

What's Going on In Artificial Intelligence?

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AI is *REALLY* hot right now!

AI: The front line in the war for tech talent

Google Acquires Artificial Intelligence Startup
DeepMind For More Than \$500M
"75 employees"

A year after Uber hired away 40 researchers,
CMU robotics center reborn
School has \$11 million in federal contracts and plans for 15 to 20 hires

A Glimpse of the Future: AI Will Change Everything

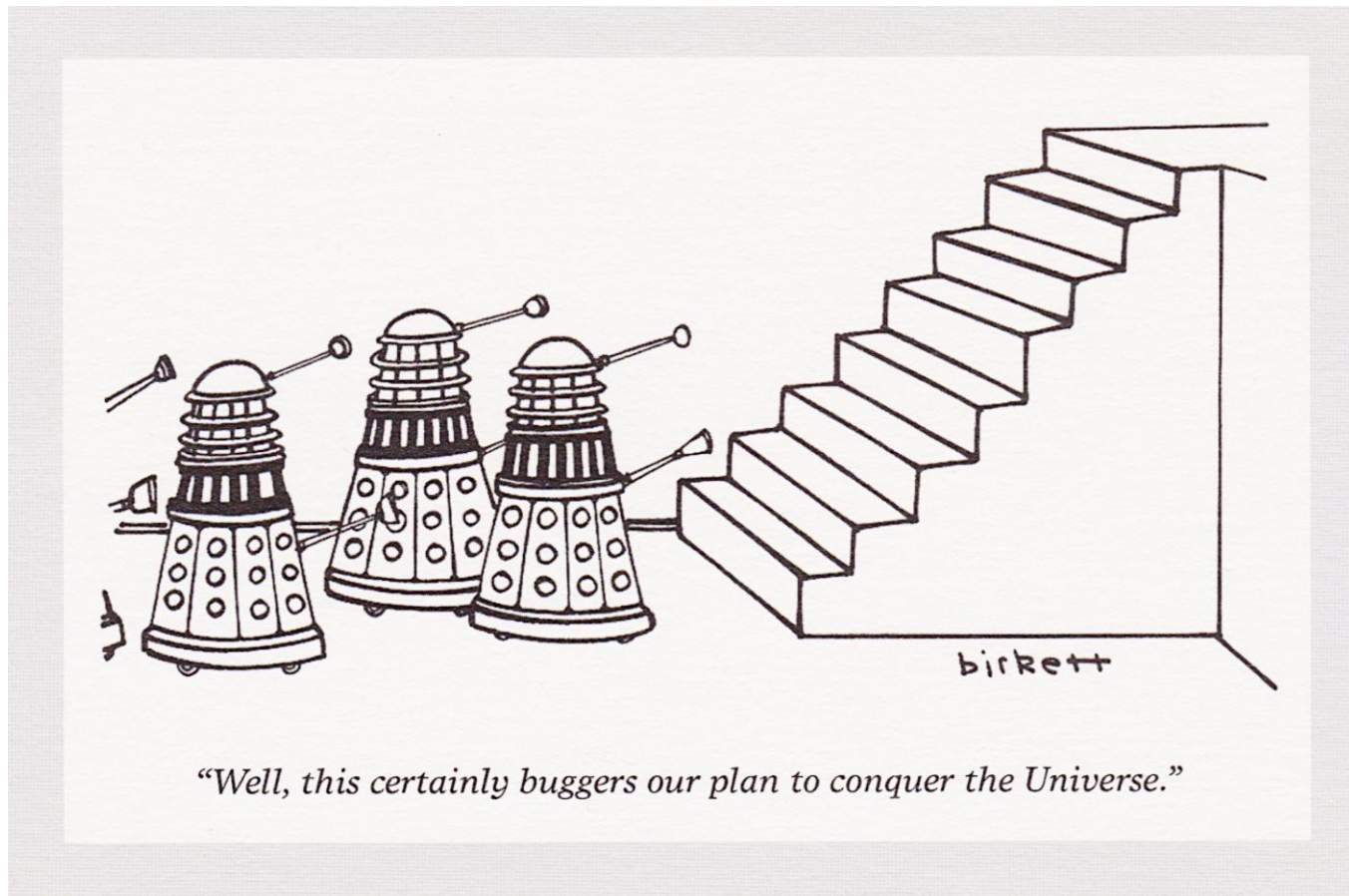
Ford invests \$1 billion in Pittsburgh
to build self-driving cars by 2021

IBM Is Counting on AI
and Paying "billions" "better than any"

Facebook Poached by Tech Giants

One Success Story: Legged Locomotion

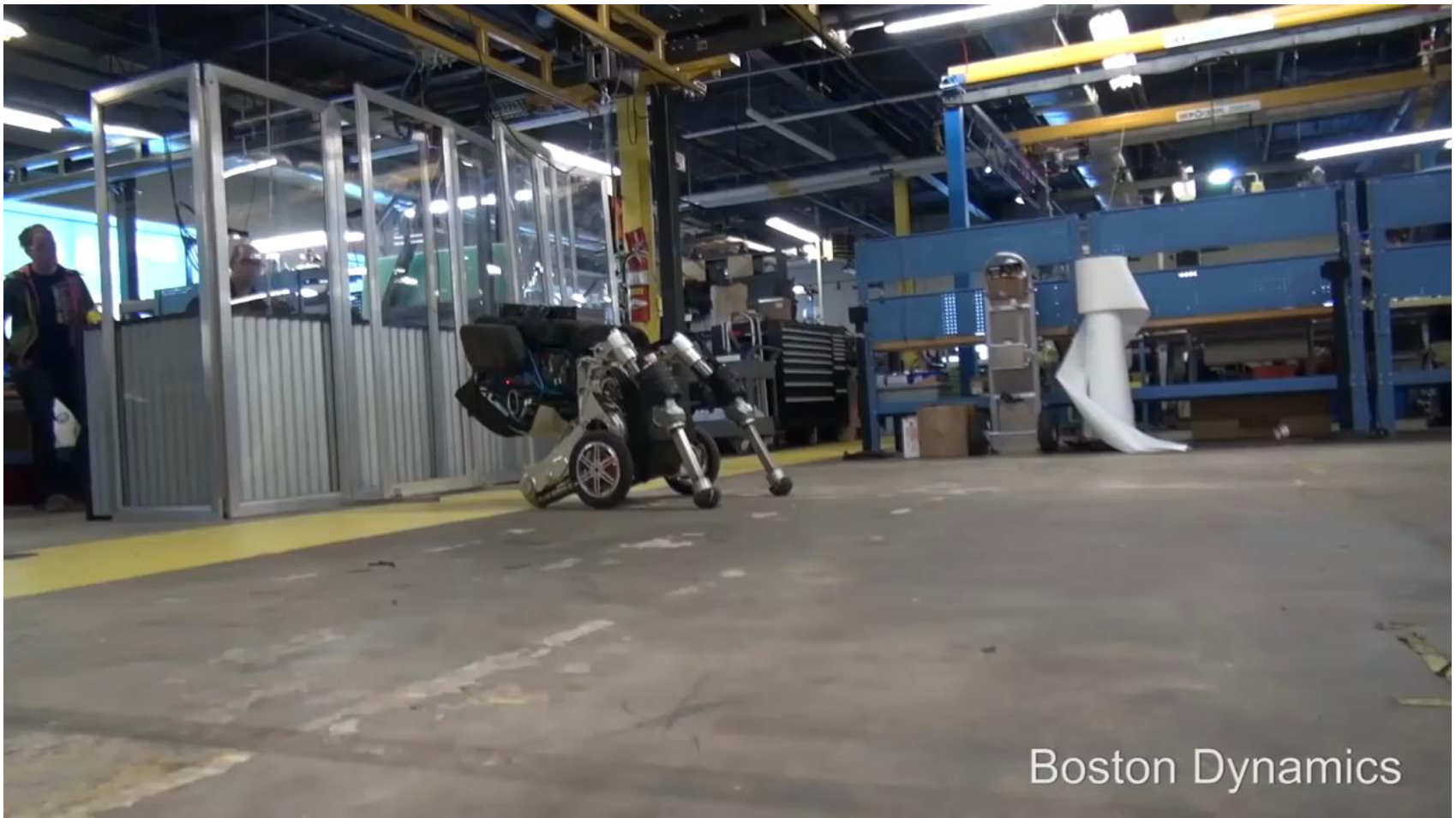
Cartoon from Punch, 1981



Big Dog Robot, Boston Dynamics 2008



“Handle” Robot, Boston Dynamics 2017



Birth of AI: The Founding Fathers

- Speculation about artificial humans and robots through history.
- Alan Turing was the first to talk about AI in the context of computers.
- 1956 Summer Conference at Dartmouth, coined the name “Artificial Intelligence”.



Alan Turing



Marvin Minsky



Herb Simon, Allen Newell



John McCarthy



Isaac Asimov
I, Robot (1950)
plus 500 other books!

Early AI, 1960s – 80s

Solving AI Backwards



Expert Skills

Everyday
Human Skills

“Animal” Skills

First Problems Attacked by AI:

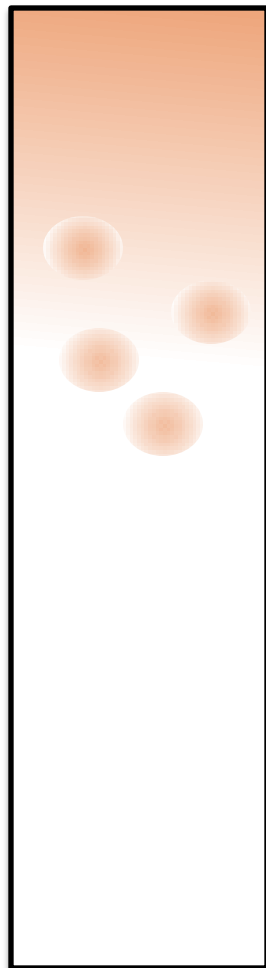
- Theorem Proving
- Calculus
- Chess
- Matching Drugs to Diseases
- Filling Out Tax Forms

Based on hand-written, hand-entered knowledge and rules.

Searching through many possible combinations.

Many AI companies started,
Then a big crash.

Machine Learning, Mid1980s - 2005



Expert Skills

Researchers realized that many problems could be solved by applying machine-learning to big data sets.

Spotty but **commercially valuable** results with minimal work by humans.

Early application of “Artificial Neural Nets”, but just a few layers.

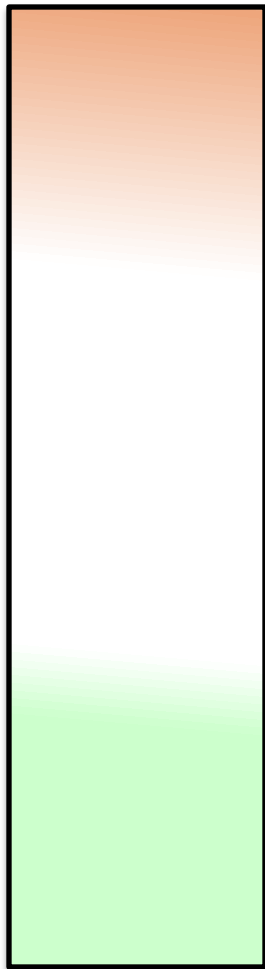
Everyday
Human Skills

- Automatic translation
- Self-Driving Cars
- Simple Speech Recognition
- Search Engines
- Recommendation Systems

Shallow spotty solutions – don’t get to meaning!

“Animal” Skills

2000–Now: Big Data and Deep Learning



Expert Skills

“Big Data” and analytics used everywhere.

Renaissance of Neural-Net research on much faster machines, GPU chips, allowing more layers of learning elements.

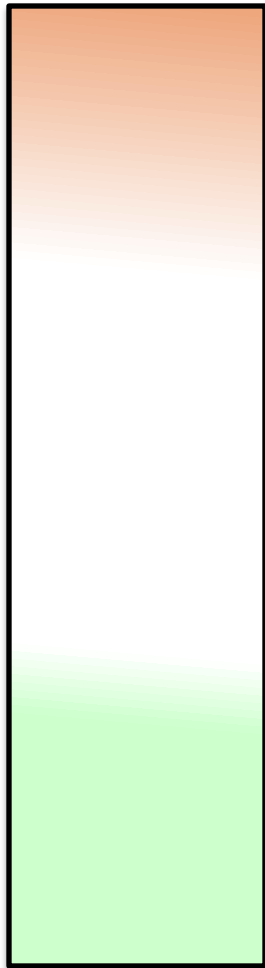
This led to an *explosion* of **Deep Learning** applications. Huge improvements in:

Everyday
Human Skills

- Coordinated motor control.
- Recognizing items in photo and images.
- Recognizing simple actions.
- Speech recognition.
- Speech to speech translation.

“Animal” Skills

2017: What's Still Missing



Expert Skills

Everyday
Human Skills

“Animal” Skills

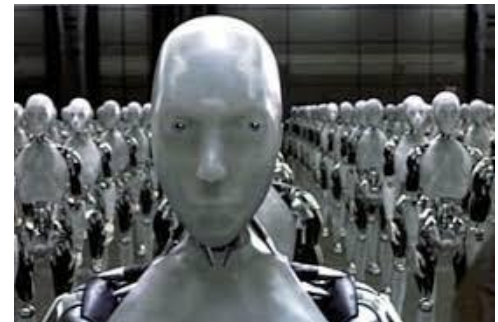
The empty “Doughnut Hole” is where everyday conscious thought goes.

Things that every normal human can do:

- Common-sense reasoning.
- Taking context into account.
- Simple, flexible planning and plan-recognition.
- Understanding natural language (human languages).
- Understanding metaphors and indirect requests.
- Generating explanations with the target audience in mind.
- Understanding the mental states of others.
- Dealing with uncertainty and incomplete info.

Is AI a Threat to Humanity?

- Some famous people have said so...
 - But very few AI experts.
- 60 years of “Killer Robot” Science Fiction.
- And now the machines can *learn!*



Will super-intelligent machines take over?

- Right now, they can't: Remember the gap in human-like knowledge, planning capability.
- There's no reason they would want to.
- The “Sorcerer's Apprentice” Problem is easily contained



Three Real Threats:

- AI in the hands of terrorists and evil governments.
- Big threats to **privacy**.
- The effect of AI on employment and our economic system.

Economic Effects:

AI/Robots will be able to do most of our jobs, some sooner, some later.

- This is a social/political/economic problem, not technical. It can be like we all won the lottery, or like almost all of us got fired.

Endangered:

Lawyers (Routine Stuff)
Car/Truck/Uber/Plane Drivers
Assembly/Inspection
Pathologists/Radiologists
Most Computer Programmers
Writers (routine stuff)
Reference Librarians
Most Bureaucrats

Safe for now, or forever:

Athletes, Performers
Pre-School Teachers
Personal Care (Companions)
Psychoanalysts
Artists and Writers (creative)

PR/Advertising

Call to arms for the communications community: Society needs your skills!

- Due to all the new technologies, everything is changing at a head-spinning rate. AI/employment is just one example.
- Evolution of social conventions and rules can't keep up.
- If society doesn't take control of this, we end up in a bad place.
- We need to have many **well-informed, respectful, adult** conversations to forge a consensus. **Not slogans or tweets!**
- **Communications professionals have the right skill-set to promote and moderate these discussions.**
- ... but will the adversarial, hired-gun structure of the field interfere?

The End