

Artificial Intelligence in the World

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Fromm Institute

Spring Session, 2017

Lecture 5 agenda

- **Finish up Lecture 4 agenda**
 - **Who is doing AI?**
 - Key people in AI – **Fei-Fei Li**
 - **Neural nets** & supervised learning – Andrew Ng
- History 1981 – 1998
- Key application – **speech recognition / speech generation**
- Movies

Who is doing AI? (6)

- **American companies (part a)**
 - **IBM** (*Deep Blue* – chess champion in 1997)
 - **Amazon**
 - Amazon reportedly employs 1,000 people in artificial intelligence.
 - **Apple** (UW / Seattle)
 - Apple CEO says iPhone's future is in AI
 - Apple will open a research and development base in Yokohama, near Tokyo, later this year (2016).
 - Earlier this month (August, 2016), the company reportedly bought Turi, a Seattle-based startup company and the latest purchase in a string of acquisitions aimed at bolstering its machine learning and AI capabilities.
 - **Google** (*DeepMind*)
 - Google X Lab [Fei-Fei Li]
 - **Facebook**
 - “We have incredible people in FAIR who are making significant progress in AI, but to really move the bar it’s equally as important to be outward focused. To push the envelope, push the science and technology forward, we must be actively engaged with the research community. We publish a lot of things we do, distribute a lot of code on open-source, and engage deeply with academia to drive the progress.” — Yann LeCun, Director of AI Research

Who is doing AI? (7)

- **American companies (part b)**
 - **Salesforce**
 - Salesforce Unveils Artificial Intelligence 'Einstein' Service
 - "There is an absolute revolution occurring in artificial intelligence," ... the team has more than 175 data scientists.
 - "Predictive Lead Scoring" to rank which sales leads are most likely to turn into a closed deal.
 - **Microsoft**
 - "We are infusing AI technology into all Microsoft products," AI chief Harry Shum says, and he has plans for **Cortana**, too.
 - **Intel**
 - Intel actively works with the open source community and also offers a variety of libraries and APIs to accelerate AI progress and broaden access to powerful tools.

Who is doing AI? (8)

- **American universities** (too many to show or count)
 - **UC Berkeley** launches Center for Human-Compatible Artificial Intelligence
- ***automobile companies***
 - **Ford** (Argo AI)(Palo Alto research center)
 - **GM** (invested in Lyft, Cruise Automation), Silicon Valley tech center
 - **Chrysler**
 - **Tesla**
 - (Uber)
 - (Google)
 - (Apple?)

Who is doing AI? (9)

- ***U.S. government (Federal agencies)***
 - DHS (Homeland Security)
 - DOE (Energy)
 - NASA (Space)
- ***Other organizations -- “Partnership on AI”***
 - Amazon
 - Google / DeepMind
 - Facebook
 - IBM
 - Microsoft
- **See HBR “The State of Machine Intelligence” chart**
 - (page 4 of the Lecture 4 handouts)



People of AI – Fei-Fei Li

Fei-Fei Li, who publishes under the name Li Fei-Fei (Chinese: 李飛飛/李飞飞), is an Associate Professor of Computer Science at Stanford University. She is the **director of the Stanford Artificial Intelligence Lab** and the **Stanford Vision Lab**. She works in the areas of computer vision and cognitive neuroscience.

Associate Professor at *the Computer Science Department* at **Stanford University**
Ph.D. degree from **California Institute of Technology**
B.S. in Physics from **Princeton University**.

- **Fei-Fei Li (Stanford / Google) on vision systems in AI**
 - <https://www.youtube.com/watch?v=VBjqWogh6Gw>
 - 11:30 quest to build (visually) intelligent machines
 - 21:00 neuron-like units in networks / layered in hierarchies
 - 26:00 components of a model
 - 25:50 is AI a force for destruction or ...?
 - Under-representation of women & minorities

Neural networks & supervised learning

- **Andrew Ng – lecture on what AI can do / neural nets**
 - <https://www.youtube.com/watch?v=21EiKfQYZXc&feature=em-subsdigest-vrecs>
 - 7:30-10:30 Supervised Learning
 - 14:40 1 second of thought
 - 25:00 Neural Nets
 - 38:00 Hype / Anti-AI
 - 39:00 No clear path to sentience
 - machine learning course, lecture 1
 - <https://www.youtube.com/watch?v=UzxYlbK2c7E>
 - 8:30

History 1981 – 1998 (1)

- (1977 **Apple II**)
- 1981 **IBM PC**
 - With floppy disks
- 1981 **PC-DOS** (Microsoft)
- 1983 **Apple Lisa**
 - With windows, menus, mouse
 - Optional external hard disk
- 1983 **Microsoft Windows**
- 1984 **Apple Macintosh**
- **1984** Quantum/Plus Hardcard
 - hard disk on a card for IBM PC
- (IBM-compatible PC “clones”)

History 1981 – 1998 (2)

- 1991 Linux, **World Wide Web**
- 1993 Mosaic web browser, **AOL**

- 1997 IBM's **Deep Blue**
 - beats Garry Kasparov at chess
- 1998 Larry Page & Sergey Brin start **Google**

Speech Recognition / Speech Generation

- **Speech recognition by machine is a very complex problem**
 - **Vocalizations vary** in terms of accent, pronunciation, articulation, roughness, nasality, pitch, volume, and speed.
 - Speech is **distorted** by a background noise and echoes, electrical characteristics.
 - **Accuracy** of speech recognition may vary with the following:
 - Vocabulary size and confusability
 - Speaker dependence versus independence
 - Isolated, discontinuous or continuous speech
 - Task and language constraints
 - Read versus spontaneous speech
 - Adverse conditions

Speech Recognition / Speech Generation (2)

- 1952 – Bell Labs
- 1969 – Raj Reddy at Stanford
- 1971 – DARPA – BBN, IBM, CMU, SRI
- 1990s – CMU -> Microsoft (Xuedong Huang)
- 2000-2005 Dragon -> ScanSoft -> Nuance -> Apple (Siri)
- 2002 DARPA – IBM/BBN/Cambridge/SRI/UW
- 2007 Google (from Nuance)
- 2009 U of Toronto, Microsoft Research, IBM, Google
 - Using “Very Deep Learning”

Movies

- **Ghost in the Shell**

- In the near future, Major is the first of her kind: A human saved from a terrible crash, who is **cyber-enhanced** to be a perfect soldier devoted to stopping the world's most dangerous criminals.

- <https://www.bing.com/videos/search?q=ghost+in+the+shell+2017&view=detail&mid=E2ED3FBE9871C42E19D1E2ED3FBE9871C42E19D1&FORM=VIRE>

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- **The Avengers (2018)**

- <https://www.bing.com/videos/search?q=The+Avengers+2017+1&&view=detail&mid=4432AE396A64247437544432AE396A6424743754&FORM=VRDGAR>

Notes from Kevin Kelly in AIW class 5/2/17 (Lecture 4)

1. Many types of intelligence
2. “alien intelligence” \approx AI
 - a. they think differently
 - b. they’re not like us
3. AI as “telescope into our own minds”
4. Centaurs – AIs + humans working together
5. Random / evolution of AIs (?)
6. Explainable AI (with auxiliary AI)
7. Responsible Robotics group
8. Re: consciousness
 - a. “if we see it in animals, we’ll see it in robots”
9. Hollywood: dystopian vision