CSCI 101
Connecting with Computer Science
# Lecture 1: Introduction

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Overview

- Focus: Introduction to CS

- Architecture: Chat

- Core Ideas:

  1. What is Computer Science? What are the other stuff that you thought were CS?

  2. Roadmap to CS: A Systematic Overview

What is Computer Science?

- IT: Information Technology

- Computer Engineering

- Software Engineering

- Data Science; Data Analysis

- Artificial Intelligence

- Cloud Computing

P1 CS

Concept
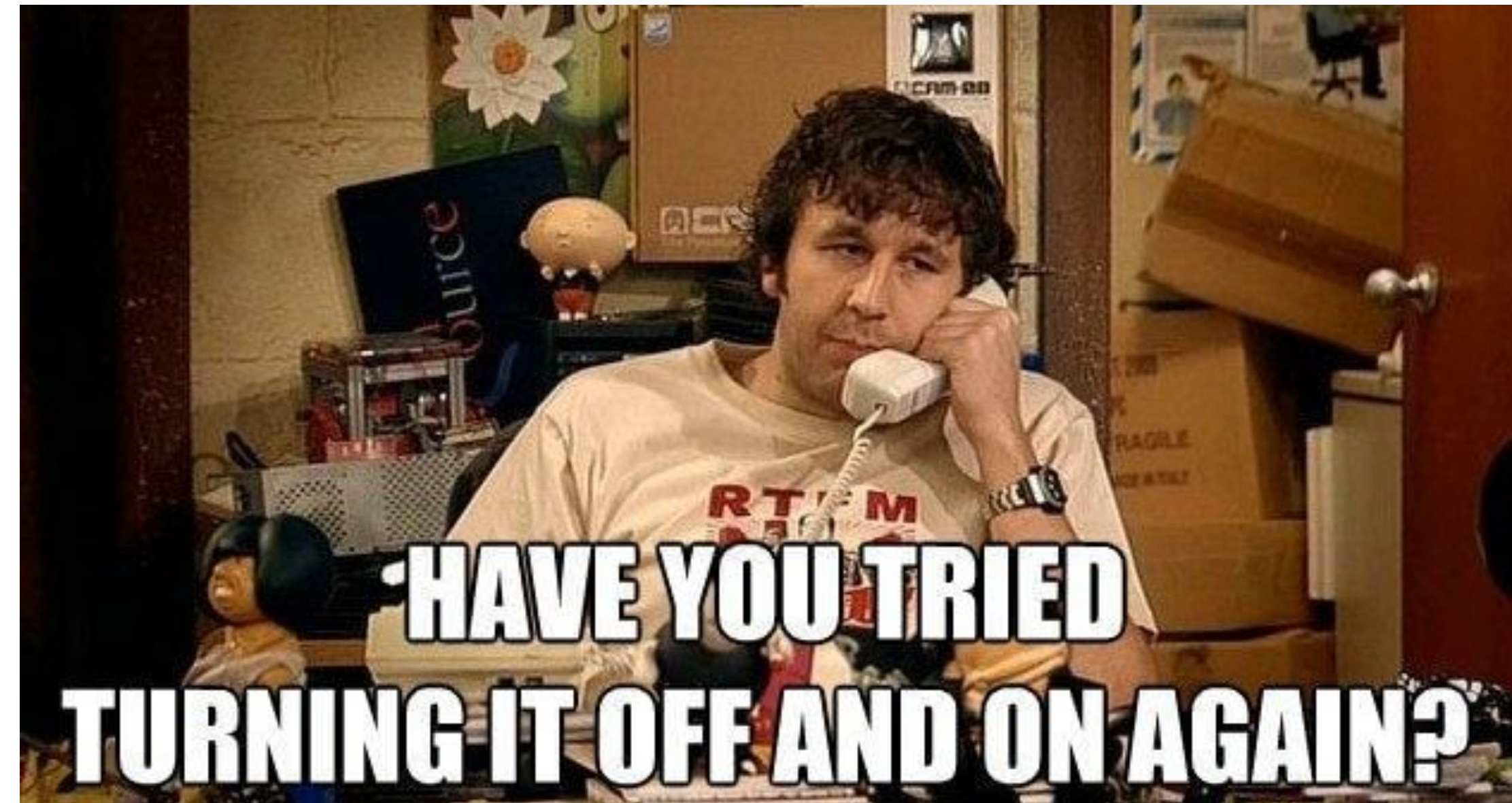
What is Science?

- Discovering the way the physical world works (e.g. Laws of Gravity)

- Scientific

  - Verifiability: a theory can stand field tests

  - Consistency: the same test when repeated gives consistent results

- Empirical

  - Theory are supported by empirical experiment

Concept

What is Engineering?

- Practical knowledge transforming scientific theories into products

  - "Without engineers, science is just philosophy."

Information Technology

- Equivalent to Computer Science

  - Anything that has anything to do with information processing using non-human labour (basically, computing machinery)

Computer Engineering

- Subset of CS/IT

  - More about hardware design

  - e.g. Embedded system, Networking equipment, Scientific/High-Performance Design, Multimedia hardware chips

Concept

Software Engineering

- Subset of CS/IT

  - Vast majority of IT professionals

    - Developing software required by customers/project managers

  - Systematic design of complex software systems

Data Science/Analysis

- Subset mostly Math (Statistics) and CS/IT

  - NOT Science: there is no science of data

    - DA is more on the Engineering side

- Use computer as tools, try to statistically analyse the data

  - e.g. How many people visited amazon.ca after Googling the term 'Refrigerator'?

  - e.g. "60% probability of 10% profit increase if we invest 100K on XXX advertising"

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Artificial Intelligence

- Subset of mostly Math (Statistics) and CS/IT

  - Pure empirical: we don't have very good theories of why it works

    - or why it doesn't work: lack of verifiability

Cloud Computing

- Subset of CS/IT

  - Stuff that you used to do on your own computer is now done by Amazon/Google/Microsoft online

  - You just see the results and interact with their servers

  - Engineering: a complicated hardware/software design problem

  - Science: optimisation, optimisation, optimisation

Concept

Roadmap to CS

- You are (or considering) majoring in CS (B.Sc), now what?

  - First two years of study: Basic of CS

    - Python, C/C++, Software Engineering Theories, OOP, Logical Circuits and Computer Organisation, algorithms and data structures, etc.

  - Last 2 years of B.Sc: Pinpoint your interest, develop in-depth professional skills

    - SE, Cloud, Communications, Hardware, Graphics, AI, Network, Robotics, etc.

Concept

Roadmap to CS

- Columbia College (or first 2 years)

  - CSCI 101: fun

  - CSCI 120, CSCI 125: Python, C/C++. Basic programming skills

  - CSCI 150, CSCI 250, CSCI 295: Computer Hardware. How Computers work

  - CSCI 165: Internet

  - CSCI 225: Data Structure and Programming: algorithms

  - CSCI 237: CS for business students

  - CSCI 275: Basic Software Engineering stuff

Concept

Roadmap to CS

- University (or last 2 years of B.Sc)

  - Advanced Algorithms, Operating System. Database System, Advanced Networks

Artificial Intelligence	Computer Graphics	Computing Systems	Information Systems	Software Engineer	Theoretical CS
Vision	UI Design	Memory	Cloud Computing	Programming Lang	Cryptography
Language	Graphics Engine	CPU	Database	Software Testing	Computability
Signal	Multimedia	Networks	Web Applications	Requirement	Complexity
Machine Learning	Animation	Distributed Sys.	Search Engine	Verification	Security
Reasoning	VR	Embedded Sys.	Data Mining		

Concept