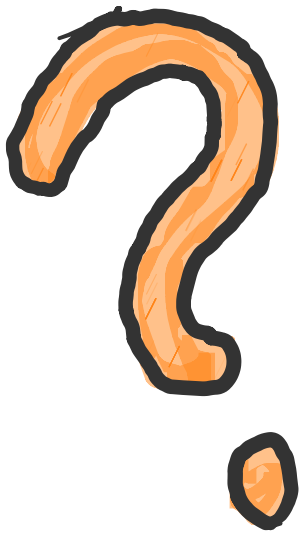
Introduction

The BUZZ words



Data Science

Artificial Intelligence

Machine Learning

Neural Networks (Deep Learning)

Data Science

- Interdisciplinary field concerning Data
- Almost anything to do with Data:

  (e.g.) Data Pipelining, Data Munging, Data Analysis, EDA…
- Includes Soft or Hard science, Small or Big data
- On the Job, Data Scientists do…

What does a Data Scientist do?

Data Scientists are responsible for the collection, cleaning and munging of data to meet the company's purpose. Duties vary according to the industry and may include experimental frameworks for product development and machine learning with the aim to lay a strong data foundation for robust analytics to be performed.

source: indeed.com

Artificial Intelligence

- One of the oldest and core subjects in CS
- About Problem-solving with Intelligence
- Theoretical and Practical
- On the Job, AI engineers/experts need skills..

Math and programming skills, Problem-solving skills, Machine learning....

and work on...

Build and deploy an AI system, build ML models, NLP, Robotics, Computer Vision...

Machine Learning

- About various statistical models and learning algorithms and training from Data
- Supervised/Unsupervised Learning
- Subfield of Artificial Intelligence
- Modern version of Statistical Learning
- On the Job, ML engineers do..

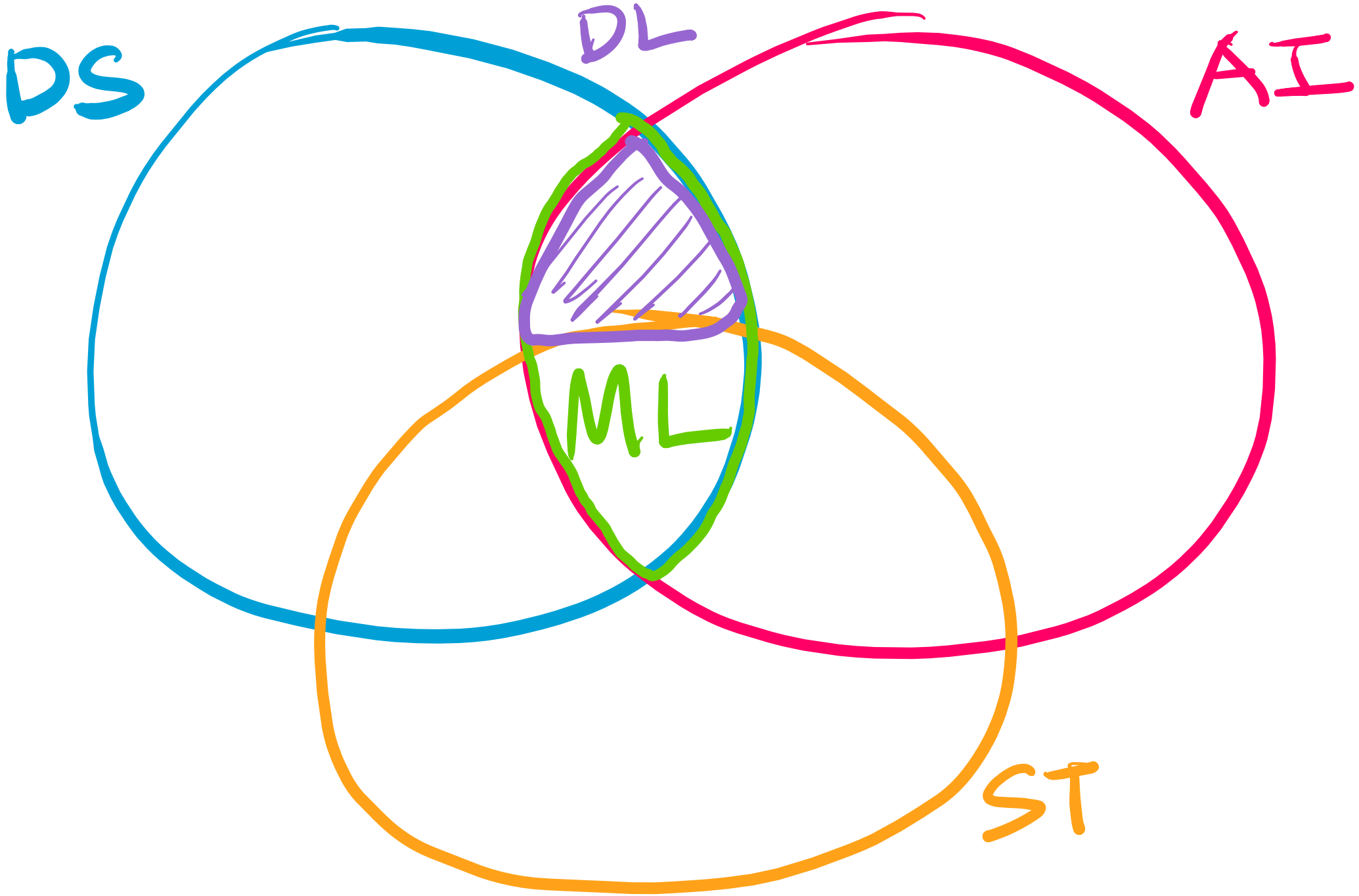
  Develop and test ML models, Design ML experiments, build ML system….

Deep Learning

- About Neural Network models, model training from Data, and all kinds of training techniques
- Subfield of Artificial Intelligence
- Subfield of Machine Learning
- On the Job, DL engineers do..

Solving complex technical challenges in various areas of deep learning such as object detection, segmentation, video understanding, sequence prediction, adaptive computing, memory networks, reduced precision training and inference, graph compilers, reinforcement learning, search distributed and federated training, and more

source: NVIDIA

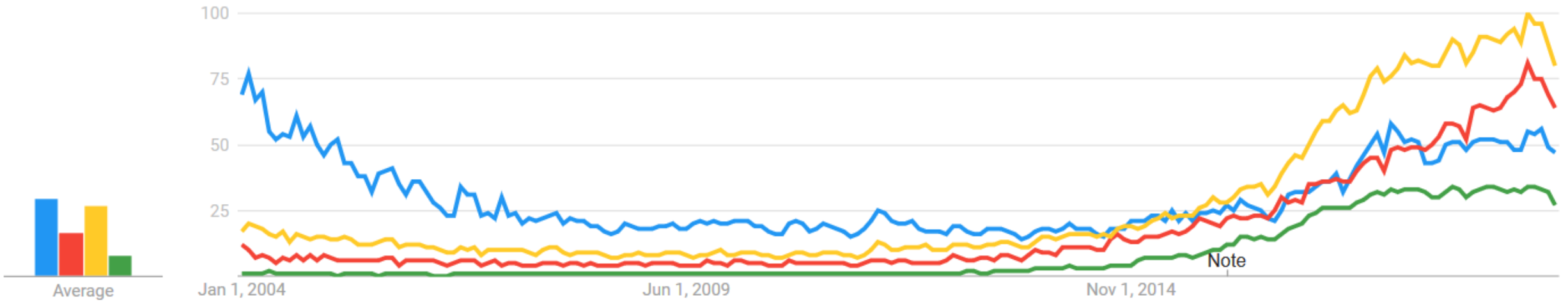

DS
DL
AI
ML
ST

Google Trend by Search Term

Artificial intelligence	Data Science	Machine learning	Deep learning	+
Search term	Search term	Search term	Search term	

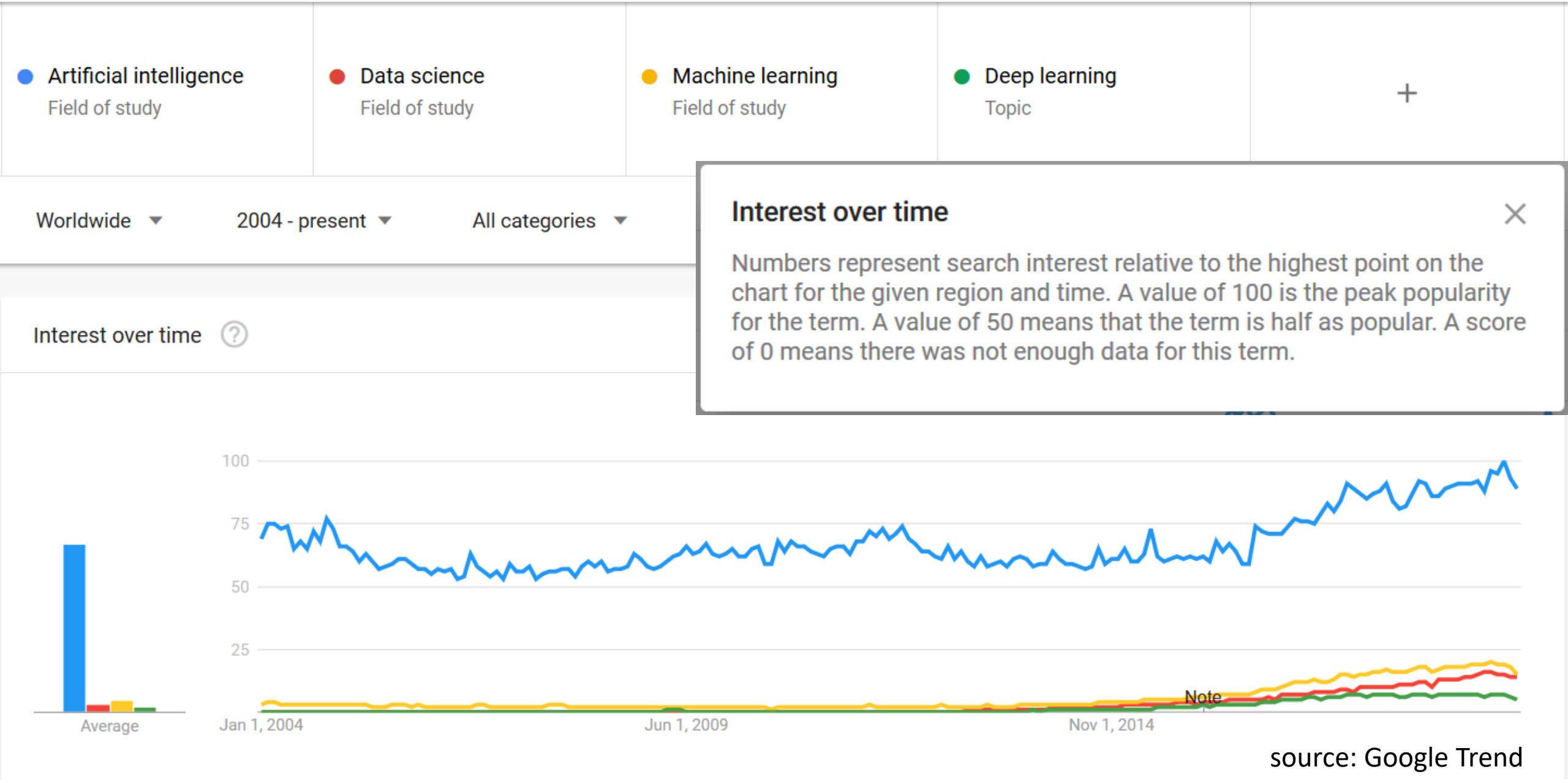
Worldwide ▾ 2004 - present ▾ All categories ▾ Web Search ▾

Interest over time

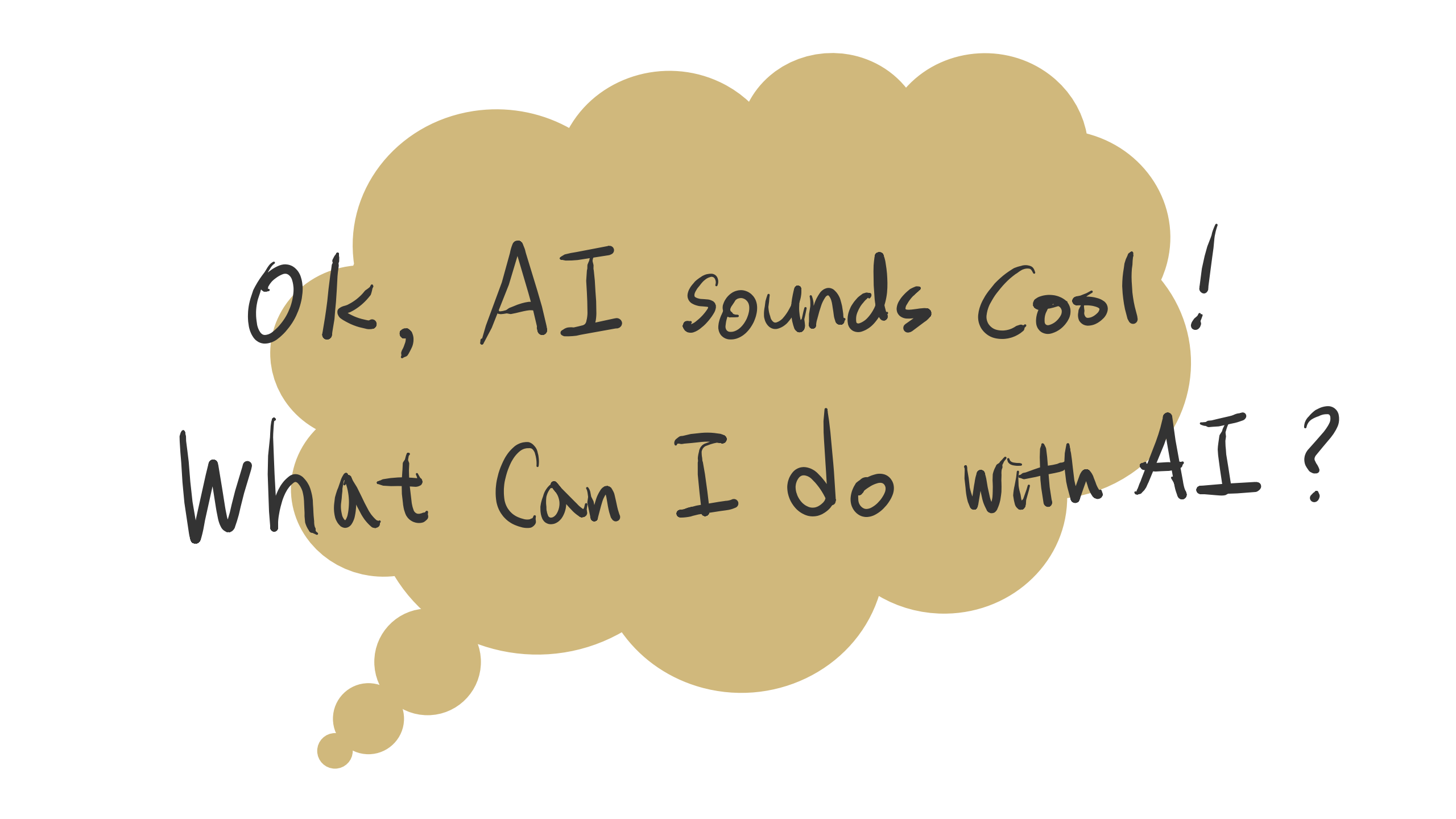


source: Google Trend

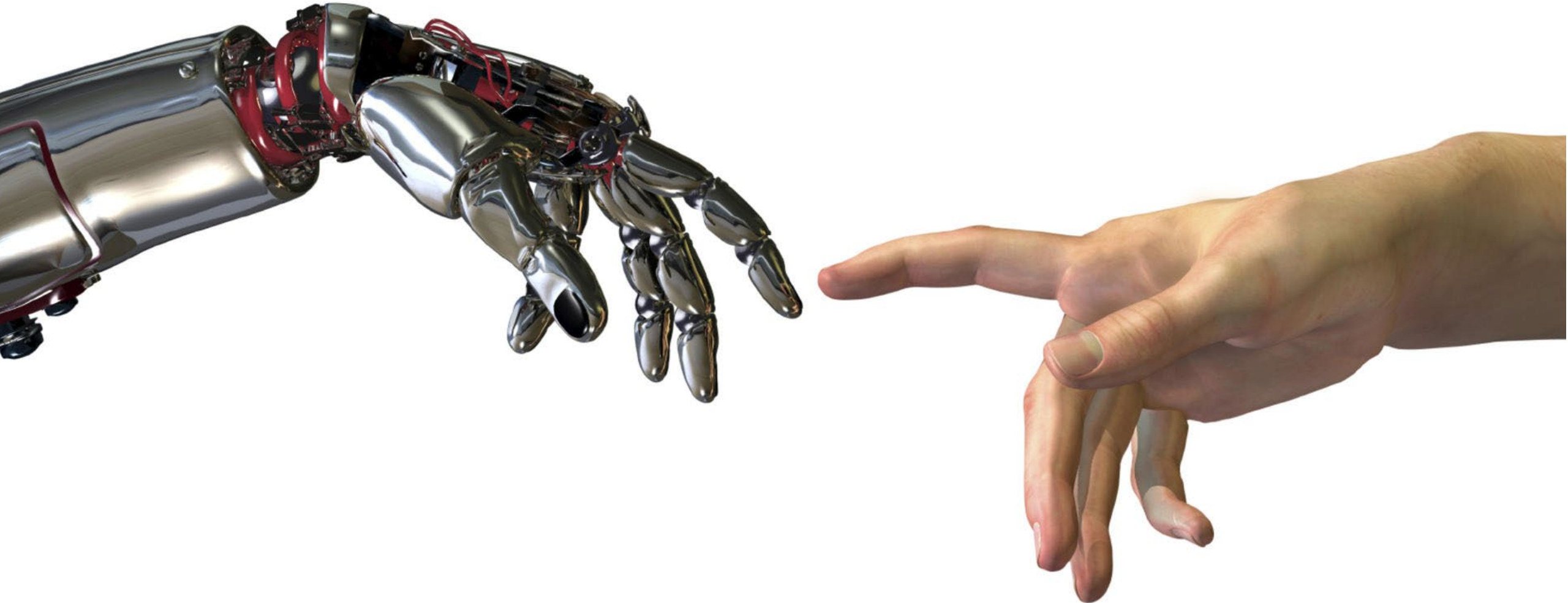
Google Trend by Field of Study



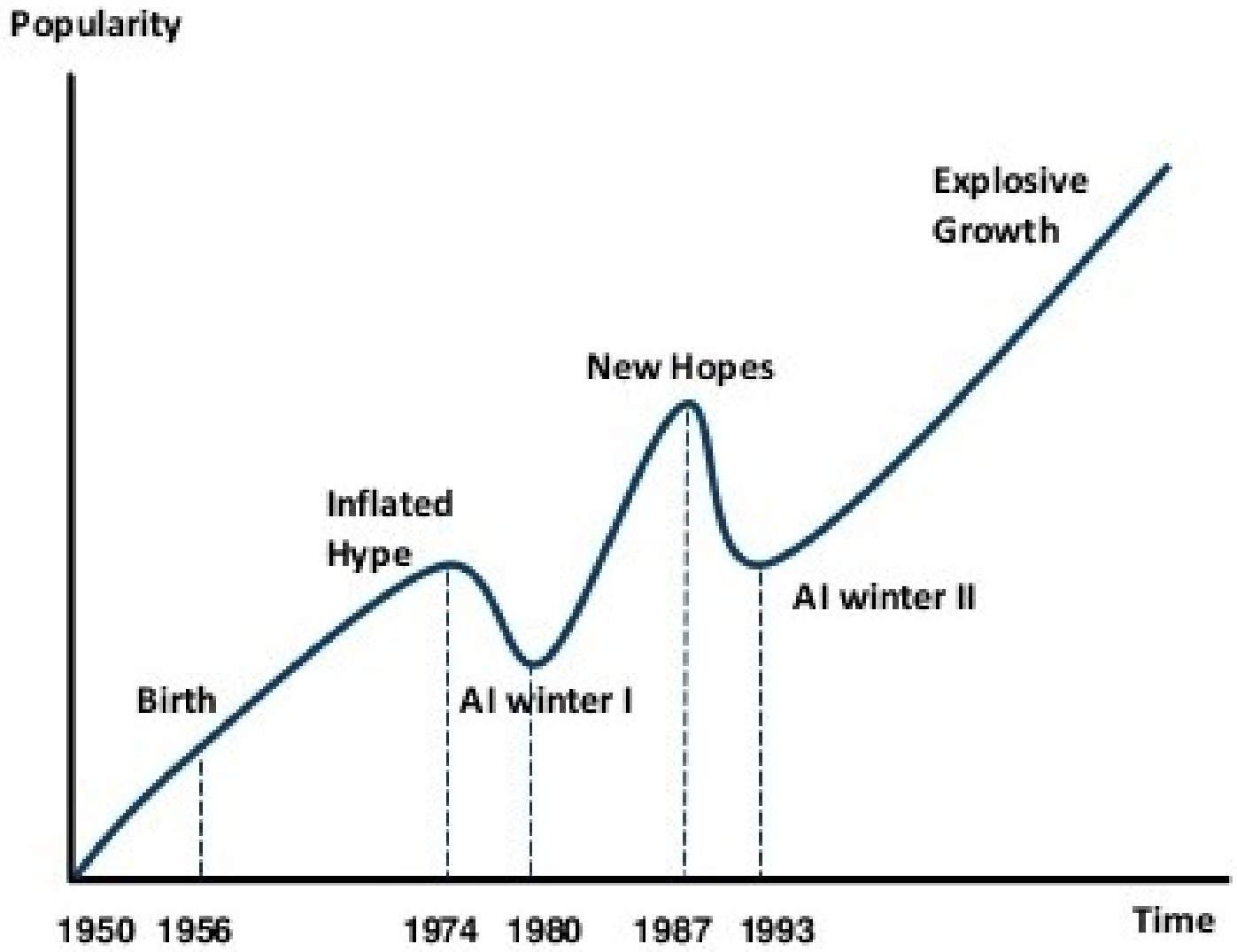
source: Google Trend


Ok, AI sounds Cool!
What Can I do with AI?

Are we there yet ?

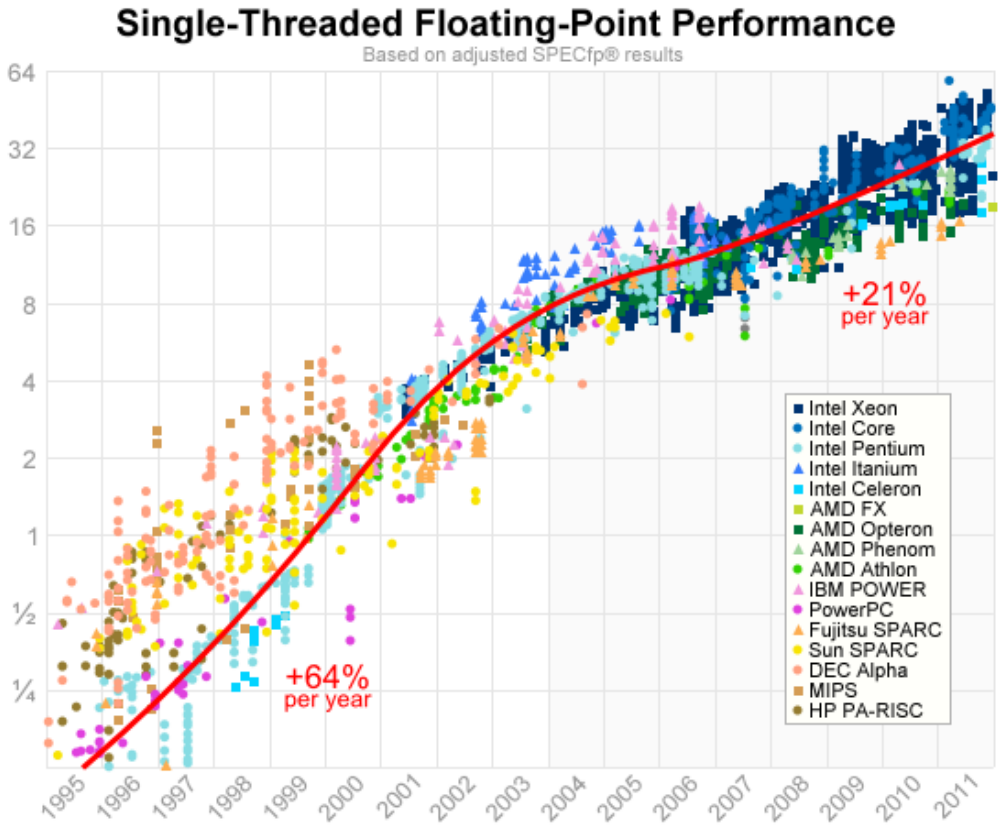


AI HAS A LONG HISTORY OF BEING "THE NEXT BIG THING"…



Timeline of AI Development

- **1950s-1960s**: First AI boom - the age of reasoning, prototype AI developed
- **1970s**: AI winter I
- **1980s-1990s**: Second AI boom: the age of Knowledge representation (appearance of expert systems capable of reproducing human decision-making)
- **1990s**: AI winter II
- **1997**: Deep Blue beats Gary Kasparov
- **2006**: University of Toronto develops Deep Learning
- **2011**: IBM's Watson won Jeopardy
- **2016**: Go software based on Deep Learning beats world's champions


Single-Threaded Floating-Point Performance
Based on adjusted SPECfp® results
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32
16
8
4
2
1
½
¼
+21%
per year
+64%
per year
Intel Xeon
Intel Core
Intel Pentium
Intel Itanium
Intel Celeron
AMD FX
AMD Opteron
AMD Phenom
AMD Athlon
IBM POWER
PowerPC
Fujitsu SPARC
Sun SPARC
DEC Alpha
MIPS
HP PA-RISC
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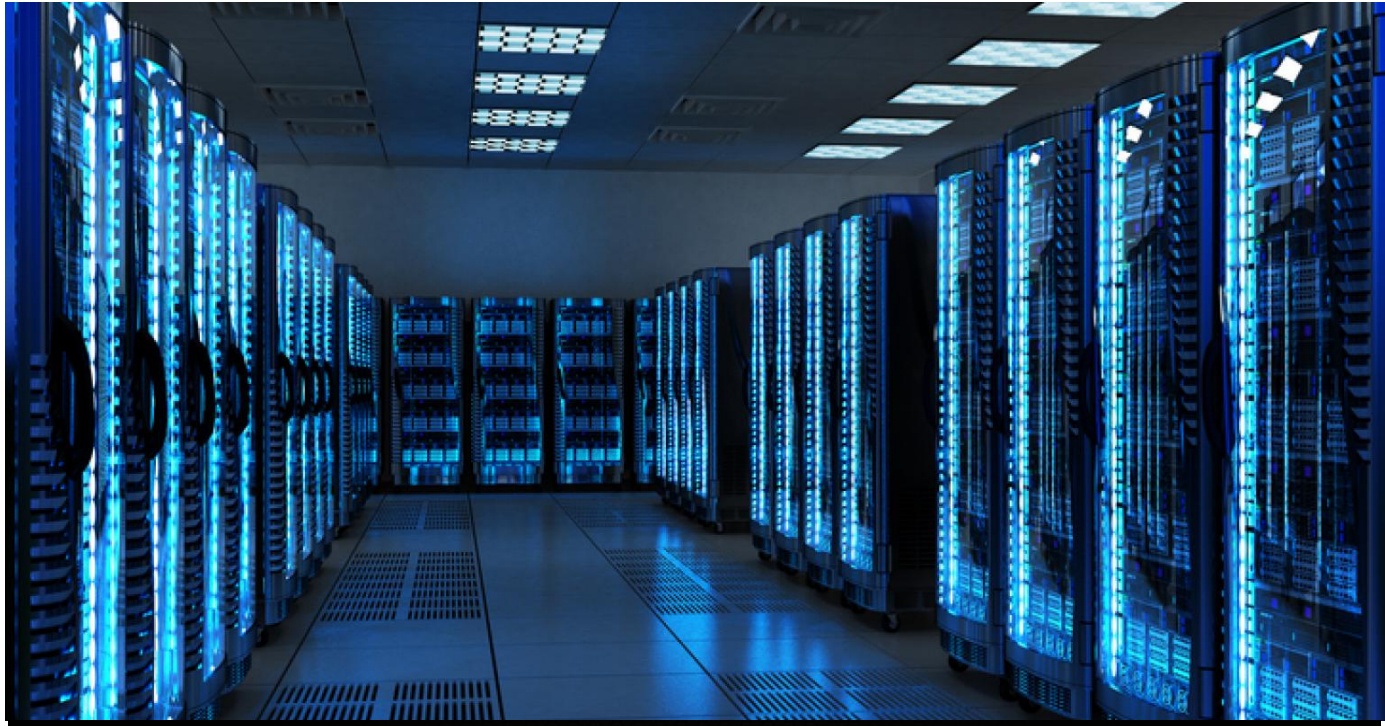

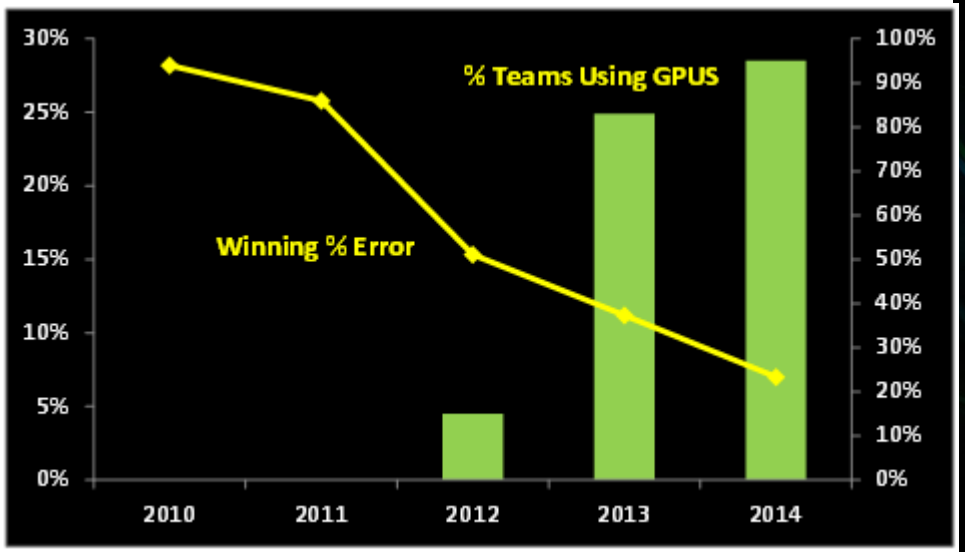
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2010
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2012
2013
2014

Titan X
VS
GTX 980
VS
Tesla M40
VS
Tesla K80
TITAN
GEFORCE GTX
GTX 980
TESLA

Course Overview

This Course is About…

- Survey of AI problems
  - Problem Formulation
- Problem-solving, Algorithms
  - Algorithm Analysis
- Implementation