

Machine Learning and the Market for Intelligence III Notes

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Ajay Agrawal, Creative Destruction Lab

- cost of prediction falling
- value of compliments rise
- value of human judgement goes up
- value of human prediction falls
- as prediction accuracy increases changes in business strategy e.g. Amazon anticipatory shipping patent (<https://www.google.com/patents/US8615473>)
- what are the tradeoffs companies are making to become AI first (e.g. Google)
- Google may have a different thesis about the time horizon of AI pay offs and are investing now as opposed to later
- Dissonance, investments in AI not necessarily transformational although narratives express great promise for AI
- The time horizon for AI will not necessarily be linear, likely exponential

Russ Salakhutdinov, CMU

- key challenges, reasoning, attention and memory, NLP, reinforcement learning, unsupervised learning
- generating captions for images have issues if the system was not training for the specific context
- issues with reasoning systems need to understand context of document
- deep reinforcement learning with memory
- developing systems that learn with fewer examples
- advancements in personal assistants and dialogue based systems (e.g. medicine, technical systems)

Elizabeth Caley, Meta

- huge volume of scientific publishing
- tools to help process the amount of scientific literature and data
- personalized learning and life long learning

Eric Jonas, UC Berkeley

- Brain activity map project

- understanding machines through neuroscience techniques
- prediction for understanding at what scale
- understanding for repair or abstraction
- need better algorithms for extracting data from neural studies
- develop quick experiments in neuroscience to avoid passive observation

Doina Precup, McGill University and Deepmind

- reinforcement learning -> AlphaGo Zero
- develop these systems further to interact with the natural world
- we can use reinforcement learning for time predictions - applications are fairly reliable
- control and exploration more difficult
- learning by imitation, more work to be done in this field - AI to work alongside with humans
- what is the error signal that is feed in for learning
- more training needed to bring people into the industry, more compute power and data in research
- LSTMs and self learning for partial observable applications (i.e. current work in Poker playing)
- getting AI to general audience maybe developing new interfaces to use technology

Shivon Zilis, OpenAI, Bloomberg Beta Interviews Prime Minister of Canada, Justin Trudeau

- canada investing in AI, and attracting companies due to talent and diversity
- winner take all, large companies that are developing AI are reaping benefits of massive data at expensive of other companies
- canadian government focusing on creating growth in middle class, expanding confidence in the future

Brad Hoverly, Grammarly

- not attended

Don Crawford, Analytics 4 Life

- collecting heart data - reconstructing 3D model, and predictive analysis for heart disease
- proprietary device collecting phase array data, voltage potentials, 7 electrodes, 3 minute data window
- high fidelity data that is highly synchronized that is important
- promising results in detecting heart disease
- 5 year development cycle - rigorous quality management system from the beginning

Lukas Biewald, CrowdFlower

- companies have issues deploying ML projects
- ML is unpredictable and may get plateauing results
- incorporating human judgement to improve performance of models
- increasing training data size and cleaning data improves performance
- recent Google paper: the unreasonable effectiveness of data
(<https://arxiv.org/pdf/1707.02968.pdf>)

- issue of understanding machine code for deep learning and the size of it increasing

Tomi Poutanen, Layer 6 AI

- ACM Recommendation System Challenge for personalization systems
- Layer 6 AI deep learning approach to model users and items - embedding - turn around recommendations in 30 min
- focus on banks (4 out 5 banks in Canada) - product focus to grow a business around this system

Peter Wittek, Creative Destruction Lab

- quantum computer is maturing: D-Wave, IBM Q, Rigetti, IonQ, Xanadu
- 4-5 years to see some results from quantum computing
- quantum ML complements not replaces state of the art
- constant-time speedup is what we are after
- sampling applications - Netramark
- 20 quantum ML start-ups at CDL
- optimization - non convex - Quantum Meta AI
- quantum simulations - ProteinQure

Steve Jurvetson, DFJ

- Moore's Law projected through last 100 years - exponential curve
- New products to focus on what is the best software, algorithm - this will apply to different spaces (e.g. automotive etc)
- Data collection key for autonomous vehicles - some companies training on software - simulators
- Observational technologies - who has the most data from satellites - incorporating AI into the devices
- Jeff Hawkins - everything is memory - ASIC chips - Mythic - incorporating compute in memory
- David Deutsch - quantum computing
- does quantum computing grow linearly or will it grow faster than more Moore's law
- quantum computers lower samples to get results e.g. Higgs Boson experiment (<https://www.nature.com/nature/journal/v550/n7676/full/550339a.html>)
- iterative algorithms for generative design - learning more effective design
- creating a new AI that we exceed our intelligence without needed to understand human brain

Max Tegmark, MIT

- control of AI - future of life institute (<http://futureoflife.org/ai-principles>)
- AI safety engineering

Rich Sutton, Deepmind and University of Alberta

- AI focus should be more human
- how do we know how people learn or make decisions

- AI is moving beyond prediction to integrating goals and decision making
- AlphaGo Zero learning from trial and error like humans

Suzanne Gildert, Kindred

- developing software, want to get it into the physical world - embodiment
- AGI to solve all kinds of problems
- Deep learning and reinforcement learning expanding in scope to solve general problems
- cheaper, faster and more efficient to build human like AI to interact with the current infrastructure
- human embodiment hypothesis
- human like AI to be related AI safety
- teleoperation, applying human AI to human like bodies for tasks
- need goals and motivation to generalize the abilities of the AI
- building AI in our image then in the future we can merge with their characteristics

Scott Phoenix, Vicarious

- robotics parts are cheap but why are robotics not ubiquitous, software is lacking
- 15 years from now robots to be as common as cell phones
- old brain is like deep learning
- lots of training data, low generalization, no model of the world
- fancy regression
- new brain
- low training data, high generalization, learns causal model of the world
- take richer inductive biases
- price of minimum wage rising, cost of robotics falling
- parallel in robotics to early computing

Ben Goertzel, Hanson Robotics

- singularity net - AI and blockchain

James Cham, Bloomberg Beta

- models, product managers, data
- needs methodologies for building models
- not necessary ROI metrics applicable to ML deployment
- data not necessarily ready for application
- do not need to work on the edge for model applicables

Albert Wenger, Union Square Ventures

- capital is not a constraint
- attention is scarce
- what is your purpose
- regarding freedom in life and applications to control attention

Joshua Gans, Creative Destruction Lab

- training data is downstream, once trained not that valuable (<http://predictionmachines.ai>)
- actions are upstream, generate value and more value
- role of judgement and the increase in value