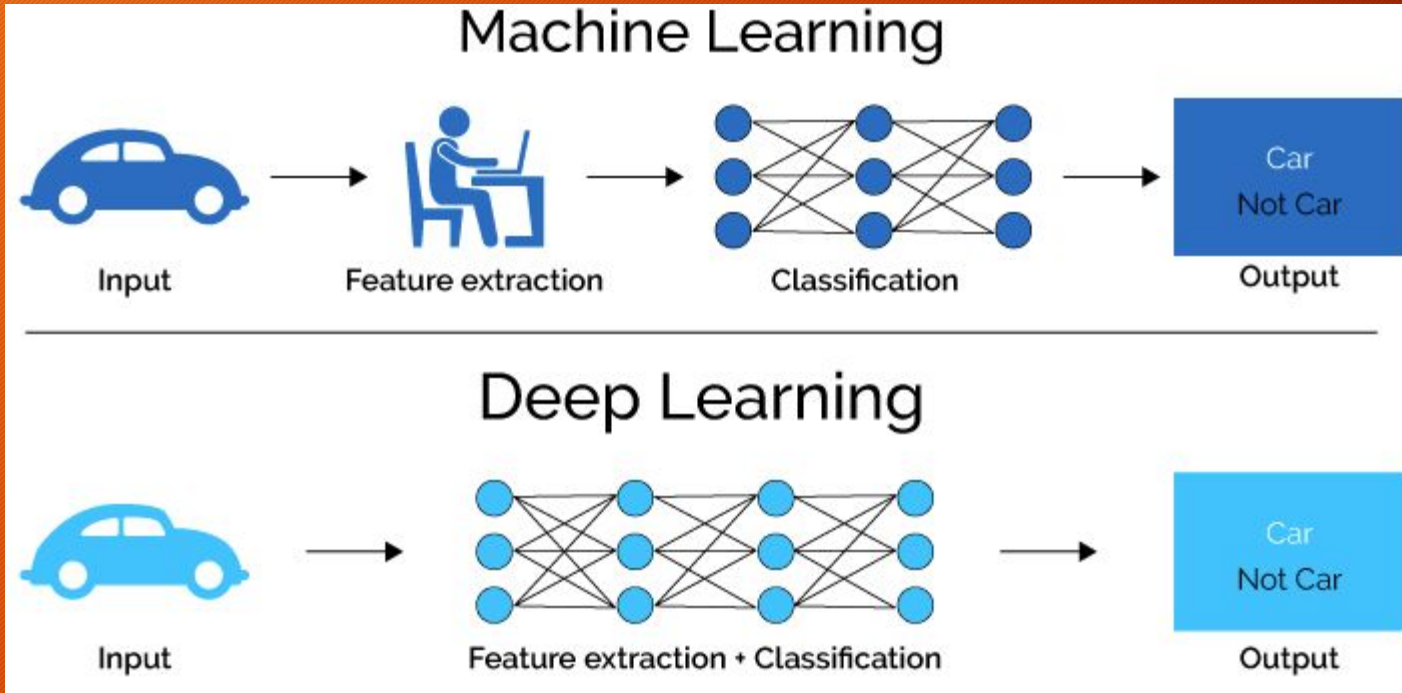
**Machine Learning** : Machine learning provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of computer programs that can teach themselves to grow and change when exposed to new data

**Deep Learning** : A broad collection of machine learning techniques based on artificial neural networks



# Deep Learning vs Machine Learning

5



# What Artificial Intelligence Really Means

6

Computer Vision



Natural Language Processing



Speech Recognition



- A “job in AI” typically means one works in one-or-more of these areas
- Professionals in the industry communicate/network via the models and data they work with

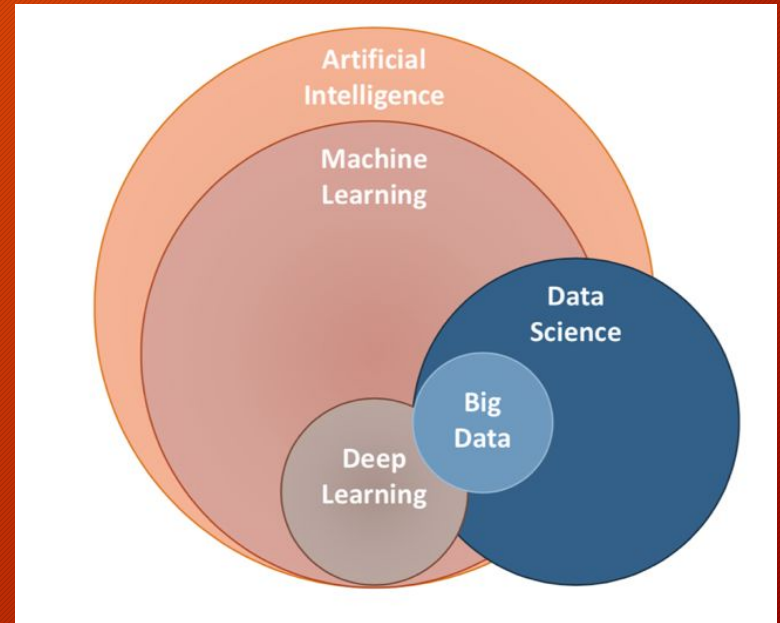
# Artificial Intelligence vs Data Science

7

- There is overlap between careers in AI and Data Science

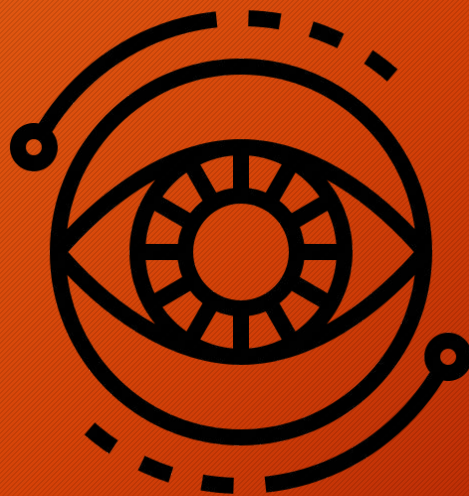
*Data Science combines programming, machine learning, statistics, and visualization to collect, process, model, and visualize data to create data products that address business questions.*

- The primary (but not exclusive) difference between AI roles and Data Science roles is the use and development of deep learning algorithms on a daily basis



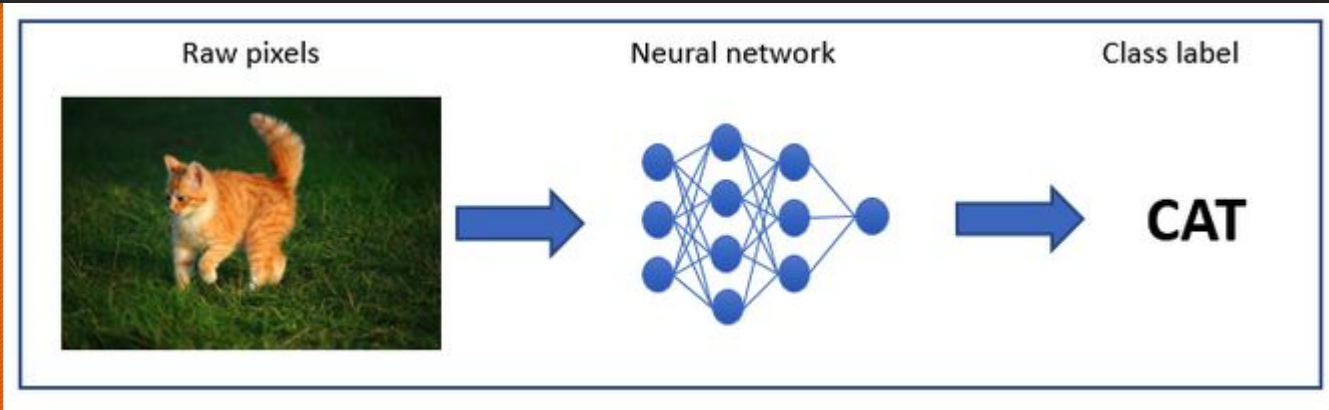
# Examples from Computer Vision

8





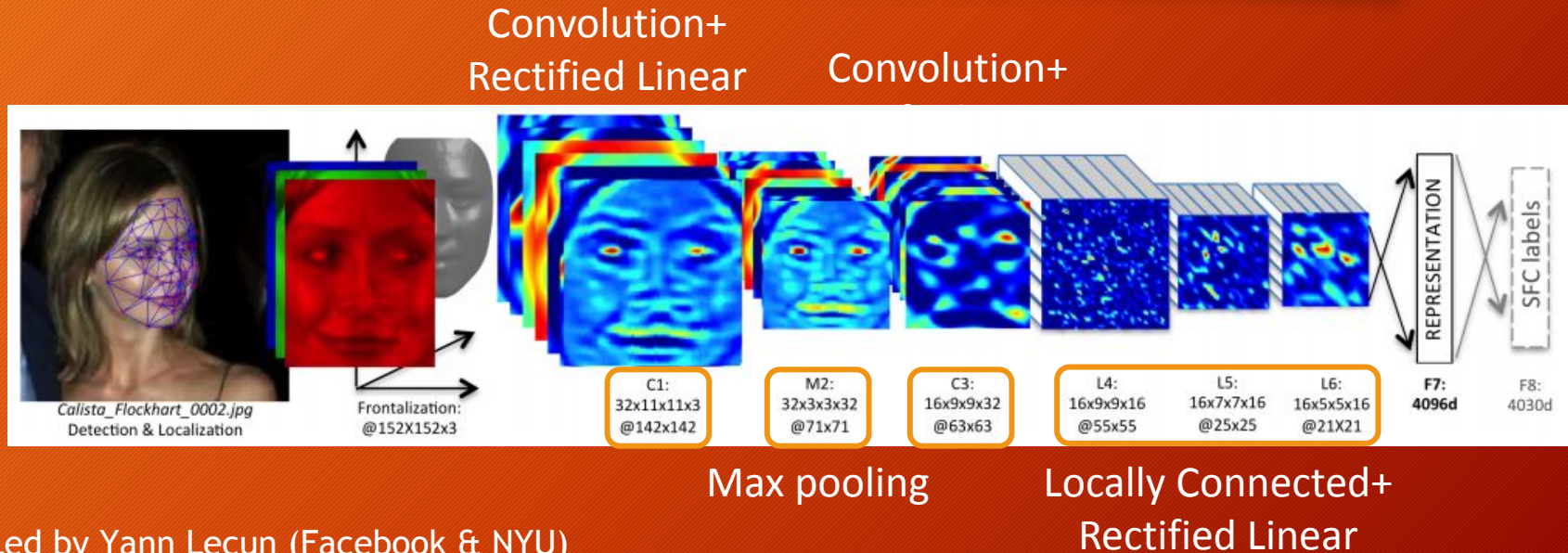
# Image Classification



- The rise in popularity of neural networks is due in part to image classification

# Facial Recognition with Deep Learning Meta's *DeepFace*

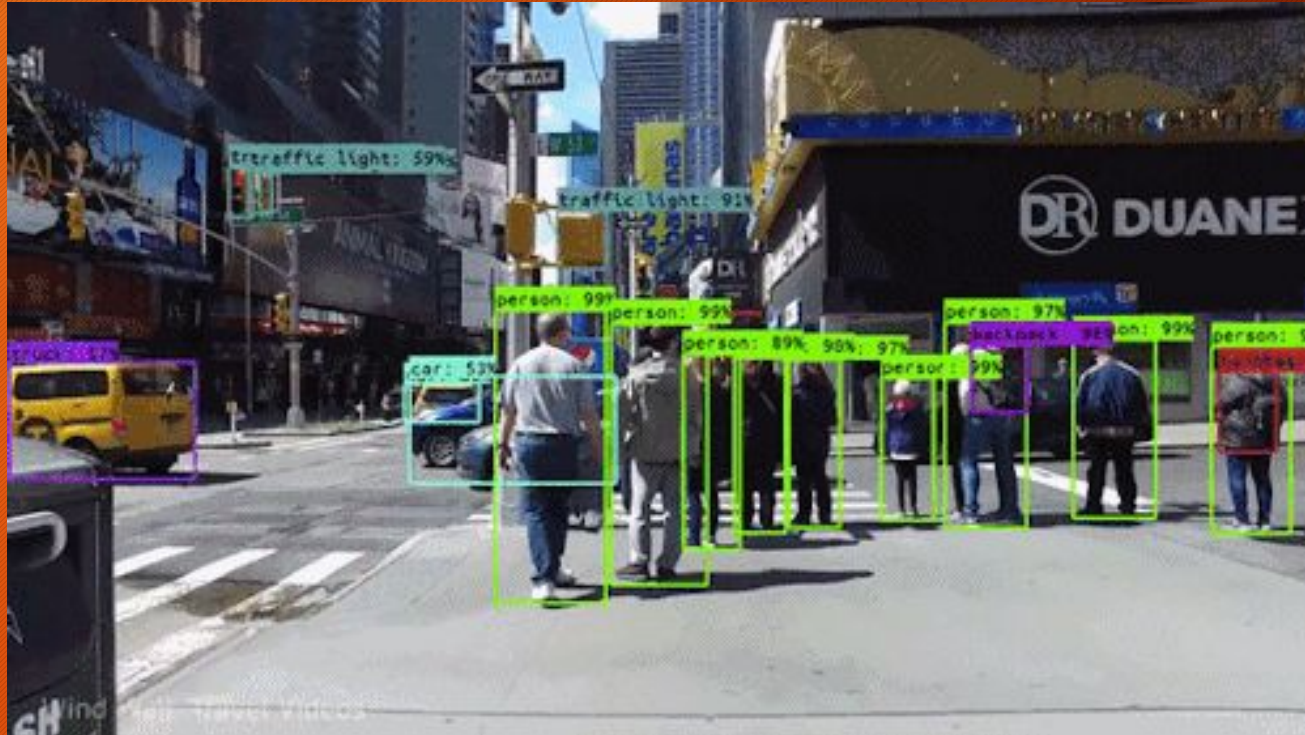
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Led by Yann Lecun (Facebook & NYU)  
97.5 accuracy in face detection  
4 million images, 4000 identities

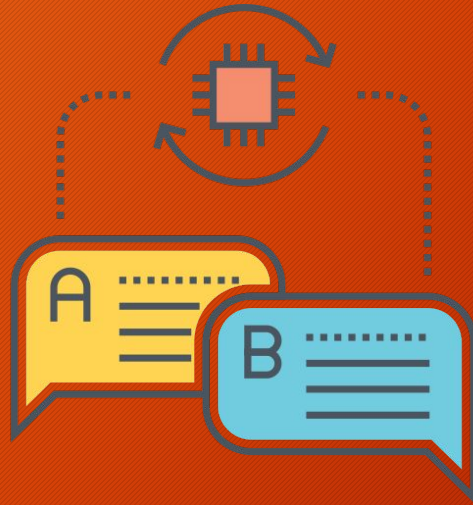
# Self-Driving Cars - Object Detection

11



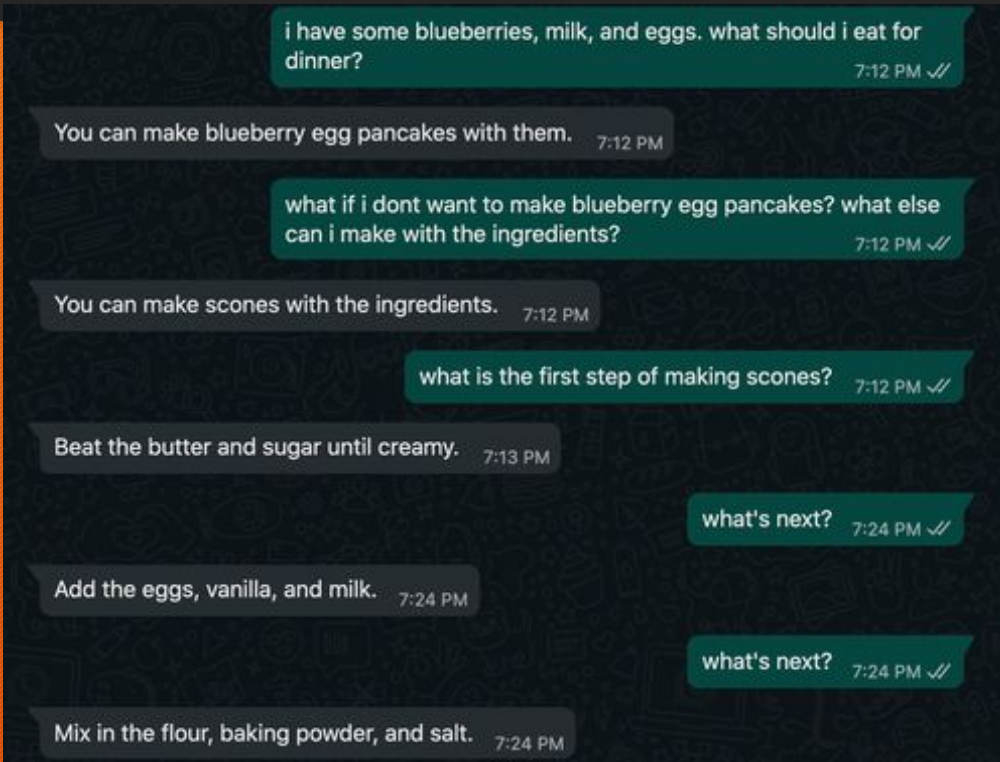
# Examples from Natural Language Processing

12

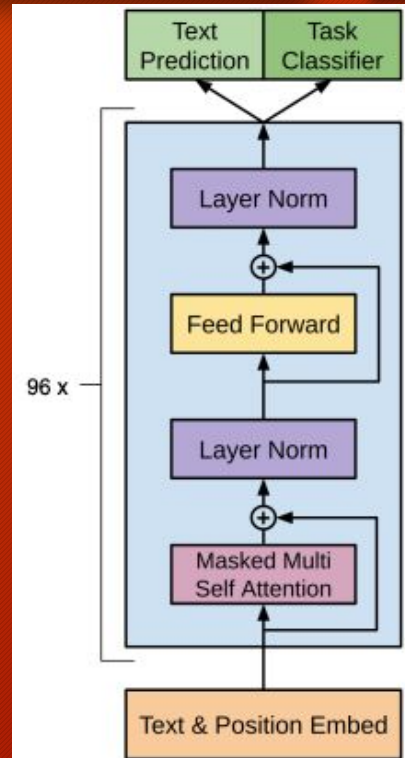


# Chatbots

13



GPT-3 architecture

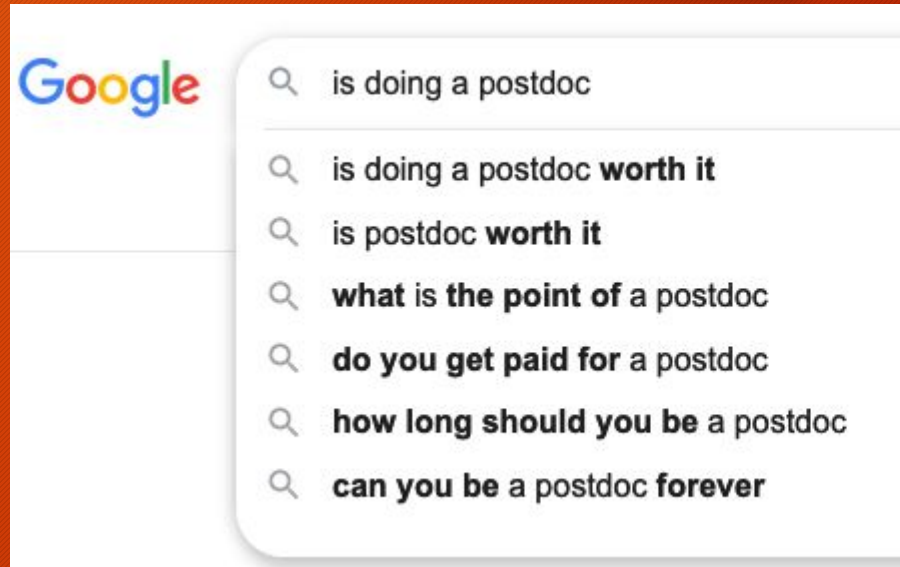


# Language Translation / Autocompletion

14



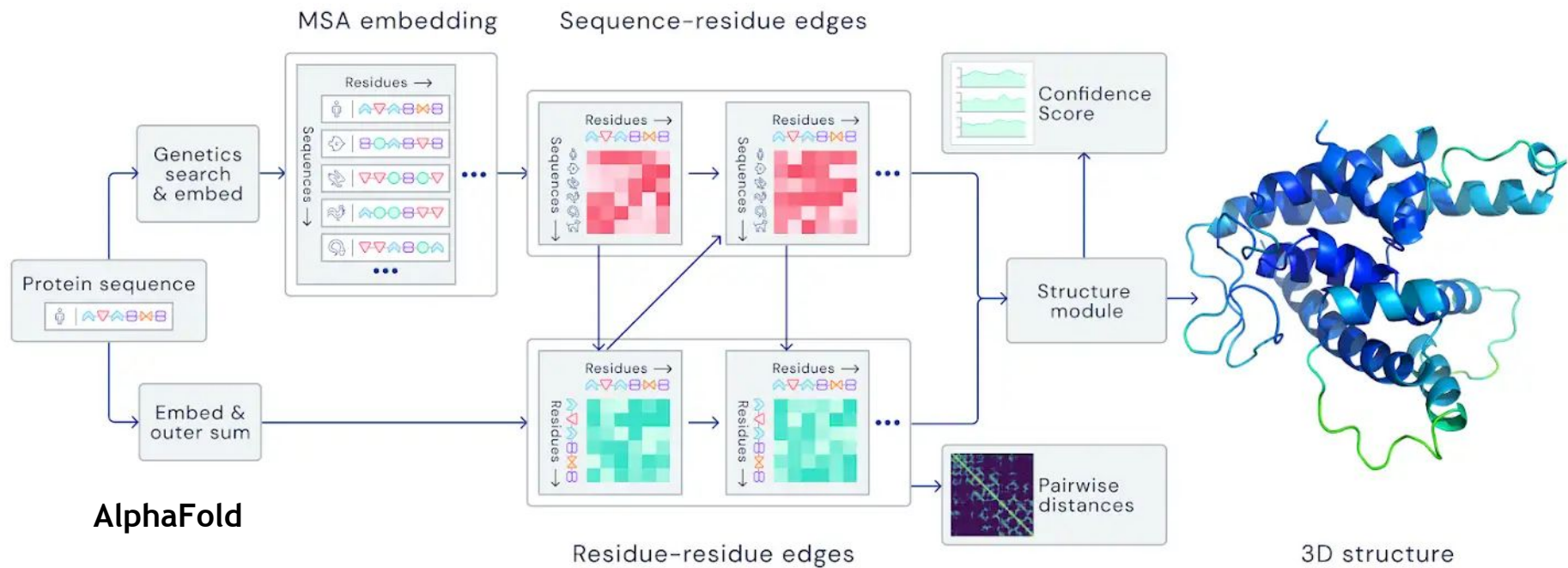
Google Translate



Autocompletion

# Protein Folding

15



# Examples from Speech Recognition

16





# Mainly Voice Assistants

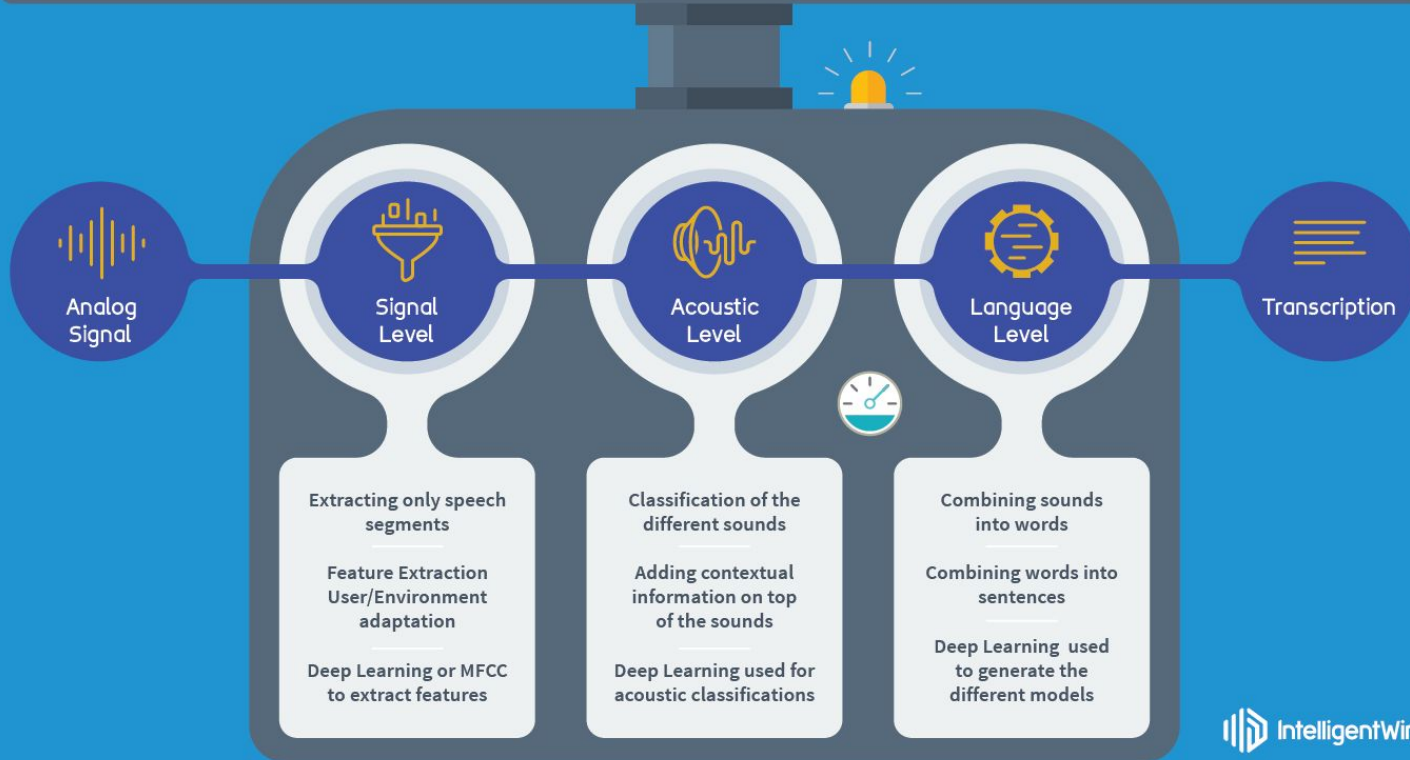
17

## Timeline of Mainstream Voice Assistants



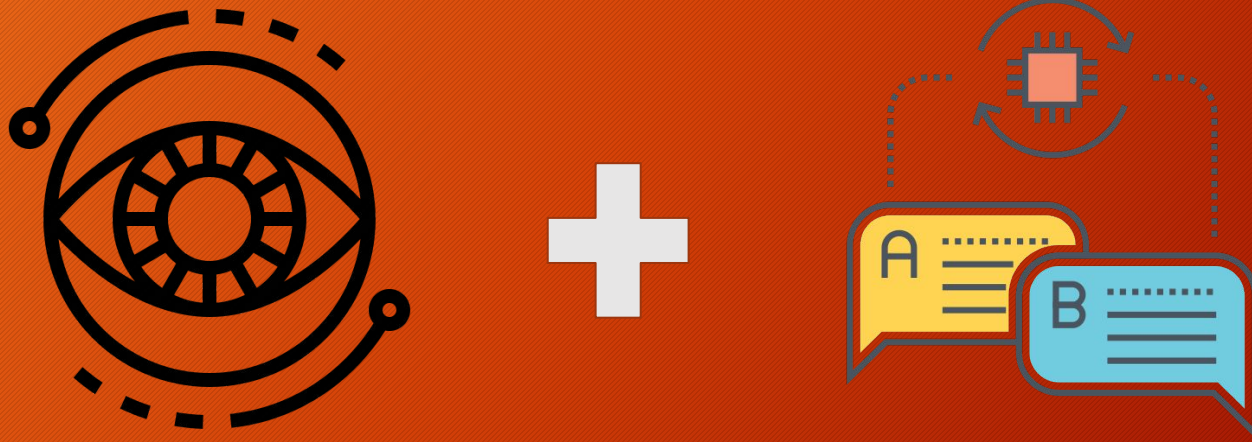
# Speech Recognition System

18



# Examples - Combining Computer Vision and Language

19



# AI-Art Generation

20



Generated from phrase “Teddy Bears working on new AI research underwater with 1990s Technology”



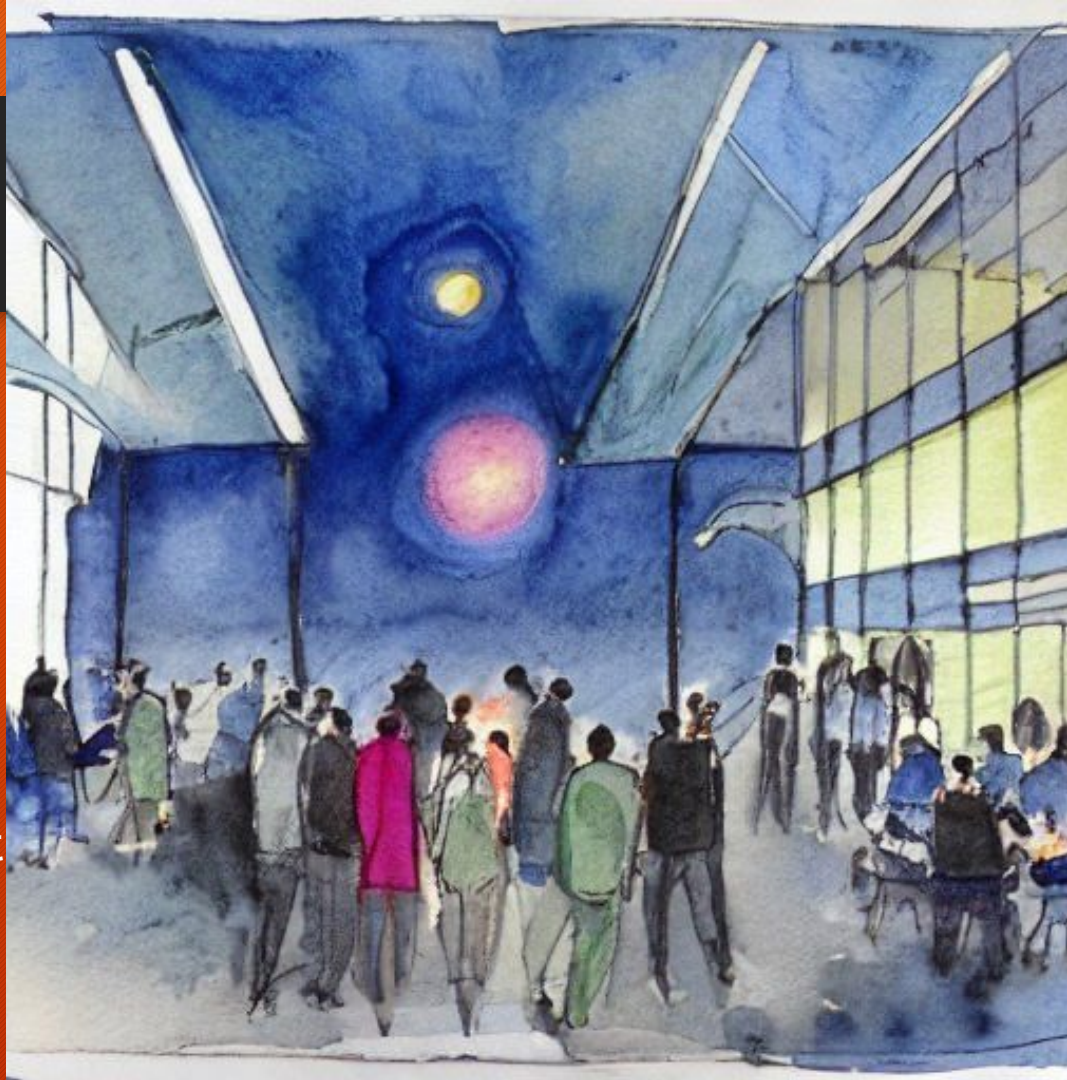
# Generating AI Art

Generated from the Phrase:  
*“Astronomers celebrating in an atrium after a seminar in watercolor style”*

Try it yourself!

<https://www.craiyon.com/>

<https://huggingface.co/spaces/stabilityai/stable-diffusion>



# Proscia

Join us, as we change the way the world practices pathology.

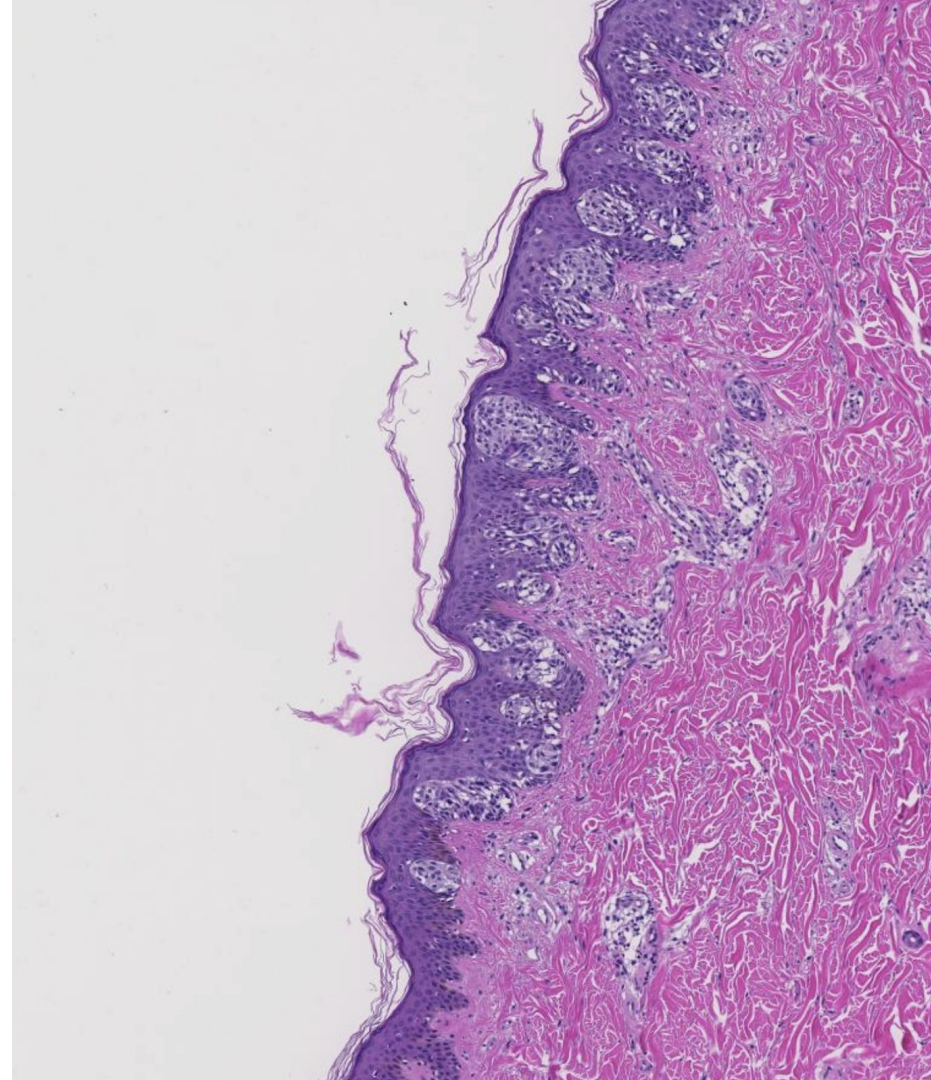
# Proscia's AI Vision

Deliver purpose-built AI products, designed to marry quality and state-of-the-art technology with the power of human cognition, guiding and enabling pathology practices to deliver efficient, superior care that manifests in improved patient outcomes.

# Motivation

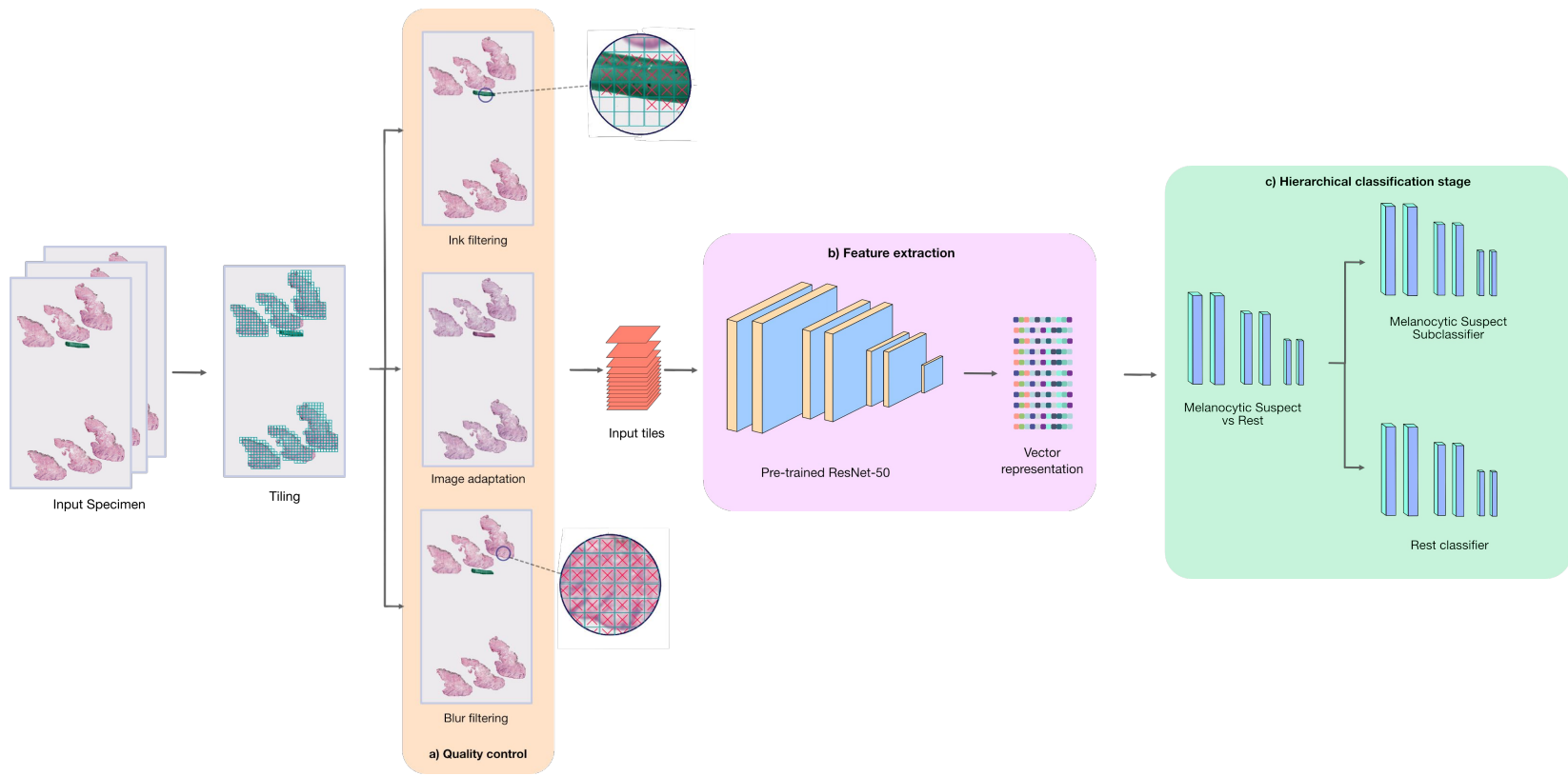
- 106,000 out of 5 million skin cancer diagnoses is Melanoma
- 5-year survival rate of patients with metastatic malignant melanoma is less than 20%

**Our main objective was to develop a system that prioritizes detecting melanoma cases and improving turnaround time - thus improving survival rates of melanoma patients**



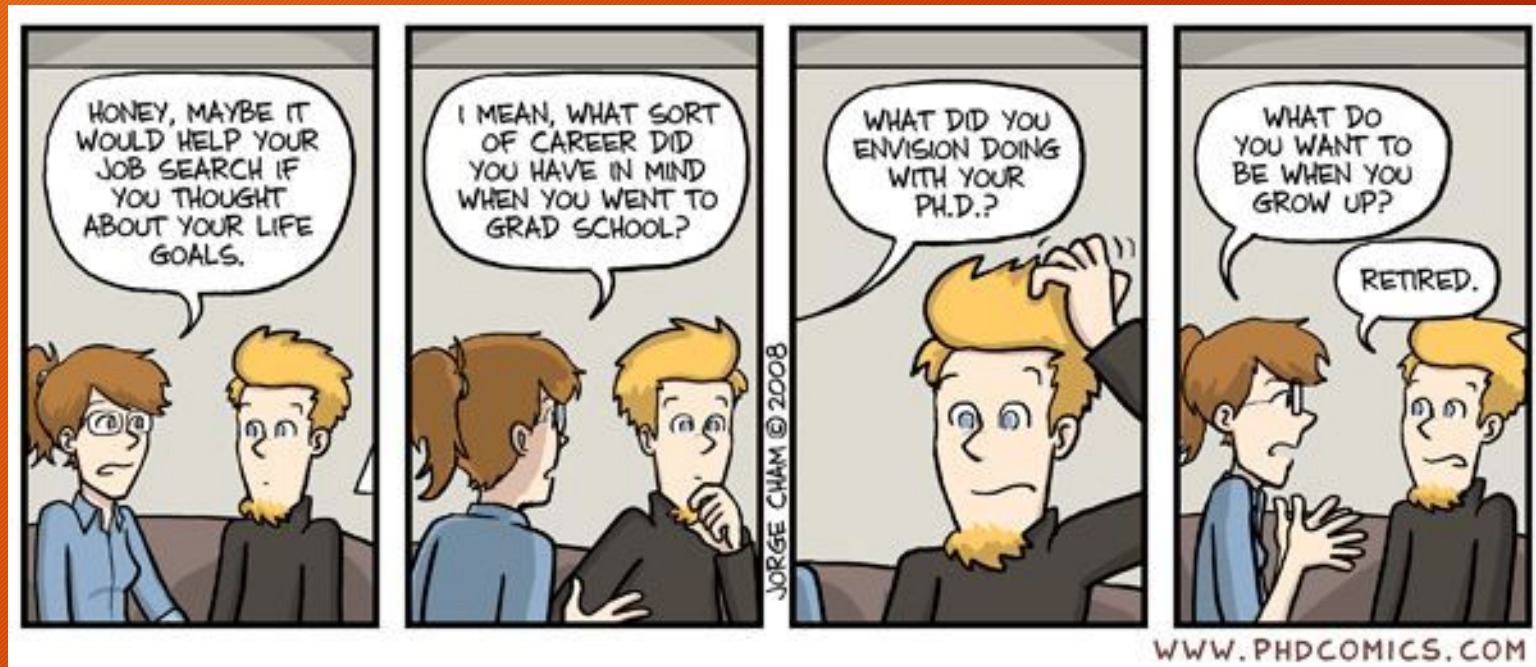


# Pathology Deep Learning System (PDLS)



# Myths about the AI job search

26



# Myth 1: “I’m at a disadvantage compared to Computer Scientists...”

1. Most computer scientists don’t have experience with real data. (Don’t underestimate this...)
2. Physicists & astronomers often have to self-teach a wide variety of skills. (Programming, electronics, statistics, etc.)
3. Core qualities of successful AI scientists include:
  - A knack for critical thinking and a passion for problem solving
  - Attention to detail in order to discover nuances in data
  - Excellent communication skills to explain technical findings to non-technical business partners and great collaborative spirit
  - Business acumen to understand non-technical challenges and perspectives



## Myth 2: “I like the freedom of Academia. I won’t fit in a corporate-structured environment ”

- In Academia - you have the freedom to pursue only what your grant says you can pursue
- Some scientists are concerned they’ll surrender the joy of learning something new at an industry job.
  - AI changes so rapidly, you need to keep learning in order to perform well.
  - “Retrospectives” for project deep dives, similar to academic lab meetings
  - Journal Clubs
  - Many companies have “Learn@work” programs
- Corporate Culture varies wildly, even in big companies - it can depend on your team in a place like Microsoft, LinkedIn, Meta.
- Startups have an “elastic” culture/environment you can help shape.



## Myth 3: “I want to make a positive impact - making money for a company seems like a conflict of interest”

- OpenAI, inventor of GPT-3 language model, began as a non-profit
- Government Agencies. (Largely Healthcare & Defense)
- Healthcare, hospital operations. (Healthcare companies, consulting, local hospitals.)
- Education
- White House’s “AI roadmap”:  
[https://www.whitehouse.gov/sites/default/files/whitehouse\\_files/microsites/ostp/NSTC/preparing\\_for\\_the\\_future\\_of\\_ai.pdf](https://www.whitehouse.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf)



# Myth 4: “The GAFAM Giants Rule Everything”

30

Google

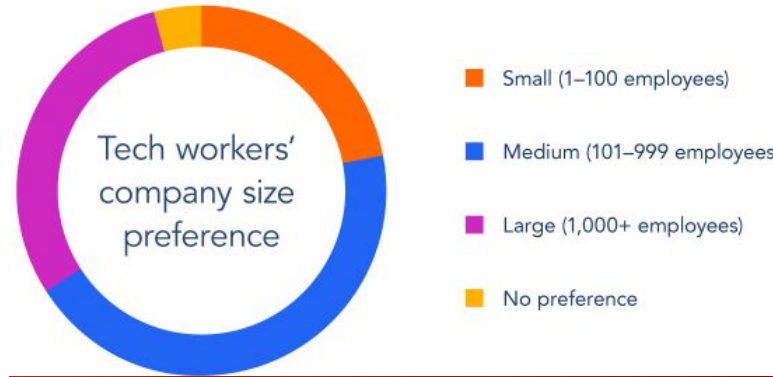
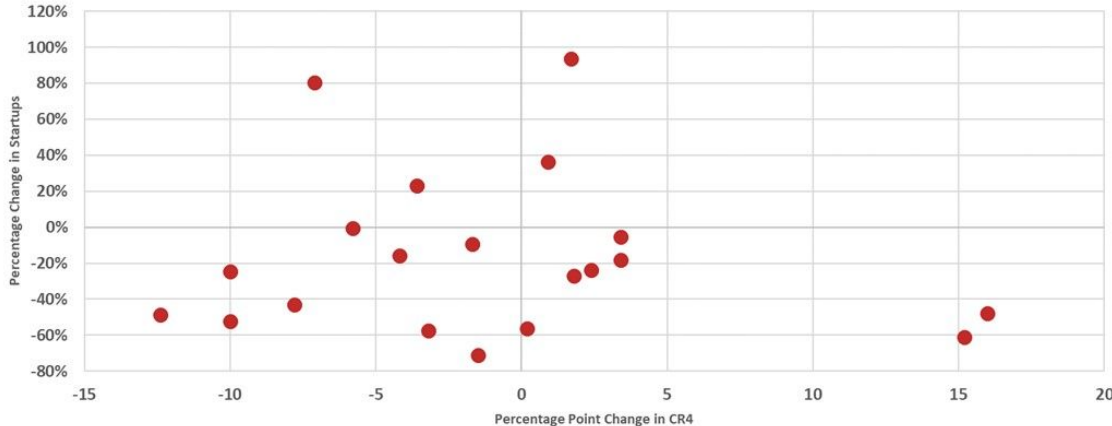
Apple

facebook

amazon

Microsoft

Percentage Point Change in CR4 to Percentage Change in Startups in the High-Tech Sectors: 2002-2017



# Ok, but what is an AI Job in industry actually like?

31



**Yann LeCun**

@ylecun



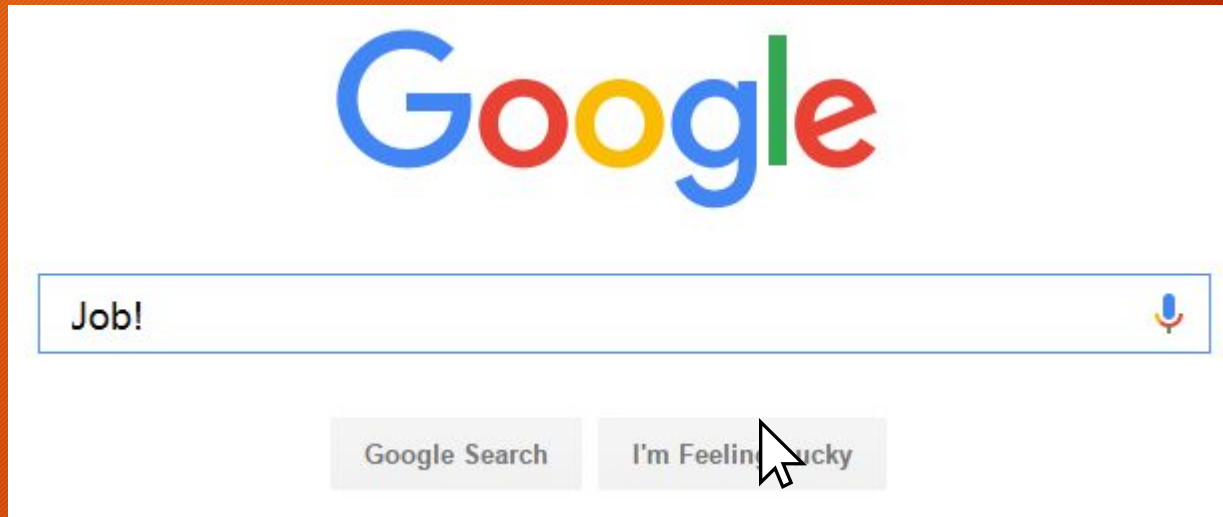
Scientist at startup= demos, product development, fighting for survival.

Scientist in engineering division of large firm= product development.

Scientist at industry research lab= research, technology transfer.

Your mileage may vary.

# Lessons learned from my industry job search





# Lesson #1: Show that you “*want it*”

33

1. Put effort into your resume.
  - A Resume is NOT a CV. One page, maximum.
2. Show some understanding of the company and their area
3. Network. It's important.
  - Stay in touch with your friends/colleagues
  - Take advantage of career services
  - Meetups can be useful - many companies use meetups for recruiting
  - Professional Social networking (like LinkedIn) has worked for people
4. A personal portfolio of relevant example work (for example on GitHub) shows that you're serious
  - This used to not be true, but demonstrating at least Machine Learning foundations is currently important to break in to the field.

## Lesson #2: Fill in gaps in skills and nomenclature

34

- Python is the default programming language in the field
- Learn about Neural Networks
  - Jeremy Howard's free fast.ai course is excellent - <https://www.fast.ai/>
  - Kirill Eremenko's [Udemy](#) course
  - Andrew Ng's [Coursera](#) course
  - For the data scientists among you, Stanford's online ML course is good <https://www.coursera.org/learn/machine-learning>
- **PyTorch** and **Tensorflow** are the two primary deep learning frameworks
  - PyTorch is more common, but both are valuable
- Depending on the role, some software engineering knowledge (particularly around cloud computing and containerization) would be very helpful

# Lesson #3: Draw parallels between academic work and industry work

35

- **Interviewing** is a skill
  - Live virtual coding challenges
  - Solution whiteboarding the final interview stage
  - <https://github.com/yangshun/tech-interview-handbook>
- **Connect** work and skills to job description
- **Demonstrate** that you
  1. Are intelligent, can work independently, and self teach
  2. Can solve a business problem quickly

# Lesson #4: What kind of company are you looking for?

*What is your priority?*



Corporate Culture



Benefits & Lifestyle



Cutting Edge Tech



Domain Expertise

# Lesson #5: Your first industry job will not be your last...

- Industry will be a new experience
  - Some folks would find the transition easy, others challenging
  - It's ok to not be fully clear about the pros and cons of different companies and opportunities
- The right manager and/or team can make the transition easier
  - Industry is more about the way of working, thinking, and style than it is about specific tasks
- Job transitions are extremely common and expected
- Your first job will give you a baseline to analyze pros and cons, your next position will be a lot easier

Thank You!