

# What is Computer Science?

Zdravko Markov

<http://www.cs.ccsu.edu/~markov/>

# *Computer Science requires true skill* 😊

*To err is human, but to really foul things up  
requires a computer.*

Murphy's Technology Law #14

*Corollary: Computer Science is the science of  
fouling things up.*

*Perfection is perfectly simple; fouling things up  
requires true skill.*

Doug Horton

*Corollary: Computer Science requires true skill.*

# The Discipline of Computer Science

*Computer science* is a discipline that spans theory and practice, that is *computation (information processing)* and *problem solving* by using computers.

*Computer science* has strong connections to other disciplines. Many problems in *science, engineering, health care, business*, and other areas can be solved effectively with computers. Thus, computer scientists often become proficient in other subjects.

# Computer Science Areas

- Computer architecture
- Software systems
- Computer graphics
- Artificial intelligence (*Machine learning*)
- Computational science
- Software engineering

# *Computer Science* is practiced by mathematicians, scientists and engineers

- *Mathematics*, the origins of Computer Science, provides reason and logic.
- *Science* provides the methodology for learning and refinement.
- *Engineering* provides the techniques for building hardware and software.

# Computer Science is Fun

Finally, and most importantly, computer scientists are computer scientists because *it is fun*. (Not to mention lucrative career opportunities!)

Peter Denning, CACM, April 2005/Vol. 48, No. 4,  
"Is Computer Science Science?"

<http://www.cs.mtu.edu/~john/jenning.pdf>

# Machine Learning

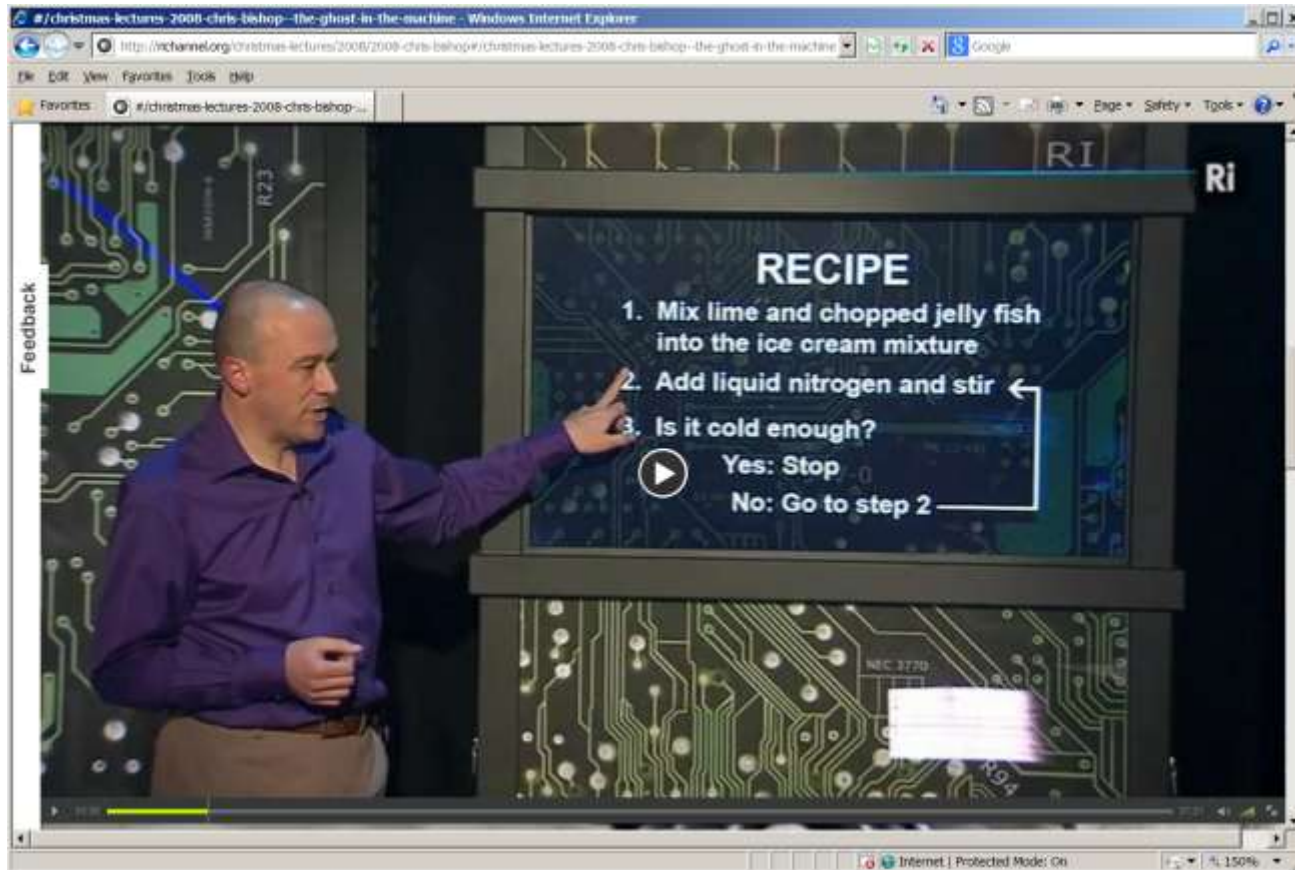
If a computer system - brilliantly designed, engineered and implemented - cannot learn not to repeat its mistakes, it is not as intelligent as a worm or a sea anemone or a kitten.

Find a bug in a program, and fix it, and the program will work today. Show the program how to find and fix a bug, and the program will work forever.

The field of Machine Learning seeks to answer the question *“How can we build computer systems that automatically improve with experience, and what are the fundamental laws that govern all learning processes?”*

# Algorithm (Software)

*A computational recipe to accomplish a task.*



Chris Bishop - The Ghost in the Machine

<http://richannel.org/christmas-lectures/2008/2008-chris-bishop#/christmas-lectures-2008-chris-bishop--the-ghost-in-the-machine>



# Hot (Fun) Topics in Computer Science

A web crawler (The Web)

<http://www.cs.ccsu.edu/~markov/demos/websphinx.jar>

IBM Watson (Artificial Intelligence)

<http://www.ibm.com/innovation/us/watson/>

<http://www.youtube.com/watch?v=o6oS64Bpx0g>

Artificial Intelligence (Udacity)

<https://www.udacity.com/course/cs271>

Augmented Reality (Google Glass)

<http://www.youtube.com/watch?v=9c6W4CCU9M4>

<https://plus.google.com/+projectglass/posts>

Robotics (Udacity course, Google, Stanford)

<https://www.udacity.com/course/cs373>

<http://www.youtube.com/watch?v=cdgQpa1pUUE>

<http://www.youtube.com/watch?v=BSS0MZvoltw>

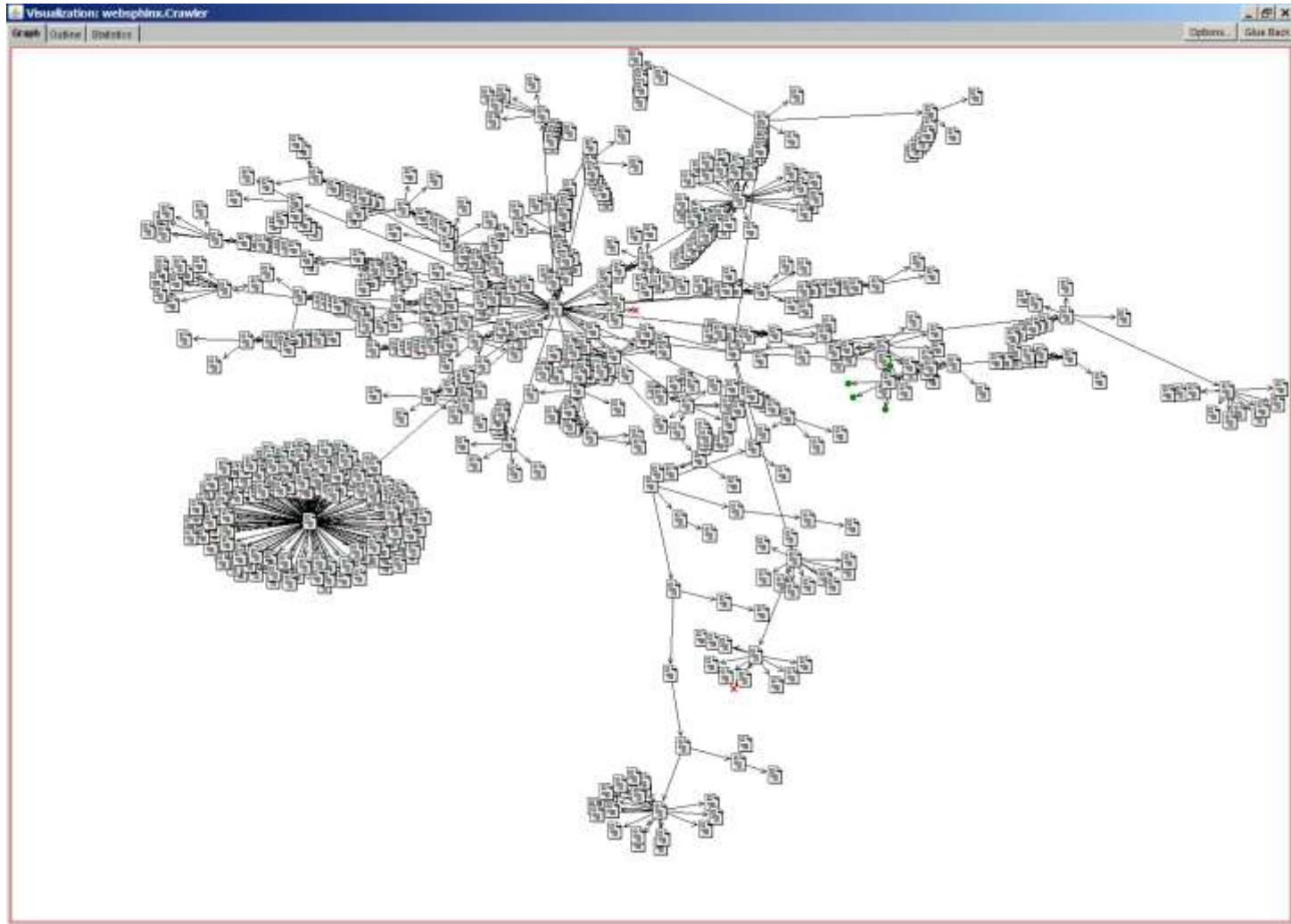
Human Connectome Project

<http://www.humanconnectomeproject.org/>

<http://directorsblog.nih.gov/the-symphony-inside-your-brain/>

# A web crawler (The Web)

15 billion pages + 500 a second



<http://www.cs.ccsu.edu/~markov/demos/websphinx.jar>

# IBM Watson (Artificial Intelligence)



<http://www.ibm.com/innovation/us/watson/>

<http://www.youtube.com/watch?v=o6oS64Bpx0g>

# Artificial Intelligence (Udacity)



The screenshot shows the top banner of the course page. On the left is a stylized head with glowing red eyes. The main title is 'INTRODUCTION TO Artificial Intelligence' in a large, bold font. To the right, it says 'In partnership with STANFORD ENGINEERING'. Below the title is a navigation bar with buttons for 'Course', 'Discussion', 'Progress', 'Information', and 'Profile'.

**The instructors**

 **Sebastian Thun**  
Sebastian Thun is a Research Professor of Computer Science at Stanford University, a Google Fellow, a member of the National Academy of Engineering and the German Academy of Sciences. Thun is best known for his research in robotics and machine learning.

 **Peter Norvig**  
Peter Norvig is Director of Research at Google Inc. He is also a Fellow of the American Association for Artificial Intelligence and the Association for Computing Machinery.

 Unit 0w. 1 Introduction to Introduction  
My name is Sebastian Thun. Hello Peter Norvig.

<https://www.udacity.com/course/cs271>

# Augmented Reality (Google Glass)



<http://www.youtube.com/watch?v=9c6W4CCU9M4>  
<https://plus.google.com/+projectglass/posts>

# Robotics (Google, Stanford)



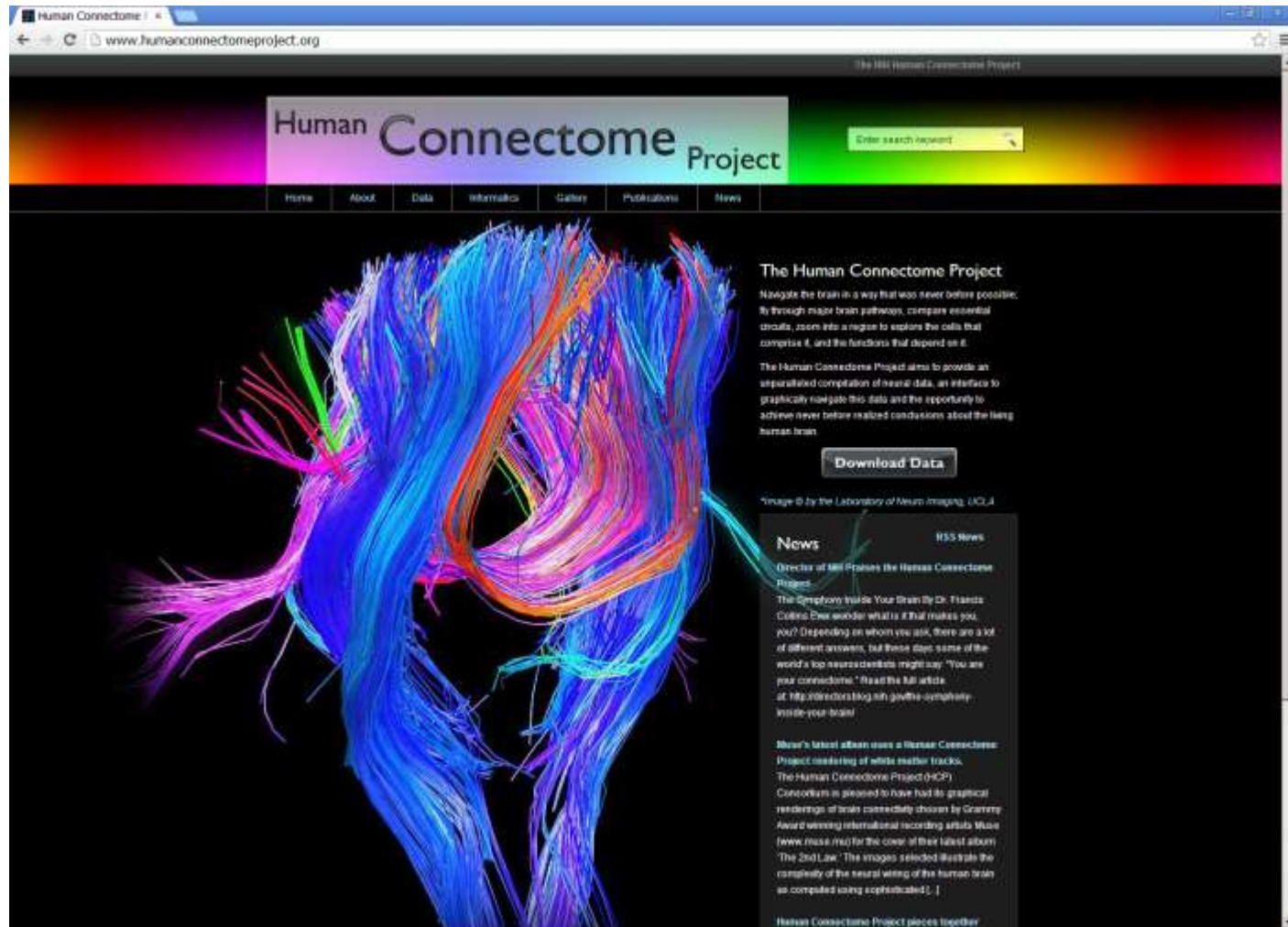
<https://www.udacity.com/course/cs373>

<http://www.youtube.com/watch?v=cdgQpa1pUUE>

<http://www.youtube.com/watch?v=BSS0MZvoltw>

# Human Connectome Project

100 billion neurons, each with about 10,000 connections



<http://www.humanconnectomeproject.org/>

<http://directorsblog.nih.gov/the-symphony-inside-your-brain/>

# Job Outlook

## Computer and Information Technology Occupations

<http://www.bls.gov/ooh/computer-and-information-technology/>

### Average annual salary offer to 2011 grads

(National Association of Colleges and Employers)

1. Chemical engineering - \$66,886
2. *Computer science* - \$63,017
3. Mechanical engineering - \$60,739
4. Electrical/electronics and communications engineering - \$60,646
5. *Computer engineering* - \$60,112
6. Industrial/manufacturing engineering - \$58,549
7. Systems engineering - \$57,497
8. Engineering technology - \$57,176
9. *Information sciences & systems* - \$56,868
10. Business systems networking/ telecommunications - \$56,808