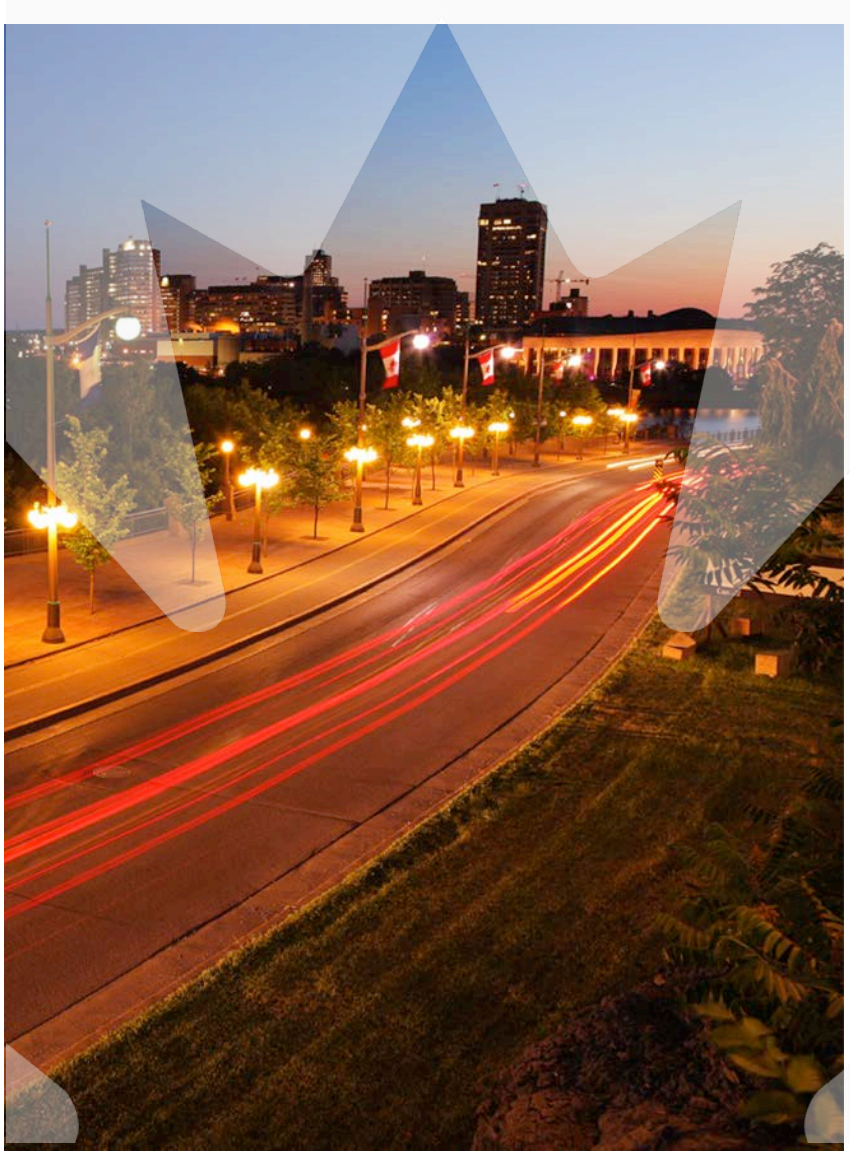
Artificial Intelligence IP Analytics Study



2nd Annual IP Research Workshop
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Objectives

1. IP Analytics at CIPO
2. Artificial Intelligence (AI) IP Analytics Project
3. Developing a Patent-Based Definition for AI
4. Geocoding & Gender Distribution
5. Qualitative Research
6. Upcoming Publication

Increasing AI Innovation in Canada

- Pan-Canadian Artificial Intelligence Strategy
- AI-Powered Supply Chains Supercluster (SCALE.AI)
- TBS Directive on Automated Decision-Making

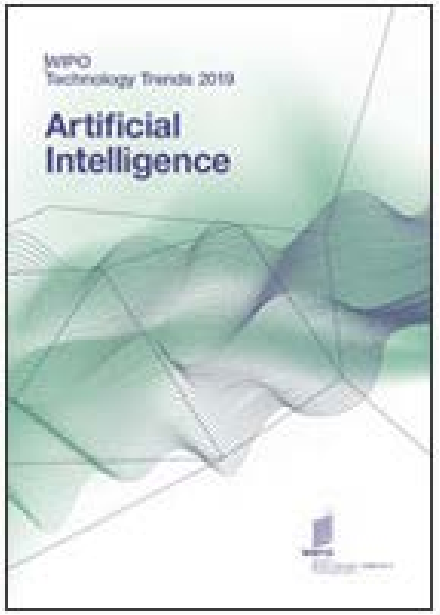
What is IP Analytics?

IP Analytics is the process of:

- Collecting,
- Transforming,
- Analysing, and
- Visualizing

IP data to answer questions on innovation and IP policy.

WIPO Technology Trends Report on AI



Canada's Rankings

AI Techniques: Ontology engineering (ranks 5th)

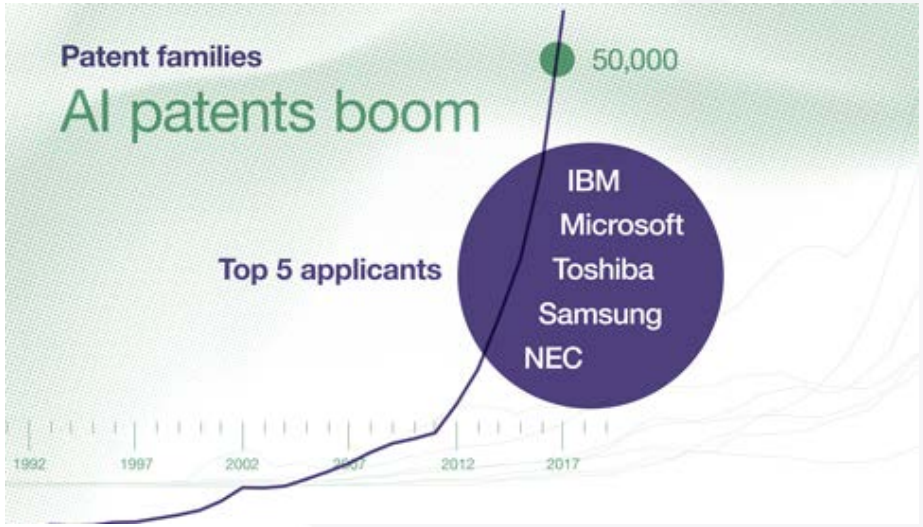
AI Functional Applications:

- Predictive analytics (ranks 5th)
- Knowledge representation and reasoning (ranks 5th)

AI Application Fields:

- Physical sciences and engineering (ranks 4th)
- Networks (ranks 5th)
- Military (ranks 5th)
- Life and medical sciences (ranks 5th)
- Entertainment (ranks 5th)
- Education (ranks 5th)
- Document management and publishing (ranks 5th)
- Computing in government (ranks 5th)
- Cartography (ranks 5th)
- Agriculture (ranks 5th)
- Law, social and behavioral sciences (ranks 5th)

WIPO
WORLD
INTELLECTUAL PROPERTY
ORGANIZATION



Source: WIPO Technology Trends Report 2019 – Artificial Intelligence

Artificial Intelligence IP Analytics Study

- OBJECTIVE: To understand the Canadian AI patent landscape
  - Developing a robust methodology for identifying AI patents
  - Use modern approaches to parse through the data
  - Deep dive into the data to identify areas where Canada has a relative advantage, collaborations, gender representation, geographical clusters, etc.
  - Leverage qualitative analysis to support findings from data

Patent-Based Definition of AI

Challenges:

- No universally accepted definition of AI
  - Encyclopedia of AI: 237 chapters in 3 volumes
  - Encyclopedia of Machine Learning and Data Mining: 800+ entries
- Multifaceted nature of AI
- Blurred boundaries between AI and other innovations
- Terms borrowed from other fields
  - e.g., control, robotics, biology, chemistry
- Overloaded terms
  - e.g., autonomous, detection, prediction, automation, simulation
- Fast evolving over time

Patent-Based Definition of AI

WIPO

- Techniques used in AI

  (e.g., machine learning)

- Functional applications

  (e.g., speech processing, computer vision, robotics, control)

- Application fields

  (e.g., telecom, security, transportation, medical)

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OECD

- Core AI

  (e.g., machine learning)

- Applications of core AI

  (e.g., image/video/speech/text analysis, data analytics, automation)

- Enabling technologies

  (i.e., hardware & software useful for AI, to foster the AI development)

OECD

Patent-Based Definition of AI

EPO

- Core AI
- Applications of AI

USPTO

- Patent landscaping rather than classification
- Seed categories:
  - Vision
  - Speech
  - NLP
  - Knowledge representation
  - Expert systems
  - Evolutionary computation
  - Machine learning
  - Planning, control
  - AI hardware

Experimental Approach

- Identify AI-related patents using a combination of:
  - International Patent Classification (IPC) codes
  - Cooperative Patent Classification (CPC) codes
  - Mix of IPC/CPC codes and AI-related keywords
  - Mix of “core AI” keywords
    - OECD/Max Planck Institute: OECD-193 list of AI keywords
    - WIPO: Keywords based on the ACM Computing Classification System
- Alternative approaches: AI-based models
  - EPO: Dynamic approach using machine learning techniques
    - Unsatisfactory results when the model was trained with classification codes only
    - Promising results when the training was based on full-text retrieval
  - USPTO: Machine learning approach to patent landscaping in collaboration with Google

Geocoding

Objective: Geocode addresses to determine if the location falls within a Canadian Census Metropolitan Area (CMA) to identify clusters of patent activity.

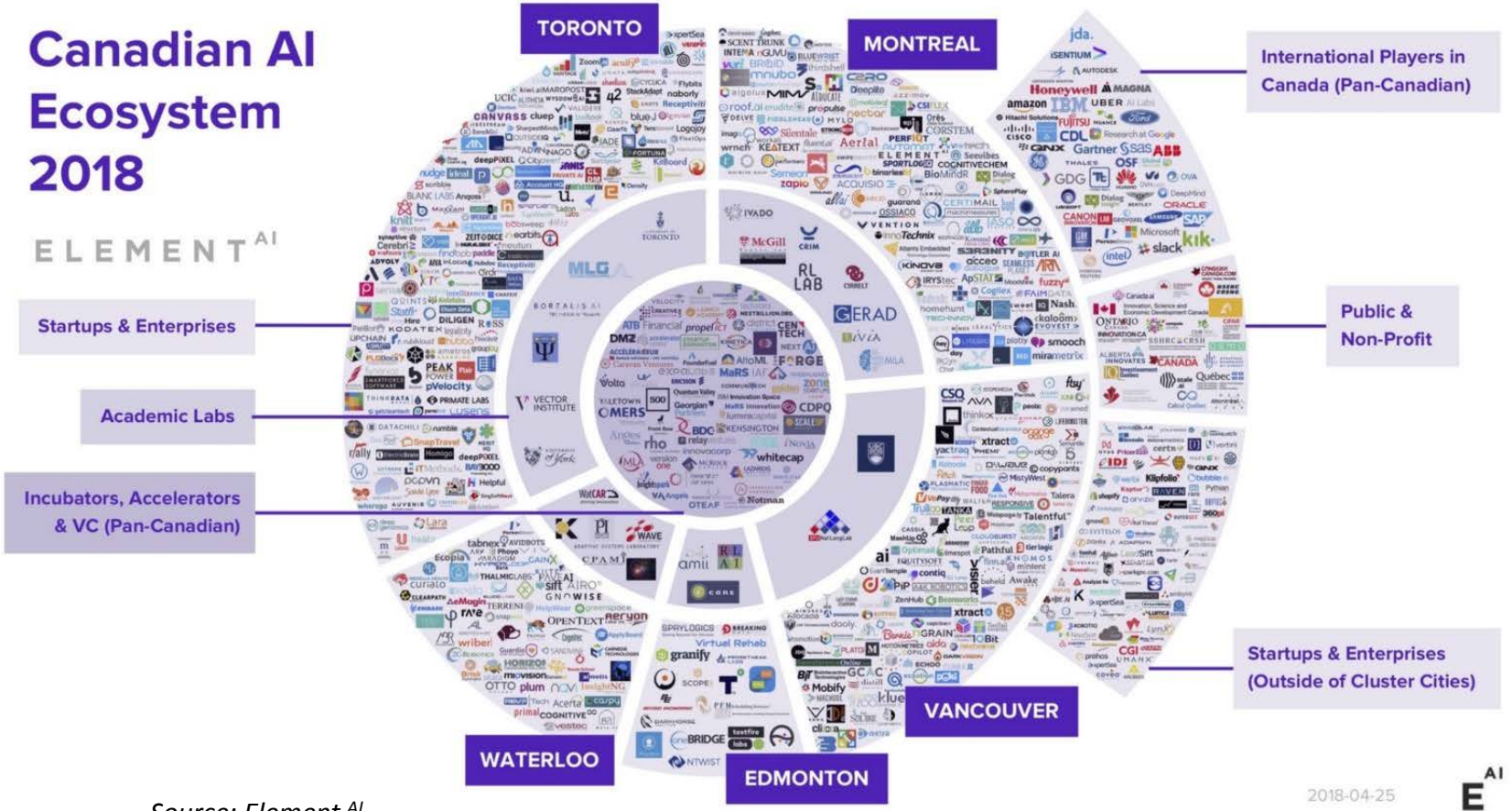
Source: Green Technology Asia Pte Ltd - The Canadian AI Ecosystem: A 2018 Profile

Gender Matching of Patent Inventors

Objective: Identify the gender of patent inventors by linking a dataset with the gender name dictionary

Explore Trademark Use by AI Companies

- Difficulty in capturing the trademarks related to AI
- Trademark used as a metric of commercialization



Source: Element AI

Qualitative Research

- Why is qualitative research important?
  - Ground up
  - Filling in the gaps – the entire ecosystem
  - Answering the “why”

Qualitative Research - What are we looking to answer?

The use of intellectual property law

- What is used?
  - Patent
  - Trademark (registered not unregistered)
- How is it used?
- What is it used for?
- Why?

Qualitative Research - Method

Participants: Lawyers; AI Companies

Locations: Montreal, Toronto, Waterloo and Vancouver

Sampling: Convenience sampling and snowball sampling

Method: Open ended questions by phone and in person

Upcoming Publications

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Joint report by CIPO and CIGI that will be included as a chapter in an upcoming WIPO publication: *Global Challenges for Innovation in the Mining Industries.*

Drilling into Patent Data to Explore Canadian Innovation in the Mining Sector

Centre for International Governance Innovation

Innovation, Science and Economic Development Canada
Canadian Intellectual Property Office

Innovation, Sciences et Développement économique Canada
Office de la propriété intellectuelle du Canada


Canada