

**Program:** The Future of Artificial Intelligence: Deep Learning & Blockchain Crypto-Ledgers

**Speaker:** Melanie Swan, Theorist of Emerging Technologies, Purdue University; Faculty, Singularity University

**Attendance:** 119

**Guests:** Larry Sievers, Paul Kellog, John Zehner, Patricia Jacob, Kevin Purrone, Marvin Ward, David Kurlander, Bob Zedanke, Kathy Dewees

**Scribe:** John Peer

**Editor:** Bill Elliott

Today's presenter was Melanie Swan from the Philosophy Department, Purdue University, working as a Theorist in Emerging Technologies. She has many degrees including an MBA in Finance and Accounting from the Wharton School at the University of Pennsylvania. She founded the Institute for Block chain Studies and authored of "Block chain: Blueprint for a New Economy". Her numerous presentations are available at <http://slideshare.net/LaBlogga>.

Discussion Questions:

- Probability humans will extinct themselves by mistake?
- How are automated algorithms changing your workplace/life?
- Would you prefer a customized vs standard mortgage?
- Want a digital backup of your mind?

Agenda:

- Artificial Intelligence
- Block chain Technology
- Deep Learning Algorithms
- Future of AI
- Future of Smart Network thesis:
- "Considering block chain and deep learning together suggests the emergence of a new class of global network computing system. These systems are self-operating computation graphs that make probabilistic guesses about reality states of the world."
- Evolution of networks:

1980s	>> Information		>> Simple Networks
2010-2020	>> Value (money)	>> Value tokening	>> Transfer Value
2050s	>> Intelligence	>> Thought tokening	>> Transfer Intelligence

**AI is a computer performing tasks typically associated with intelligent beings.**

- Global robotics spending \$66B in 2025; CAGR +9% from 2000
- AI direct and enabled spending from about \$1B in 2016 to \$36B in 2025
- Waymo (Google) > Autonomous driving in AZ without a safety driver since Oct 2017  
Testing in 35 cities

What is real?

- Voice Imitation and risk of identity theft
- Fake News using facial recognition, political matching, & nervous system analysis

**AI Super intelligence Problem >> Computer capabilities can grow faster than human capabilities. Thus, computers might become vastly more intelligent than humans (i.e., super intelligent), AND willfully or inadvertently present a danger to humans.**

Global Catastrophic Risks Survey > 19% risk of extinction by 2100 of which AI will grow to be 5% or 25% of the risk. Is our human future doomed?

Roboethics and Robotiquette certified websites may provide a counterbalance to the fear of AI super intelligence.

"Work" = meaningful engagement of human capabilities

Human-machine collaboration > EG legal firm of Robot, Robot, and Hwang

## Technological Unemployment

Facilitate an orderly transition to Automation Economy

47% of employment at risk by 2035

E.g., automated driverless transportation

**Our AI Future: high impact emerging technology**

*Big Data and Deep Learning*

*Blockchain*

*CRISPR & Bioprinting*

Top disruptors and job growth opportunities: Deep Learning and Blockchain > robotics/automation/data science/deep learning

Block chains to confirm authenticity and transfer value

Deep learning algorithms for predicative identification

**Block chain > To inspire us to build this world**

Block chain is a software protocol for sending money just as SMTP is a protocol for sending email. It is a tamper resistant ledger s/w underlying cryptocurrencies like Bitcoin. It facilitates internet transfer of assets (\$\$, titles, contracts, etc) without a 3<sup>rd</sup> party intermediary.

**How does Bitcoin work?**

P2P (Peer to Peer) network confirms and records transaction and assembles transactions into "Blocks" every 10 minutes. Blocks are linked (hence Chain) and recorded in Peer nodes forming a distributed ledger. The Bitcoin P2P network has more than 12000 nodes. The nodes compete (or "mine") to decrypt the Block and hence "earn" the business. All Peer nodes are "equal" and can provide services vs. the present centralized and hub networks for financial transactions. Both Public (no ID) and Private (credentialed) distributed ledgers exist.

Due to secure value transfer, Blockchain will apply to finance, property, contracts, & identity fields. Transaction fees are also substantially reduced as no 3<sup>rd</sup> party (bank or credit card) is involved. Due to the distributed structure and P2P relationship, blockchain has never been hacked. A significant drawback is speed.

**Deep Learning Algorithms**

Big data is not smart data > global data is expanding exponentially. New data science methods (algorithms) needed.

Deep Learning networks are a form of neural networks within the broader AI field. **Deep Learning is a computer program that can identify "what something is"**. It uses a cascade of layers (tiers) to extract features and make predictive guesses about new data. The system "learns" with big data by making trial and error guesses to adjust weighting factors to identify key features. It depends on big data as its raw input material.

"Supervised" learning starts with identified characteristics. "Unsupervised" starts with observations.

Machine Learning progress >> in 2013 Google voice activated word recognition accuracy was 77% vs 95 % for humans. In 2017 Google matched human recognition levels.

**Two kinds of Deep Learning Neural networks:**

Convolutional > image recognition; convolve to higher levels of abstraction

Recurrent > speech, text, audio recognition with sequential inputs and a memory function

**Three key Technical Principles of Deep Learning:**

Sigmoid Function > non-linear function forcing 1/0 outputs for greater mathematical manipulation

Perceptron Structure > "dumb" systems learn by adjusting parameters and verifying outcomes

Loss Function > optimizes efficiency of solution

Neural network "learns" by varying the weights/bias parameters for a better outcome (loss function)

Backpropagation is a technique to improve the efficiency of the “algorithm guesses” to cope with the exponential growth of big data

**Future of Artificial Intelligence**

Block chain and Deep Learning:

Robust self-operating computational systems

Probabilistic guesses about reality states of the world; state engines

New forms of automation technology that might automate entire classes of human activity

AI will be “baked in” to future smart networks.

Next Phase > Deep Learning Chains: cross-functionality for many applications.

Application 1: Autonomous Driving & Drone Delivery, Social Robotics

Deep learning to identify; Block chain for secure transactions/interactions.

Application 2: Big Health Data

Large scale secure predictive analysis to understand disease prevention

Need big data; sequencing human genomes too slow

Application 3: Leapfrog technology to enable human potential

Delivering financial and health inclusion to the underserved worldwide without brick-and-mortar

**Conclusion**

Considering blockchain and deep learning together suggest the emergence of a new class of global network computing system.

These systems are self-operating computation graphs that make probabilistic guesses about reality states of the world.



Melanie Swan

