

AI World Forum 2019 Summary

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1 Conference Summary

Canada is in a unique position in the world to lead the standards and best practices of AI based technology. The world is looking to Canada, and Toronto specifically, for many of the decisions being made. The industry is moving to the democratization of data, and to the emphasis on user privacy and consent in data collection and utilization. Machine learning is touching all industries, from tech, to finance, to medicine. There is a growing need for explainability of these systems, and for accountability for their uses. The world is moving towards full adoption, and before this happens, decisions on ethics need to be made in order to prevent harm. Developers need to understand the ramifications of their systems *before* a line of code is written. Just because you can, does not mean you should. Canada is currently a leader on the global stage in terms of research, but we are lagging in implementation in industry. As adoption rate rises, companies need to be clear with their employees with the purpose of AI in their corporation. AI policies need to be created with guidelines for each corporation to ensure that AI is used in a meaningful way, without wasting money. At the end of the day, the leading experts believe that AI will *augment* workers, and not replace them. As one expert said, it will be the digital Iron Man suit, allowing for faster, better, more efficient uses of time.

We are in a very exciting point of time!

2 CEO's Talk Tech:

2.1 Speakers:

- Sebastien Gendron, Transpod
- Steve Irvine, Integrate.AI (Former Exec. Facebook, Instagram)

2.2 Sebastien:

- From his experiences at Transpod, Sebastien recommends for those wanting to build a business: **courage**
 - You cannot rely on family to bootstrap your ideas, you need to rely on the value proposition of your proposed business
- Transpod is seeking to create a hyperloop system that places air travel speeds on ground through a contained loop system. They're seeking to have Toronto -> Montreal in 45 minutes as a reality in the next ten years. They're coordinating with European governments on research, and our own Canadian government on policy implementation. They Canadian gov. has suggested a pilot system connecting Calgary and Edmonton, which we can expect to begin in the next 5 years.

2.3 Steve

Through several successful ventures, Steve shared 8 tips for launching a business.

1. Understand your edge

- Find out what you do better, and use it

2. Fall in love with the *problem*, not the solution

- Always keep innovating. Large companies grow stagnant as they stop addressing a problem, and focus too heavily on their existing solution. By focusing on the problem, and constantly iterating on the solution, you can disrupt a market
- Amazon, Uber, etc. all shook their respective markets, since they changed the way people thought of the problem

3. First principles thinking

- Be skeptical about the current solution
- Think of SpaceX. They have started from the bottom up, and completely re-engineered things in a more cost effective way. Don't look to what your competitors are doing, think of the basics

4. What is data missing

- In WWII, engineers assessed how to reinforce planes to prevent deaths in dogfights. The planes that came back had bullet holes in the wings, and tail, but not the engine. The initial thought was to reinforce everything but the engine, but this was the wrong way of thinking. They instead reinforced the engines, and more planes came back. The data was missing the fact that planes with *any* bullets in the engine stopped operating, and that the planes coming back with the bullet holes proved that those areas could survive fine
- Similarly, in WWI the British issued helmets in an effort to reduce deaths from head trauma. However, casualties went *up*. This was because people who would've *died* were instead being *injured*!
- The data tells the story, but look at it from all perspectives!

5. Care more

- Steve shared a story from Facebook's ten year anniversary party. Mark Zuckerberg said that all of their competitors beat them in every metric, capital, man power, market reach, etc. Facebook won because they cared more about delivering a quality service.

6. Rent vs. owning your position

- Never become so loyal to your beliefs that you cannot admit that you are wrong in an argument.
- Be open to change

7. Find people that care as much as you do

- The culture of a company is important, curate it and ensure that your team wants to be there

8. Take the first step

- The scariest, but most important thing!
- Get busy living, or get busy dying

3 Planes, Trains, and Automobiles - The Future of Transportation

3.1 Speakers:

- Ken Sills, Preteckt
- Matti Siemiatycki, University of Toronto
- Stanislaw Schaml, Lufthansa Industry Solutions

Moderator: Christopher Reynolds, The Canadian Press

3.2 Notes:

- Self Driving Cars
 - In their development, it's very important to consider how they fit into our human landscape. Things are very much chaotic, and our rules of the road, while in theory orderly, are oft not followed.
 - Currently, they experts predict that self driving cars will most easily be integrated into society in rural, or transportational environments, and that fully autonomous commercial vehicles are a ways away.
 - In rural environments, they is less traffic, less people. More predictable than a city, and far less dangerous in terms of threat to human life
 - The ethical questions of who would the autonomous vehicle "choose" to save in life or death situations was raised. AI Researchers need to be very cautious of the ethical situations.
- The value of predictive maintenance:

- Ken Sills of Preteckt offers a service to fleets of shipping trucks, that provided data from their trucks, they could predict the need for maintenance before failure, increasing the time on the road
- Working with New York City transportation to instantiate similar systems – integrating AI to solve commute issues, erase inefficiencies.
- Key issue with AI in transportation: **removing the pain points for the travellers in as unobtrusive way as possible**
- Today, in some airports, Stan mentions that you do not even need to check in. Facial recognition software will do that for you as you walk through the airport. Everything from meal preference, to baggage checking, to seating preferences on planes are starting to be automated by AI systems (with a manual selection still available), and companies implementing these services are receiving rave reviews from the passengers: — **it makes life simpler**
- Issue of how these systems make their decisions was raised: many types of models are blackboxes, with their decision process unknown to humans. This is difficult in assessing how “safe” autonomous vehicles can be.
- Ken spoke to the **democratization** of data. Companies that are too small to produce enough data alone, can pool their resources together to produce a shared system that benefits them all. His company does this with small freight fleets, and all of them are quite pleased with the results
- Who owns the data? Who owns the model?
 - The question was raised about intellectual property in terms on the model. Does the data owner have ownership of a model produced from their information? The consensus was that the data should remain the rightful property of its owner, and can be withdrawn from the possession of the modeller, but the modeller reserves the right to their own system produced from that data.
 - Again, the idea of **democratization** of data was mentioned: information sharing makes up a key part of this industry. Almost all tools used by data scientists are open source, free (libre) software.

Ethics:

- There is a responsibility of the individuals performing and creating these models to do so ethically, and with the concerns of the general population in hand.
- How do we handle opting out to data collection?
- Sidewalk Labs:
 - Many of the experts were very excited about the potential opportunities of the system
 - Fear regarding the constant surveillance : how to opt out when the whole neighbourhood you live in has cameras, microphones, and data collection? Does the individual *have* the right to request their information not be collected? How can you enforce that?
- In China, their social credit system limits individuals access to transportation. The government has set a goal of setting up cameras everywhere to perform facial recognition on all citizens, such that any individual that has left their home will be known about within 3 minutes.
 - How do we now deal with the concept of a totalitarian state leveraging these tools with intent of control of a population?
- Finally, the discussion ended with the optimistic note that Canada is a leader in this technological space. The world is watching to see how Toronto handles the situation with Sidewalk labs, and we have an opportunity to set a global precedent.

4 Don't waste money on AI

4.1 Speaker:

- Terry Boyland, CPQI

4.2 Notes:

- With artificial intelligence coming, there is the potential for:
 - 800 million jobs lost (comparable to all of North and South American unemployed)
 - a 46 Billion dollar industry to be created
- Large enterprises are investing unbelievable amounts of money into the implementation of AI in their business:
 - One large US bank is spending 20 billion dollars
 - Many companies are wanting to implement it, without knowing the domain in which the tools are best used!
- Understand that AI is a buzzword, and what it can provide to business, is prediction.

Guideline for “Should I spent money on AI?”

- Assess your business. Look at business processes, and then in turn, their workflows
- Does your workflow include any sort of prediction?
- Is there room for optimization in this prediction?
- Would there be sufficient return of investment on such an optimization?

5 The Role of AI in ECommerce

5.1 Speaker:

- Sarah Siu, Shopify

5.2 Notes:

- People are 91% more likely to return to a service if they feel that the service “knows” them or is tailored to them
- 83% of people are willing to give data in order to receive that feeling, specifically: predictions and customizations
- Todays market places are increasingly digital, and the most successful services leverage this fact by implementing AI, and augmented reality
- In China, Alibaba has launched brick and mortar stores where individuals must scan the code on the item to purchase it/get more information. In this way, Alibaba is getting data from consumers who use brick and mortar stores, in order to improve their predictions.
- The future will see individuals being able to set up their own custom shops online, and through point of sale app stores like Shopify’s, they will be able to use latest AI technology in their business

6 How AI is Transforming Banking

6.1 Speakers:

- Gary Kearns, Growth Analytics (formerly MasterCard)
- Jenny Lin, RBC
- Terry Hickey, CIBC (former IBM VP Watson, AI, Quantum Computing, & Global Business Services)
- Melissa McSherry, Visa

Moderator: James Bradshaw, The Globe and Mail

6.2 Notes:

- One role of AI across the board in finance and fintech, is fraud detection
 - Many, many AI systems are in-place in financial institutions, and have been for some time now. They are used to detect transactions on accounts that do not follow the user’s typical behaviour patterns
 - Experts have stated that their end goal is a world where no fraudulent transactions go through
- How powerful is the AI in fintech? An anecdote:
 - A money laundering scheme was detected by using machine learning tools to assess the relationship between weather and sales of a pizza shop. The tool showed that the sales of one shop did not correlate with weather, and was then investigated, and found to have been a front for money laundering. For all other pizza shops in the area, the data showed that sales decreased in poor weather
- The onus of changing a companies culture to be more accepting of AI is on **leadership**:
 - Leadership needs to be clear on the purpose of AI in the company
 - Leadership needs to be straightforward with employees : i.e. automation or augmentation, will employees be replaced or empowered?
 - Instantiate a policy coming from the top level of a company about **when, where, and why** to use AI. Too often do companies produce POC after POC that have 0 value add
 - Clear guidelines about putting models into productions
- AI makes since in finance when : **segmentation & classification** are required!
 - make *better* decisions
 - touch all jobs; improve *efficiency*
- **Ethics**
 - Are we using raw data? Should we ask again for permission if it was collected without the understanding it would be used in a commercial tool?
 - In financial technology, informed consent of the data owner if important
 - Allow for customers to **opt out**
 - **we could, but we shouldn’t** — exercise restraint, and good will to the client
- Canadian financial institutions have much more trust from their clients than compared to the rest of the world. This needs to be recognized and maintained by following strict data privacy.
 - **“We have the chance to do better than Google”**
- **Traceability of decisions**:
 - Many machine learning algorithms cannot be used in fintech as they are “black boxes” which cannot explain *how* or *why* they’ve made a decision
 - Banks are accountable to auditors and regulators, and therefore **must** be able to explain their reasoning
 - **explainability is key**
 - This isn’t to say that work should not be done with these blackbox algorithms to *create* a way of generating explanations — the older techniques are simply more *mature*.
- **People who put these tools into the world are responsible for their actions. Period.**
- Developers have a responsibility to remove **bias** from their systems
 - Ensure that appropriate statistical distributions are accounted for in the data used, and if not, to compensate
- ML & AI will be like an iron man suit — **augment and empower** individuals

- automate tedious / boring parts of jobs
- more time for higher level work in the company
- human element will be evolved
- If you are making an AI, prepare for the worst case to be sued
 - How to defend yourself
 - Think NOW
 - You are liable. Ex. An individual is denied for a loan.

7 AI-Based Autonomous Response: Are Humans Ready?

7.1 Speaker:

Nabil Zoldjalali, Darktrace

7.2 Notes:

- Darktrace is a system that acts analogously to the human immune system: it assesses what is normal, and when there are abnormal entities/behaviours, it raises the alarms and investigates
- Darktrace leverages unsupervised learning algorithms in order to achieve this. It sits on a corporate network, and learns what is normal internet traffic for that enterprise. The system becomes bespoke for each client.
- It allows security analysts to focus on the important aspects of their job, instead of sifting through GBs of system logs

8 NVIDIA'S Advances in AI

8.1 Speaker:

Sanja Fidler, NVIDIA, University of Toronto

8.2 Notes:

- Focus of research on computer vision & understanding the world
- Labelling data is an intensive task, often requiring pixel-perfect classification.
 - Expensive, time consuming, not efficient
 - Bottlenecking advances in computer vision
- Solution: training an AI based system to suggest the boundaries of an object, then allowing the user to modify errors in the outline
 - Saves time; improves itself as the user interacts with the system (user's adjustments are batched and used to further train the alg)
 - More efficient
- While this allows for the generation of more data, can we do better? Enter **synthetic data**
 - Creating data that has the same probabilistic distributions as real world data
 - Can be easy to mass manufacture; Train on synthetic data first, then give it the real world data
 - Potential to be very limited in representation of the real world
- NVIDIA has used a simulation of the real world to train a self driving car
 - The maps were modelled off of real world locations; Textures of the 3D models were hyperrealistic
 - A model trained on this environment performed fairly well in the real world, in a real car

- NVIDIA took it one step further, and has created a method of procedurally generating a 3D simulation model that has real world probabilistic distribution of buildings, trees, etc.
- having to create the simulations for the synthetic data was expensive; automating via an AI system was the natural extension of the research
- Can reference real world topology and maps to generate unique maps that do not exist in the real world. This can allow a simulation to create much, much more data than otherwise available in the real world
- While limited, Sanja believes systems like this could be AI “Kindergarten”, allowing the system to gain its bearings before graduating to more expensive real world data

9 Enterprise AI and The Consumer Experience

9.1 Speakers:

- Benji Sucher, Layer 6 (TD Bank Group)
- Sanjay Srivastava, Genpact
- Carolina Bessega, Stradigi AI
- Robert Barton, CISCO
- Megh Gupta, ELEMENT AI

Moderator: Curt Hopkins, Hewlett Packard Enterprise

9.2 Notes:

- As employees of enterprise are consumers of today’s popular AI based technology, there is a growing expectation internally that the enterprise should implement similar technologies within their day to day workflow
- There is a potential for 2 trillion dollars of impact in the enterprise world with AI implementation
- Some of the experts on the panel said that in the near future, this technology is comparable to the invention of fire, or to the invention of the computer
 - others said that people need to dial back expectations; focus on its applicable use cases for now
- The panel members all agreed that there is a need to take accountability for bias in AI based programs
 - policy is needed to ensure that these flawed programs do not make it into production; diversity of opinion and creations facilitates diversity of outcome in such programs
- Data privacy and security needs to become a focus
 - Multi-party agreements need to be made to protect consumers
- Adoption of these technologies is proportional to the understanding and implementation of “Human in the loop” systems
 - Augmentation of existing roles, not replacement; people will adopt when they realize it will make their lives easier, not harder

10 Quantum Computing

10.1 Speaker:

Michael Brett, QxBranh

10.2 Notes:

- Quantum computers are no longer a thing of the future; they are here, and they are ready for serving business needs
- They excel at non-deterministic problem solving, such as with chemical simulations, optimization, and machine learning
- Quantum based cloud computing services are going to be the future of quick, reliable, and accessible machine learning hardware

11 Can AI Outperform Doctors?

11.1 Speakers:

- George Cernile, AIM
- Anna Ansel, Provenio AG
- Dornoosh Zonoobi, MEDO.AI
- Devin Singh, The Hospital for Sick Children

Moderator: Natasha Puri, Cyclica

11.2 Notes:

- AI based medical systems need to perform *better* than doctors by a wide enough margin for public to trust them
- AI systems *cannot* totally replace a doctor; there is the need for a human in the medical field to be making decisions
 - Similar issues as mentioned prior; responsibility and accountability for decisions made by software
- Machine learning systems can outperform doctors in certain domains of data analysis (such as interpreting medical imaging results)
 - Doctors can use these as *tools* to provide better, and faster healthcare
- Devin Singh, a doctor at Sick Kids, sees a future where he can remove the 70% of his job that is data entry and analysis, and instead enter a patient's room, and have a discussion with them *without* needing to type up every word
 - More of doctors' time spent on patient care
 - Better experience for patients
 - *Faster* service for patients; doctors can serve more people in less time!

12 The Future of AI in 2025

12.1 Speaker:

- Sarmad Ibrahim, IBM

12.2 Notes:

- IBM is providing assistance to AI based startups looking to use Watson
 - Initially \$1000/month in API credits following application
 - As business grows, can reach \$120,000/year in API credits
- IBM is also providing access to free courses online regarding machine learning, data science, and Watson

– IBM Watson Academy

Relevant links:

- [IBM Watson Startup Assistance Program](#)
- [IBM Watson Academy](#)