Introduction to CS & AI

Tao LIN

September 2, 2024

1. General Introduction

2. Introduction to AI
   - AI History
   - How to Become a Good AI Researcher

Table of Contents

Indeed “introduction to CS & AI” DOES NOT indicate that

we will go through all basic CS & AI materials step-by-step in this course!

If you are still unfamiliar with

[1] https://inst.eecs.berkeley.edu/~cs61a/sp22/
[2] https://sp23.datastructur.es/
[3] https://cs61c.org/fa23/

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- (Even) UC Berkeley, CS 61C: Great Ideas in Computer Architecture (Machine Structures)[3].

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Build your research weapons and wheels

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Classes teach you all about advanced topics within CS, from operating systems to machine learning, but there's one critical subject that's rarely covered, and is instead left to students to figure out on their own: proficiency with their tools. We'll teach you how to master the command-line, use a powerful text editor, use fancy features of version control systems, and much more!

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Advanced CS: System, Theory, and AI

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Dive into AI

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  3. In contrast to strong AI, **weak AI** is any program that is designed to solve exactly one problem.

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Underwhelming Results:

The report by the Automatic Language Processing Advisory Committee (ALPAC) in 1966 resulted in the government funding cut for Machine Translation (MT), causing the first AI winter.

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- AI industry boosts: from a few million dollars in 1980 to about two billion dollars in 1988.

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- End of symbolic AI domination for multiple decades.

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- The history of neural AI dates back to 1943.

Inspiration from Neuroscience

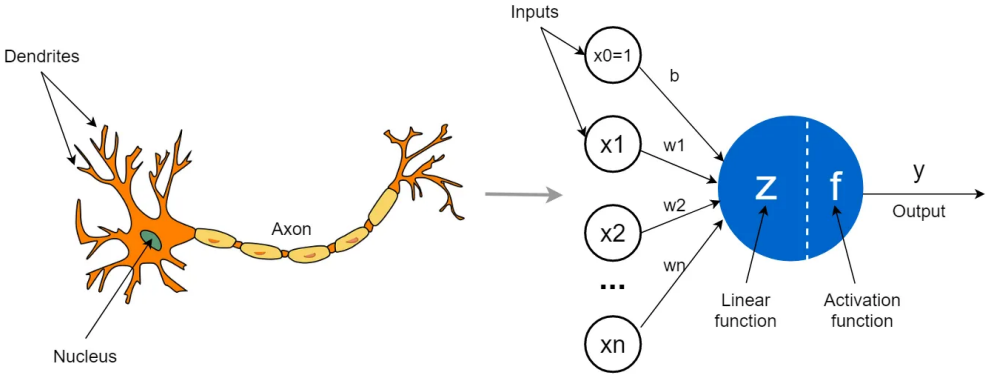

Figure: Human neurons (left) and artificial neurons in ANN (right). Image from towardsdatascience.com.

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- Many (2022):

  large language model and generative pre-trained transformer (GPT)
  greatly improve the performance of the generative model. e.g. ChatGPT, GPT-4.

Ideas from Outside AI: Algebra and Statistics

- Carl F. Gauss (1801): linear regression.
- Ronald Fisher (1936): linear classification.
- Richard Bellman (1953): dynamic programming, Markov decision processes.
- Judea Pearl (1985): Bayesian networks.
- Corinna Cortes & Vladimir Vapnik (1995): support vector machine (SVM).

AI is Multi-disciplinary

- Mathematics (Algebra & Statistics)
- Optimization
- Neuroscience
- Computer Software
- Computer System

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- Practice these skills and make steady progress in your research

Thanks & Question Time!