What is Computer Science?

Sofya Aksenyuk, 150284.

Main question

Is it a research-scientific discipline or a technical/engineering activity?

Based on

*"Scientific Methods in Computer Science" by Gordana Dodig Crnkovic

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(https://www.researchgate.net/publication/2563629_Scientific_Methods_in_Computer_Science)

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Science is...

a systematic **study** and **exploration** of the world and its phenomena, aiming to understand, explain and predict how things actually work

Keypoints

1 Systematic

Scientific research is conducted in a systematic way to **ensure reproducible and reliable results**

2 Empirical

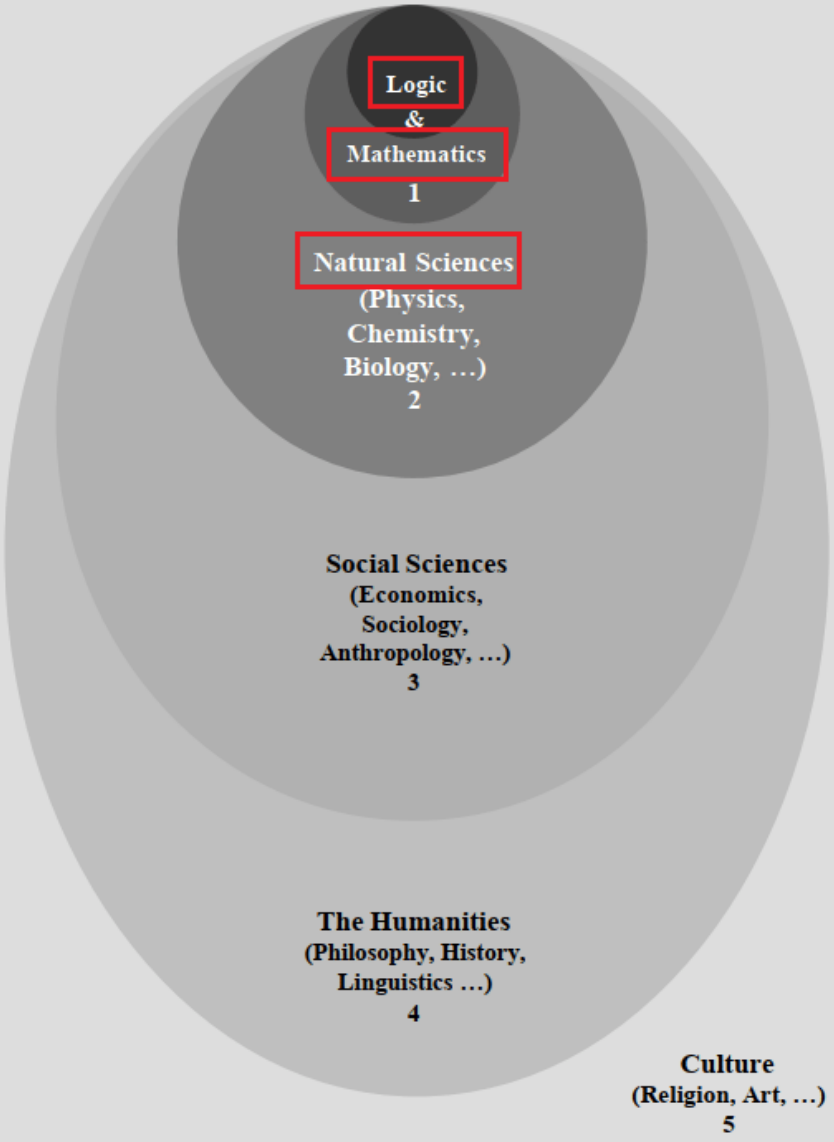
It relies on **empirical evidence** that is collected through observation and experiments

3 Predictive

It uses that evidence to make **predictions** about phenomena and create models to **explain** their behavior

Vastness of Science

- Objective inquiry
- Reliance on evidence
- Openness to revision and improvement based on new observations and discoveries



Interdisciplinary Nature of Computer Science

Computer Science is a field that borrows from and contributes to **many other disciplines**

For instance:

Artificial Intelligence has roots in Logic and Mathematics but uses principles from Physics, Chemistry, Biology, and even Medicine and Psychology

Exemplary Fields of Computer Science

1 Theoretical

Examples: algorithm design, computational complexity, logic of relational databases, concurrency programing, cryptography, etc

2 Experimental

Examples: Artificial Intelligence, computer graphics and computer vision, hardware architecture, etc

Distinctive Features

Research-scientific

- **Problem-solving:** Explore complex problems, introduce new algorithms, etc
- **Theory building:** Use the traditions of Logic and Mathematics to explore complex systems and phenomena, build theories as logical systems
- **Advanced Research:** Design concepts for Quantum Computing, AI, Neural Networks, etc

Technical/Engineering

- **Problem-solving:** Build intelligent systems
- **Development:** Create hardware/software
- **Versatility:** Experiment in different fields (search, automatic theorem proving, planning, NP-complete problems, NLP, CV, games, DL, ML)
- **Conceptual:** Turn theoretical concepts into physical applications

Simulation: Complement theory and experiment. Study phenomena that cannot be replicated in laboratories, such as the evolution of the universe

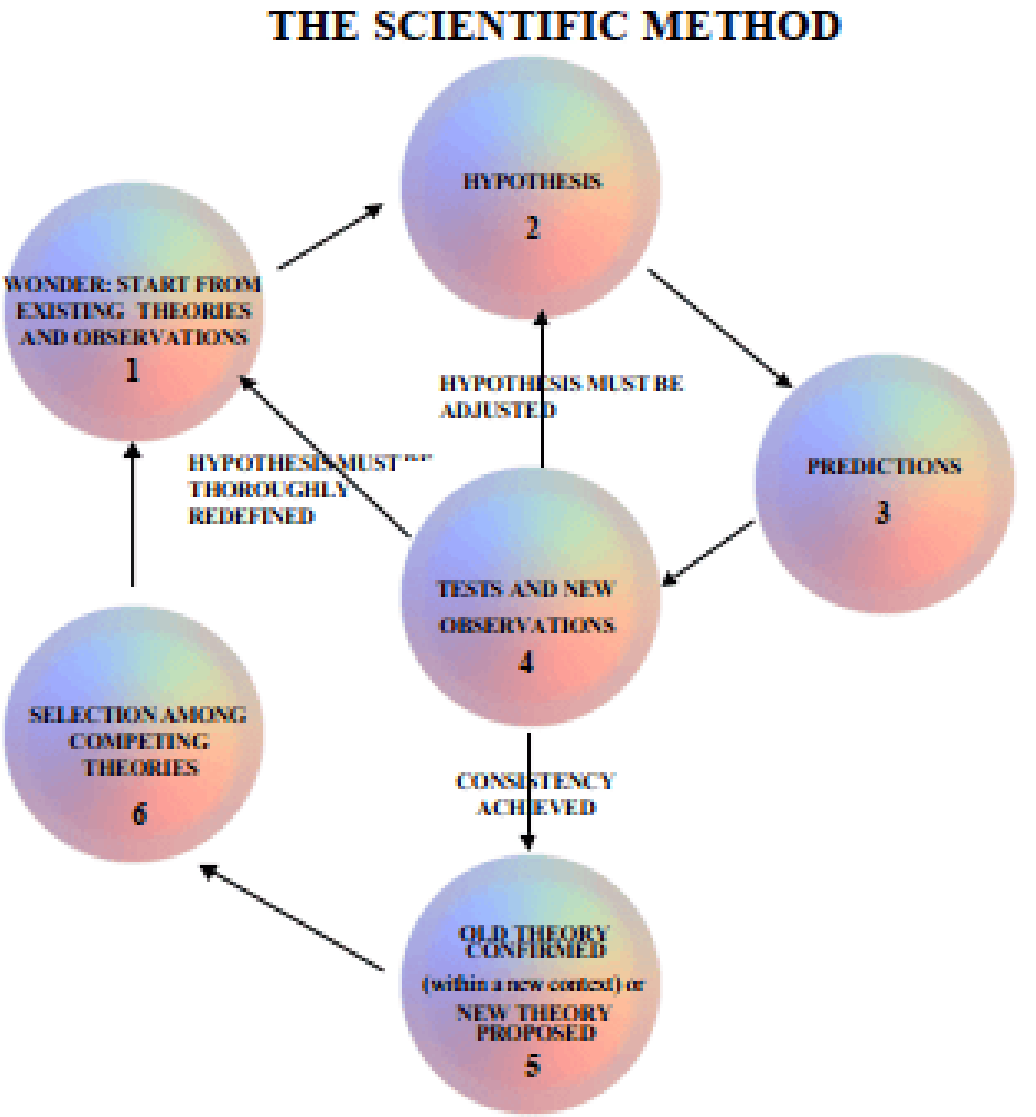
Keywords

Research-scientific

Highly focused on **original research**, innovation, problem-solving, and **theoretical foundations**

Technical/Engineering

Emphasizes **"hands-on"** skills, practical applications, and problem-solving skills



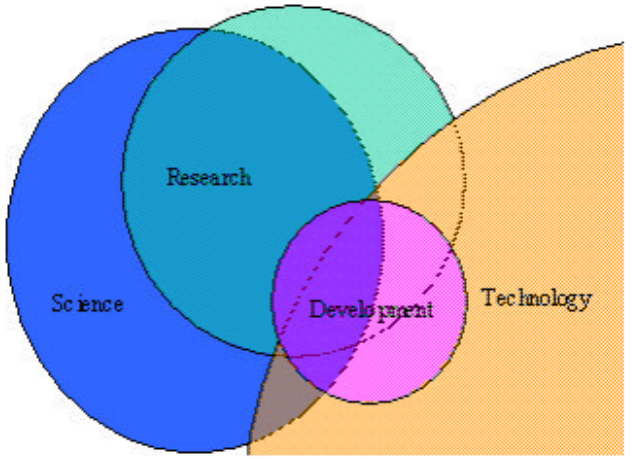
Combination of Science and Technology

Dependency

There is an essential **interplay** between science and technology: all modern sciences are very much **influenced** by technology

Blurring the Lines Between Science and Technology

It allows researchers to **collaborate** across disciplines and develop innovative solutions to complex problems



Conclusion

Computer Science is an exciting field that offers **both** research-scientific and technical/engineering perspectives:

Its theoretical aspects are scientific, based on Logic and Mathematics, while its experimental and applied aspects lean towards engineering

Thank you!