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Protecting AI/ML Innovations: IP Opportunities and Pitfalls

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Our Presenters

Charles R. Macedo, Esq.

Partner

AMSTER ROTHSTEIN & EBENSTEIN LLP

Intellectual Property Law

Charley, a physicist by training, litigates in all areas of intellectual property law, including patent, trademark and copyright law, with a special emphasis in complex litigation and appellate work. Companies and individuals from a wide range of industries turn to him to develop offensive and defensive strategies for the development and enforcement of their patent and trademark portfolios.

Daniel Dardani

Technology Licensing Officer

Massachusetts Institute of Technology

Daniel is an intellectual property licensing professional at the MIT Technology Licensing Office – the country's premier technology transfer office. He has over 17 years of experience at MIT managing a large and sophisticated portfolio of technologies, where he has negotiated license agreements with countless businesses from startup companies to SMEs to Fortune 500 global corporations.

Agenda

- What is AI/ML?
- Current Limits on Protections
- Strategies to Protect
- Monetization Strategies

- What is AI/ML?
- Current Limits on IP Protection for AI/ML Innovations
- Strategies to Protect AI/ML Innovations
- Monetization Strategies

Agenda

- What is AI/ML?
- Current Limits on Protections
- Strategies to Protect
- Monetization Strategies

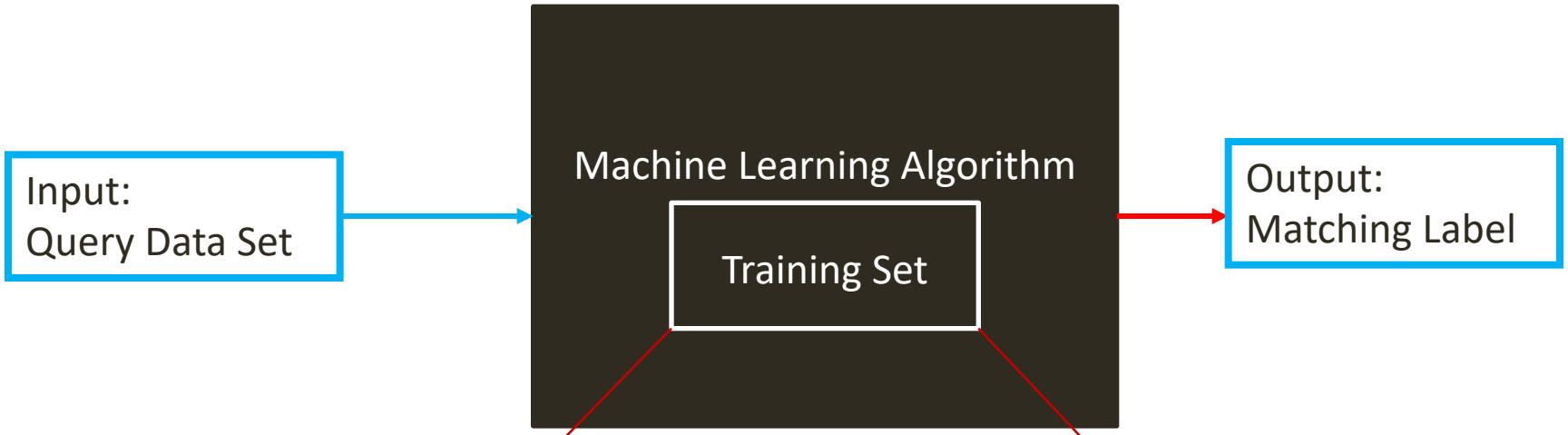
- What is AI/ML?
- Current Limits on IP Protection for AI/ML Innovations
- Strategies to Protect AI/ML Innovations
- Monetization Strategies

What is AI/ML?

How Does AI/ML Work?

What is AI/ML?

How Does AI/ML Work?



Training Set

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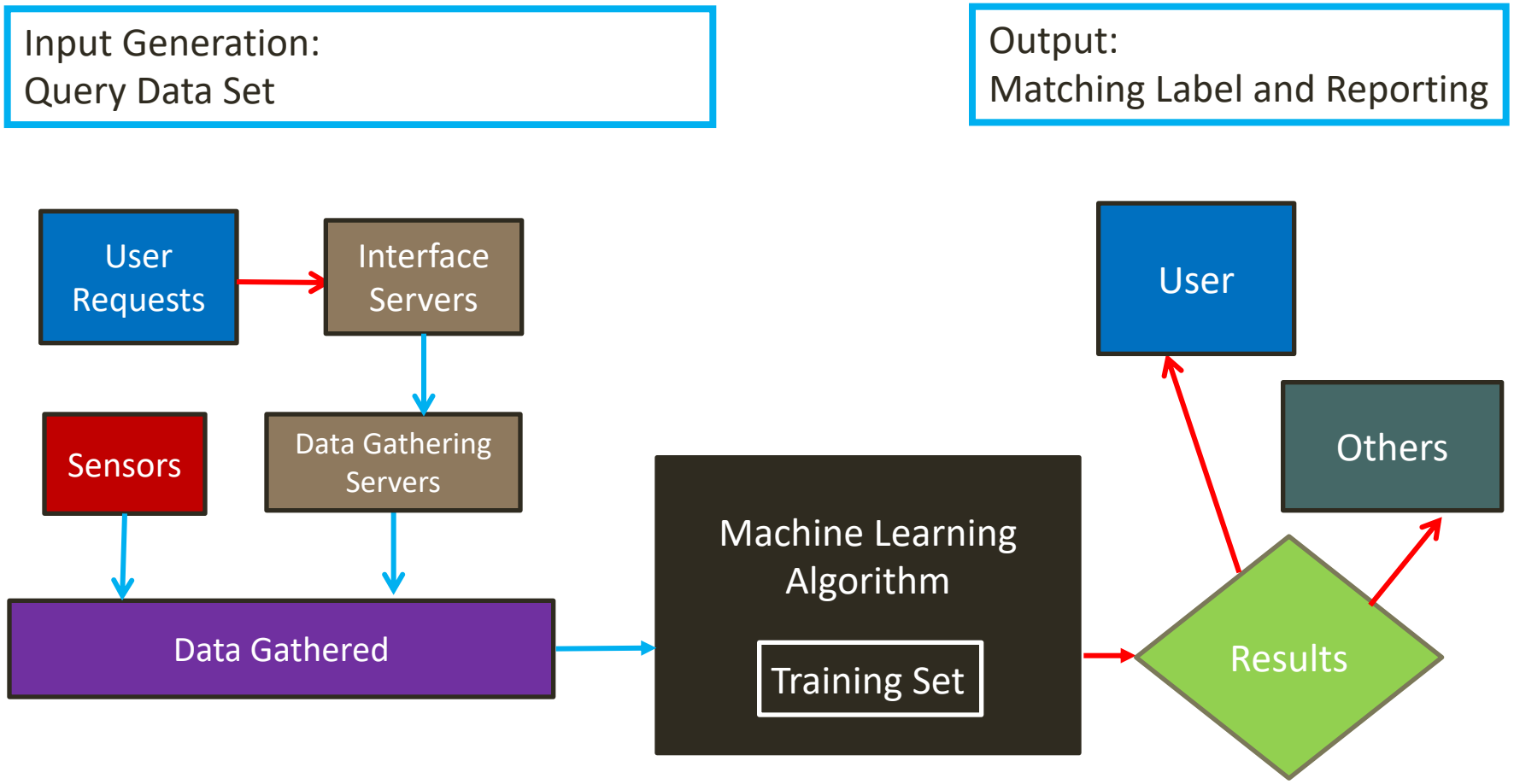
...						
M	44	15	e		9	Abnormal

What is AI/ML?


Input Generation:
Query Data Set
Output:
Matching Label and Reporting
User Requests
Interface Servers
Sensors
Data Gathering Servers
Data Gathered
Machine Learning Algorithm
Training Set
Results
User
Others

Where are AI/ML relevant?

Example Applications For Using AI/ML Today

Healthcare and Medicine:

Diagnosing and stratifying patients, and treating disease based on those diagnoses

Financial Services:

Identifying and predicting optimal investments

Marketing:

Identifying and presenting personalized advertising

Recruitment/ Human Resources:

Identifying best potential candidates and/or problem employees

Products production:

Identifying and designing key product features/designs

Security:

Facial recognition, identity recognition, detecting security risks

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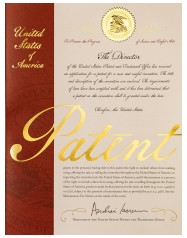
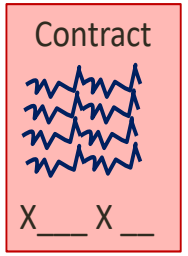
Relevant Potential IP Protection

Relevant IP Tools	Scope of Coverage	Examples
©	Protects Original Expressions, but not underlying Ideas	Computer programs, some data compilations, images, stories/ narratives, etc.
	Protects new, not-obvious, useful inventions – can't be abstract	Computer systems and methods, user interfaces, equipment, etc.
	Protects what parties agree to protect	Data license, software license, R&D agreement, NDA, etc.
	Protects secrets that have value because they are secret	Data, processes, algorithms, compilations, know how, etc.

Potential Innovation Spots

Training Sets:

- Data Items, Labels, Generation

ML Algorithms:

- Kind, Query Format, Output format

Query :

- Query and processes used in generating Query

Output Processing:

- Output and processes used in processing Output

Overall System:

- How the pieces fit together

Training Set

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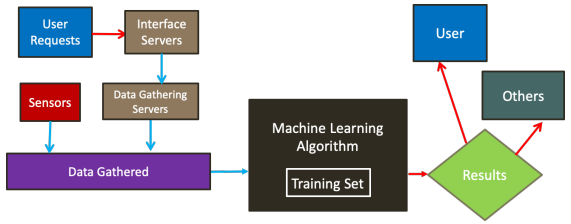
Machine Learning Algorithm

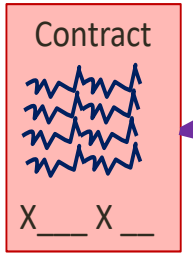
Query

Output



Potential IP Protection

Relevant IP Tools



Potential Innovation Spots

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Machine Learning Algorithm

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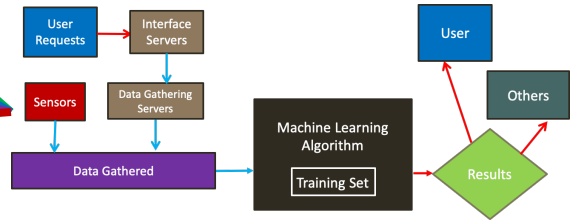
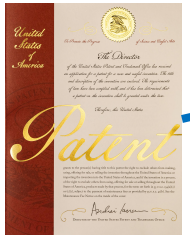
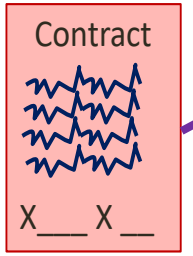


Challenges to IP Protection

Relevant IP Tools





Potential Innovation Spots

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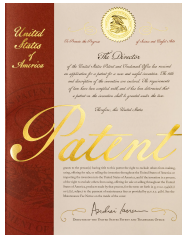
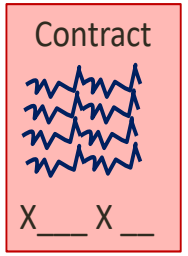
Challenges to IP Protection

Relevant IP Tools | **Challenges:** | **Potential Innovation Spots**

Copyright law may not protect data sets without enough **originality** in the selection, inclusion and/or presentation of data included in the database.



Patent law under "**printed matter**" doctrine will not protect data sets.



Contract law is one of the best options, but it requires **the other side to agree**, and for the licensor to **have something** to license.

Trade secret law requires that the training set be **kept secret** to be protected. If dataset becomes available without restrictions, this option may not be available.

Training Set

Item	Data 1	Data 2	Data 3	...	Data N	Tag
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Other challenges:

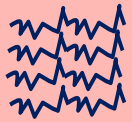
Owning underlying data (consent of data sources)

Regulatory issues (hipaa, pii, privacy, etc.)

Challenges to IP Protection

Relevant IP Tools **Challenges:** **Potential Innovation Spots**

Contract



X___ X __

Technological Solutions May be Best Protection

Data N	Tag
4	Normal
4	Normal
5	Normal
9	Abnormal

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of data

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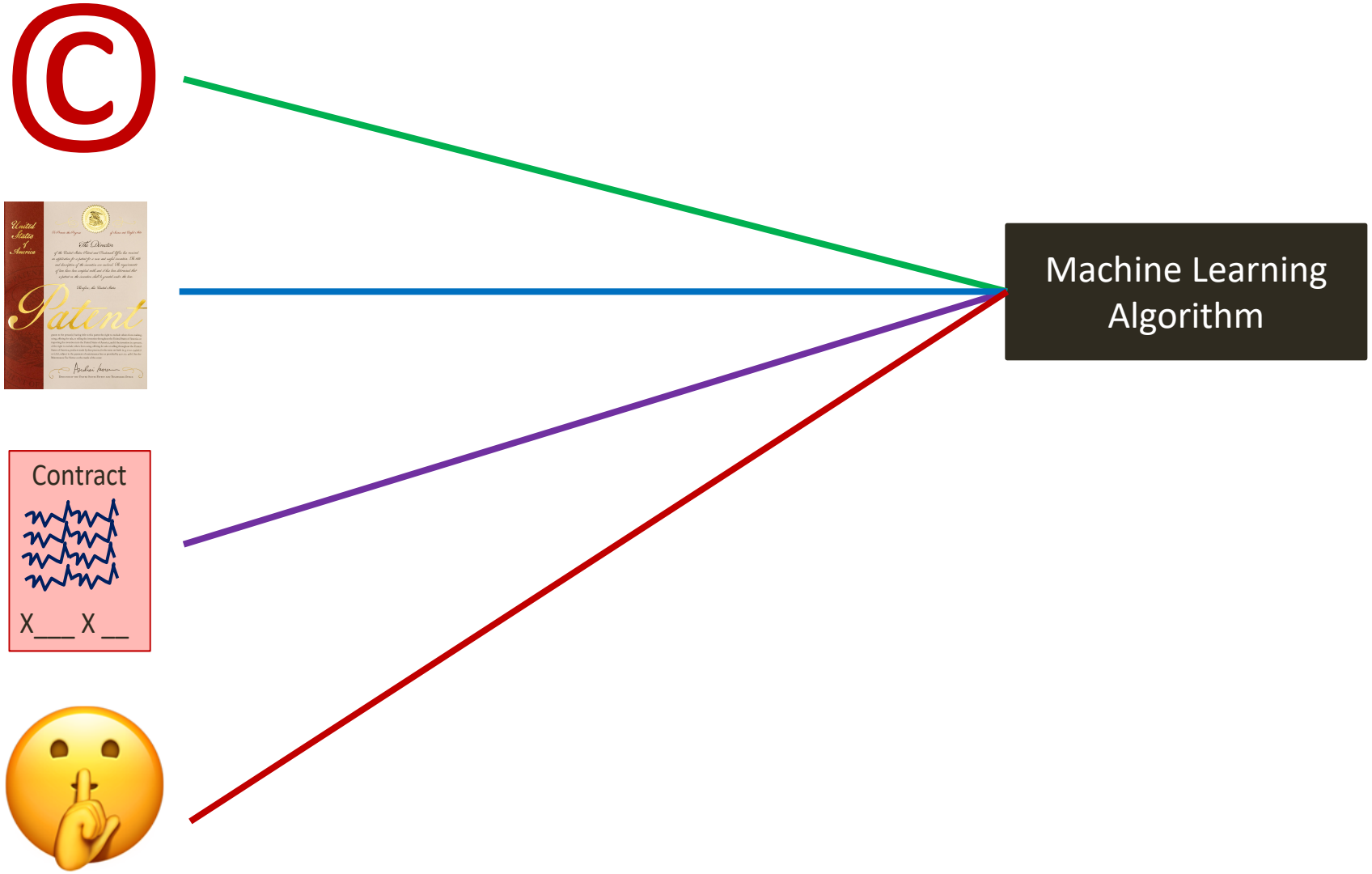
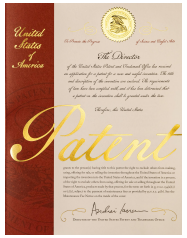
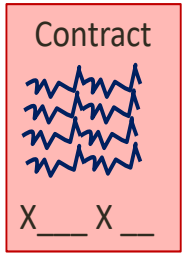
Challenges to IP Protection

Relevant IP Tools

Potential Innovation Spots



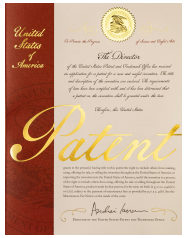
Challenges to IP Protection

Relevant IP Tools	Challenges:	Potential Innovation Spots
©	**Copyright law** can **potentially protect** software, but beware of "**open source**" issues	
	**Patent law** may **potentially protect** a novel and non-obvious algorithm, **but** must navigate *Alice* challenges since an algorithm may be an "**abstract idea**"	Machine Learning Algorithm
	**Contract law** is one of the best options, but it requires the **other side to agree**, and for the licensor to **have something to license**.	
	**Trade secret law** requires that **algorithm be kept secret** to be protected. If "**open source**" or **required to be disclosed** for, e.g., regulatory reasons, this option may not be available.	

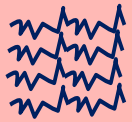
Challenges to IP Protection

Relevant IP Tools

Potential Innovation Spots



Contract



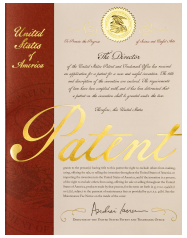
X___ X __

Query

Challenges to IP Protection

Relevant IP Tools | **Challenges:** | **Potential Innovation Spots**

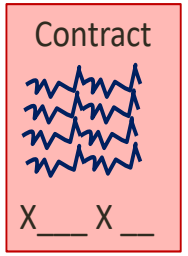
Copyright law is probably not available.



Patent law is probably not available.

As a practical matter, protecting merely the the form of the query without more will be difficult.

Query



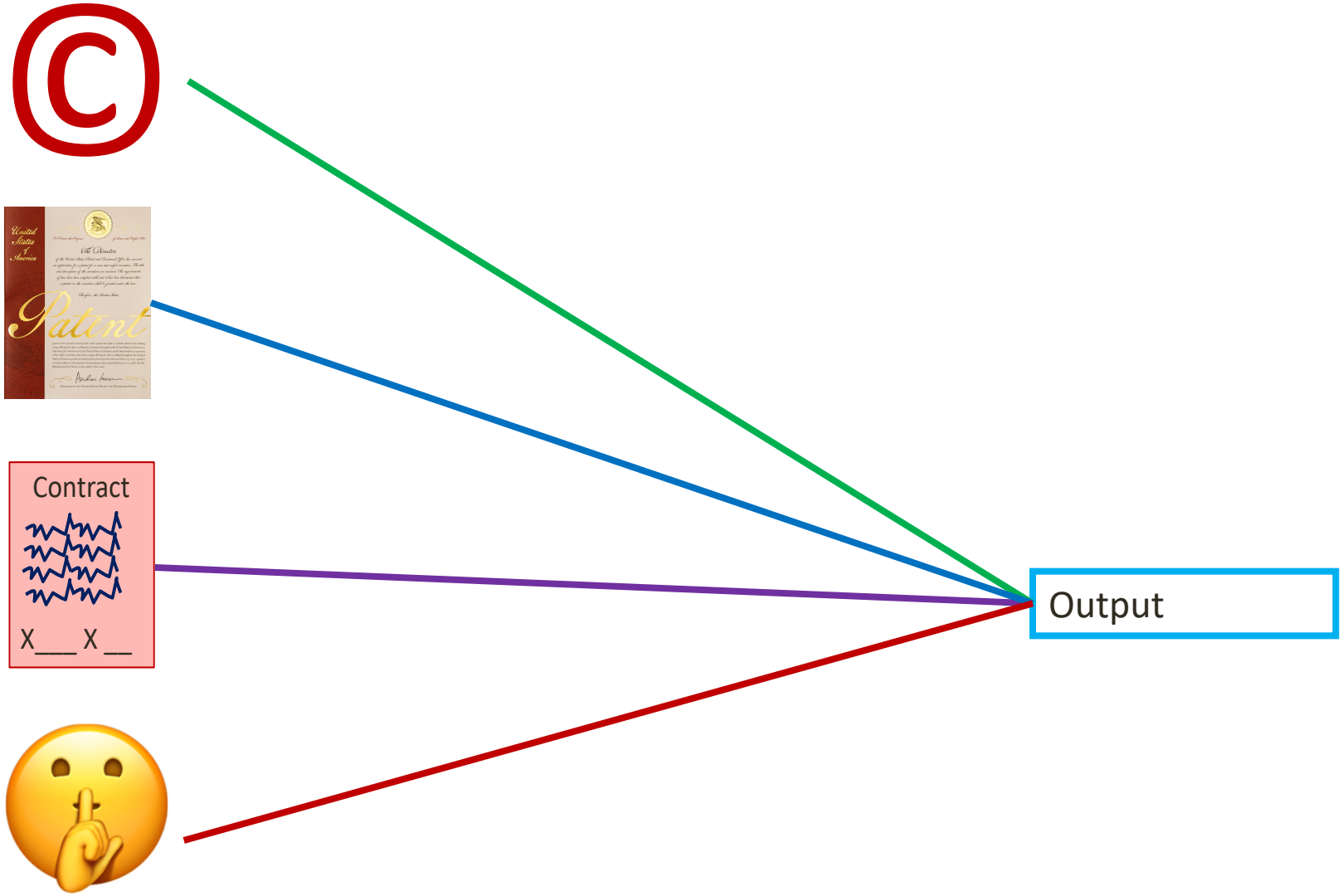
Contract law is one of the few options, but it requires the **other side to agree**, and for the licensor to **have something to license**.

Trade secret law requires that **query be kept secret** to be protected, this is unlikely to be the case in most instances.

Challenges to IP Protection

Relevant IP Tools

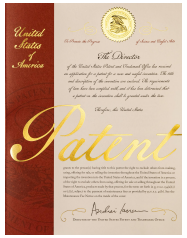
Potential Innovation Spots



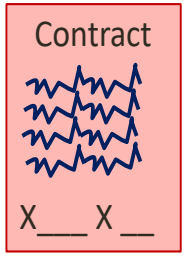
Challenges to IP Protection

Relevant IP Tools | **Challenges:** | **Potential Innovation Spots**

Copyright law will not allow computers to be "authors".



Patent law will note allow computers to be "inventors".



Contract law is one of the best options, but it requires the **other side to agree**, and for the licensor to **have something to license**.

Trade secret law requires that **output be kept secret** to be protected. Most uses cases involve selling the "output" so it may not be a good option.

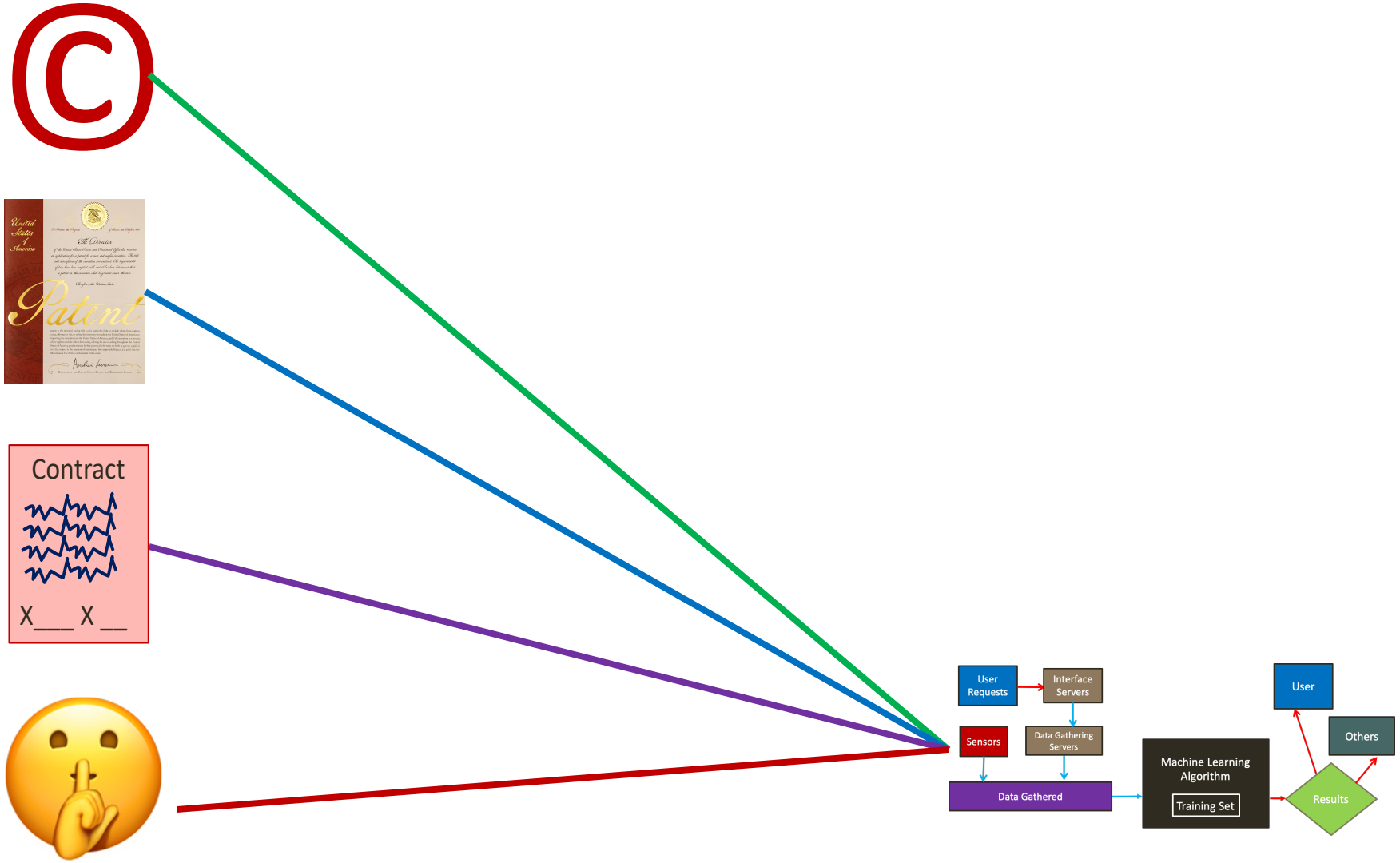
As a practical matter, protecting merely the the output of an AI/ML program without more will be difficult.

Output

Challenges to IP Protection

Relevant IP Tools

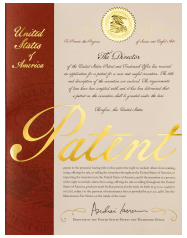
Potential Innovation Spots



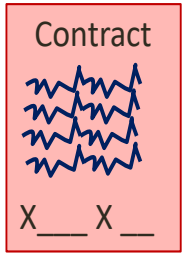
Challenges to IP Protection

Relevant IP Tools | **Challenges:** | **Potential Innovation Spots**

Copyright law can **potentially protect** software, but beware of "**open source**" issues

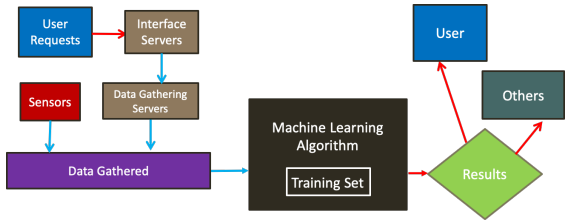


Patent law may **potentially protect** a novel and non-obvious computer implemented systems and methods, **but** must navigate *Alice* challenges since an algorithm may be an "**abstract idea"**



Contract law is one of the best options, but it requires the **other side to agree**, and for the licensor to **have something to license. Need to make sure all rights holders participate.**

Trade secret law requires that at least licensed **components be kept secret** to be protected. If "**open source**" or **required to be disclosed** for, e.g., regulatory reasons, this option may not be limited.



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Strategies to Protect AI/ML Innovations

Start with Picking the Human Conceived Elements as item to protect

Training Sets:

- Data Items, Labels, Generation

ML Algorithms:

- Kind, Query Format, Output format

Query :

- Query and processes used in generating Query

Output Processing:

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Overall System:

- How the pieces fit together

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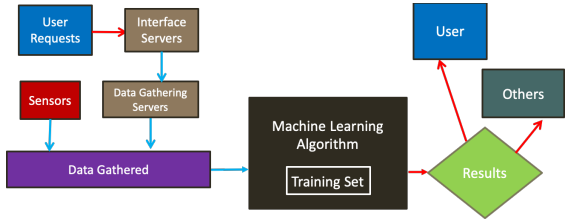
Machine Learning Algorithm

Query

Output



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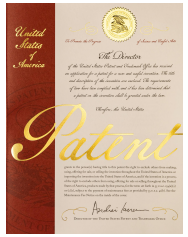
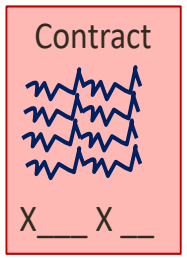
Use technology to block unauthorized access/copying where possible

Altering the structure or content of the training set to incorporate greater creativity -- tags can be a sufficient ”enhancement”

Limit access to training set if possible, so only AI algorithm using training set is provided



Patent methods and systems used to generate and update training sets



Fill gaps with contract law

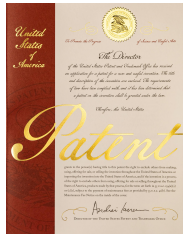
Beware of open source and third party rights issues if training set includes data taken from publicly available resources

Strategies to Protect AI/ML Innovations

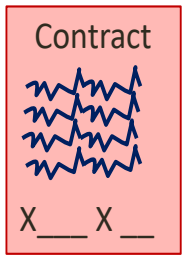
Machine Learning Algorithm

Software protection available potentially for original ML algorithm as encoded

Limit access to coding for AI algorithm where possible



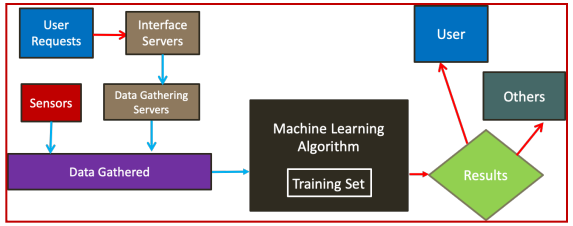
Patent methods and systems implementing ML algorithm as part of a larger application



Fill gaps with contract law

Beware of open source and third party rights issues if third party algorithm is used in part or whole

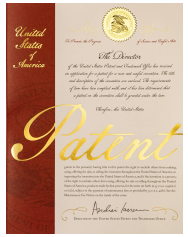
Strategies to Protect AI/ML Innovations



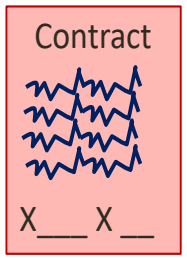
Seek to protect the system as a whole or a larger part of the system to make sure to include human input.

Software protection available potentially for system programming and its components

Limit access to necessary components that are not necessary to make publicly available



Patent methods and systems implementing the larger application



Fill gaps with contract law

Beware of open source and third party rights issues if third party algorithm is used in part or whole

Applying for IP Protection

© Tips for Copyright Applications

- The Copyright Compendium provides instructive guidance - the application requires creative input or intervention from a human author.
- Try to frame the application to say that the Applicant is the author and the machine is just an intermediary.
- For example, Applicant X's creative input throws AI into motion to create the specific output, even if AI is very smart. Show that the input is what creates the output.
- Without showing input or intervention from a human author, the application will fail.
- If litigation is required, avoid litigation in 9th Cir. as evidenced in *Naruto* case.

Applying IP Protection

Patent Drafting Challenges

- Defining the Inventor
- Patent-eligibility
- Divided Infringement
- Claim Support

Applying IP Protection

Patent Drafting Challenges

- **Defining the Inventor**

-- avoid a “Daubus” issue – chose to patent what a human contributed vs. what the computer developed

Applying IP Protection

Patent Drafting Challenges

- **Patent-eligibility**

-- claims should be drafted to the practical application of an abstract idea instead of an abstract idea itself

-- identify the technological problem faced and the technological solution implemented in the disclosure

-- include sufficient details of “how” an “end result” is achieved, rather than merely that an “end result” is achieved

-- have the claim do more than merely state an algorithm, but end up doing something with the results of the algorithm

Applying IP Protection

Patent Drafting Challenges

- **Divided Infringement**

-- claims should always be drafted on a single actor

-- when multiple actors are involved, passively claim what other actors do

Applying IP Protection

Patent Drafting Challenges

- **Claim Support**

-- ML algorithm should include disclosure and details in claims of:

  - Data elements and Tags in training sets
  - Query elements
  - Form of output
  - Type(s) of ML algorithms to be applied

-- disclosure should include examples and code/pseudo code and narrative examples where possible

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Monetization of AI/ML

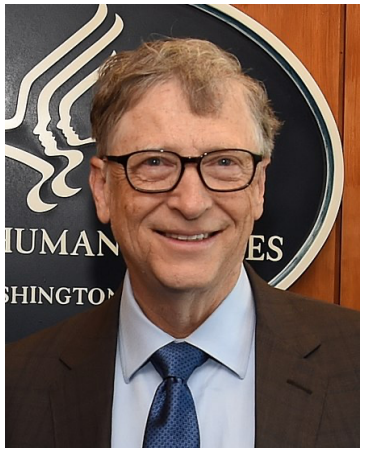
"Monetization"

- Impact
- Investments
- Scholarship/Publications
- IP Licensing Trends at University

- TRUTH *versus* HYPE/BUZZ

AI is the new electricity. I can hardly imagine an industry which is not going to be transformed by AI.

Andrew Ng, Landing AI and deeplearning.ai



Source: https://en.wikipedia.org/wiki/Bill_Gates

A breakthrough in machine learning would be worth ten Microsofts.

-Bill Gates

Humans should be worried about the threat posed by artificial intelligence.

-Bill Gates

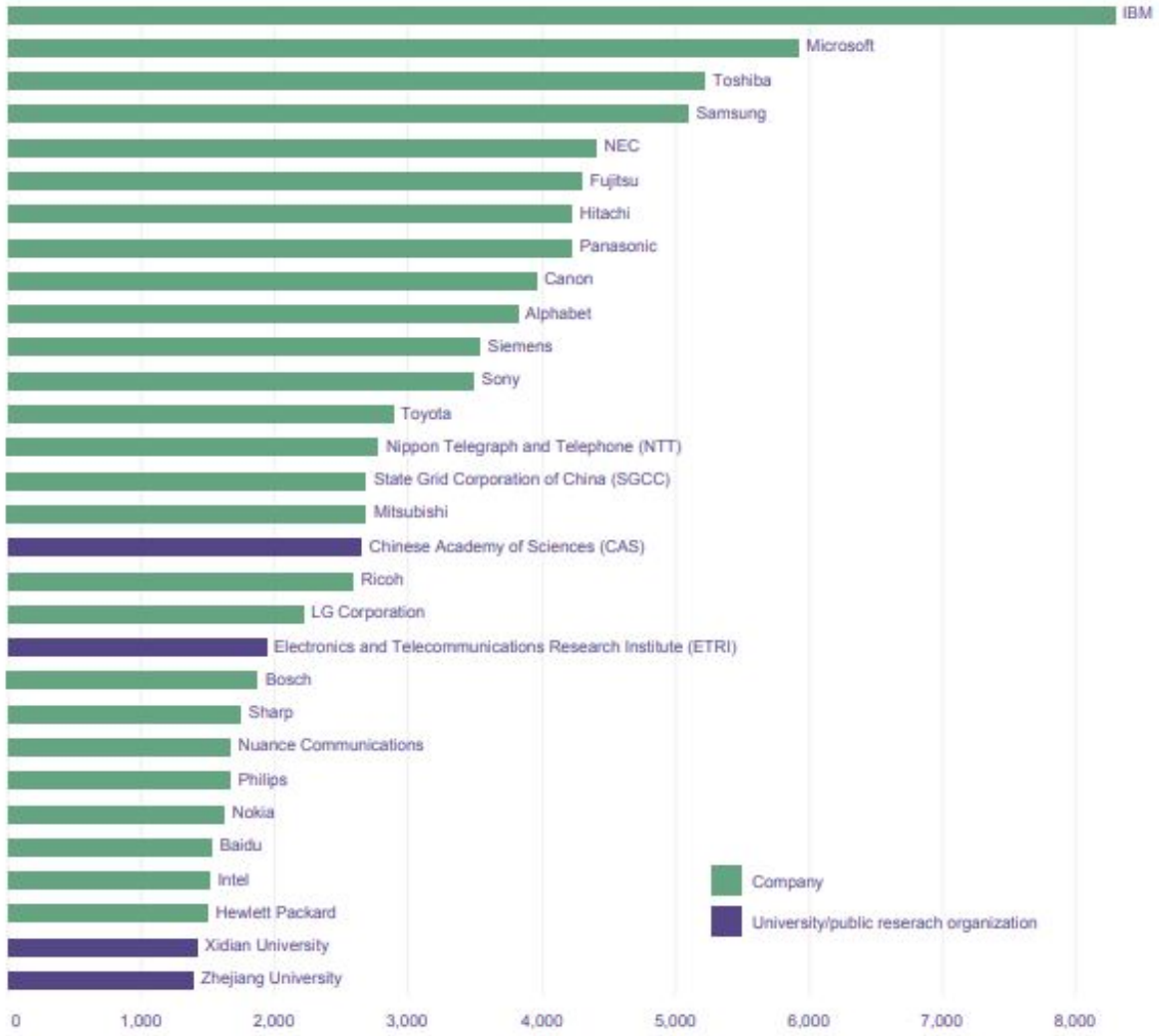
Impact

- PricewaterhouseCoopers (PwC) estimates that AI/ML technology will lead to improvements in labor productivity, product value, and consumption that can potentially create $15.7 trillion in global annual GDP by 2030.
- Up to 14.5% boost in GDP for local economies from AI by 2030 (+14.5%)
- McKinsey&Co. report: $13 trillion globally by 2030, or about 16 percent higher GDP compared with today (+16%)
- AI/ML: 1.2 percent additional GDP growth per year
  - 0.3 percent a year in 1800s for the steam engine
  - 0.4 percent a year in 1990s for robotics
  - 0.6 percent a year in 2000s for spread of IT

Sources: © PricewaterhouseCoopers *PwC's Global Artificial Intelligence Study: Exploiting the AI Revolution*
© McKinsey Global Institute. *Notes from the AI frontier: Modeling the impact of AI on the world economy*

Investments

Top 30 Worldwide Patent Applicants by # of AI Patent Families (26/30 are commercial companies)



Note: Fujitsu includes PFU; Panasonic includes Sanyo; Alphabet includes Google, Deepmind Technologies, Waymo and X Development; Toyota includes Denso; and Nokia includes Alcatel

Source: © WIPO (2019). WIPO Technology Trends 2019: Artificial Intelligence. Geneva: World Intellectual Property Organization. CC BY 3.0 IGO

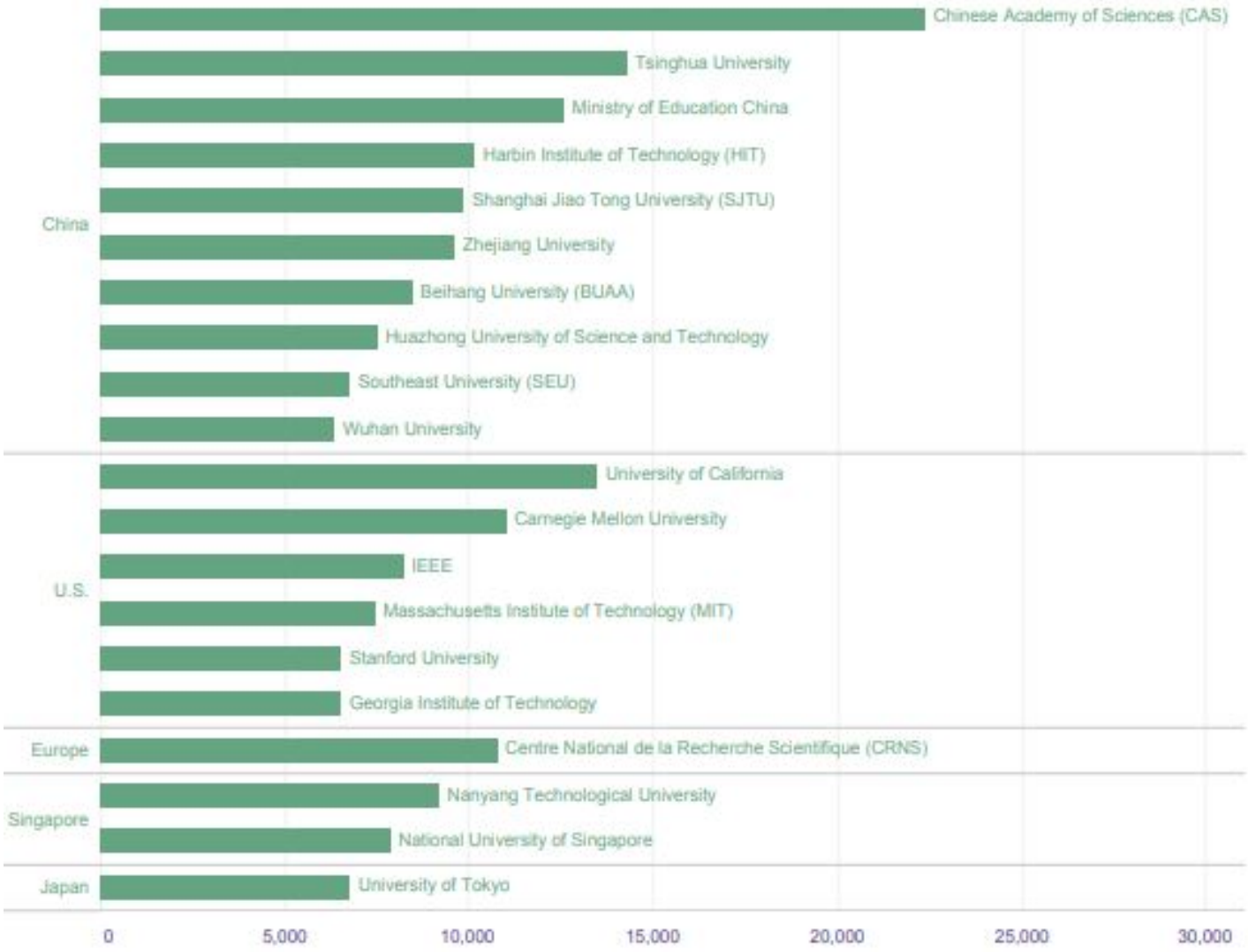
Investments

- Investments in core research and education @ MIT
  - **MIT IBM Watson AI Lab** - $240 Million over 10 years
  - **MIT Schwarzman College of Computing** – backed by $1 Billion investment!
    - Brand new school; 50 new faculty positions; cross disciplinary “clusters” for teaching and research
  - **MIT-Air Force AI Accelerator** - $75 Million over 5 years

- Similar investments at **CMU**, **UPenn, Stanford**, **Steven’s Institute of Technology**, etc.
  - Partnering with industry and US Govt.

Scholarly/Publications

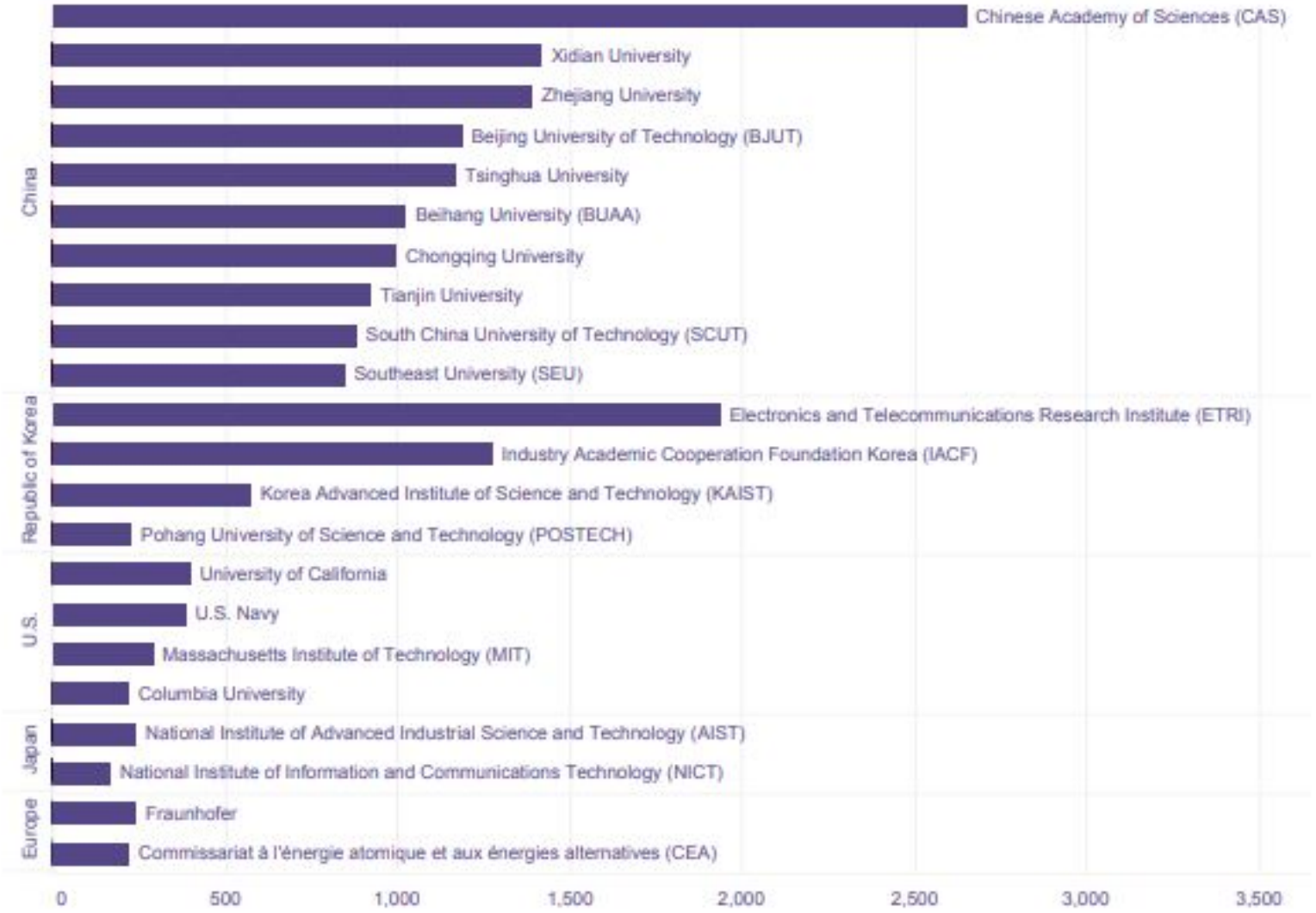
Top 20 universities and public research organizations producing AI scientific publications



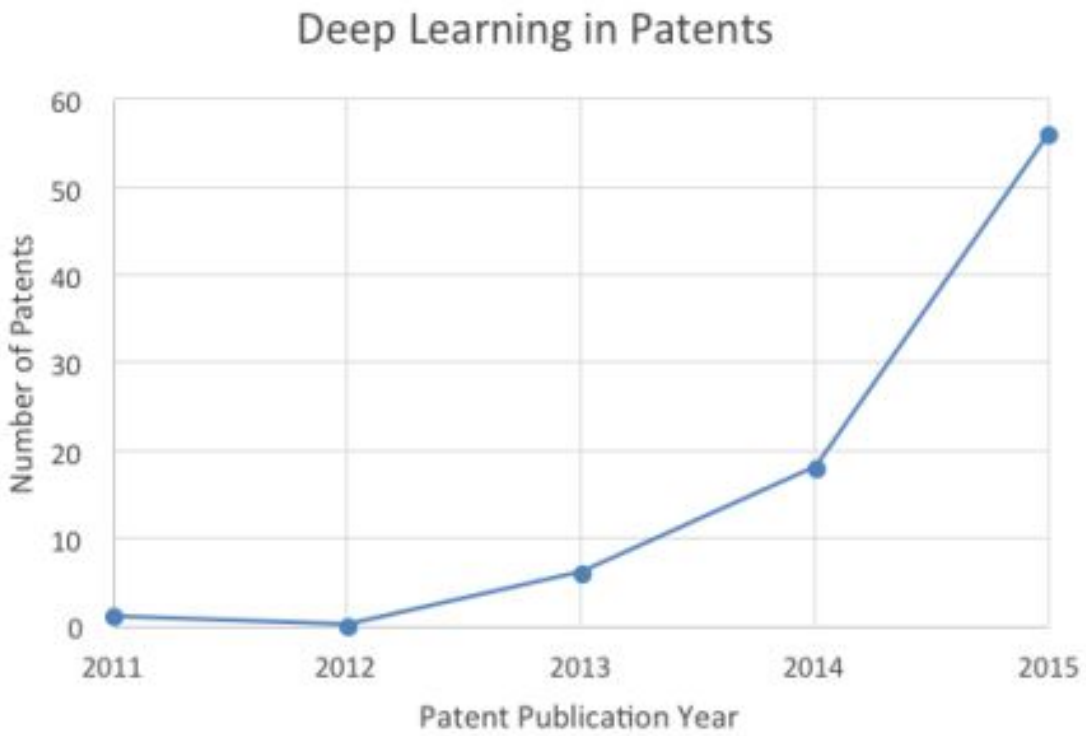
Source: © WIPO (2019). WIPO Technology Trends 2019: Artificial Intelligence. Geneva: World Intellectual Property Organization. CC BY 3.0 IGO

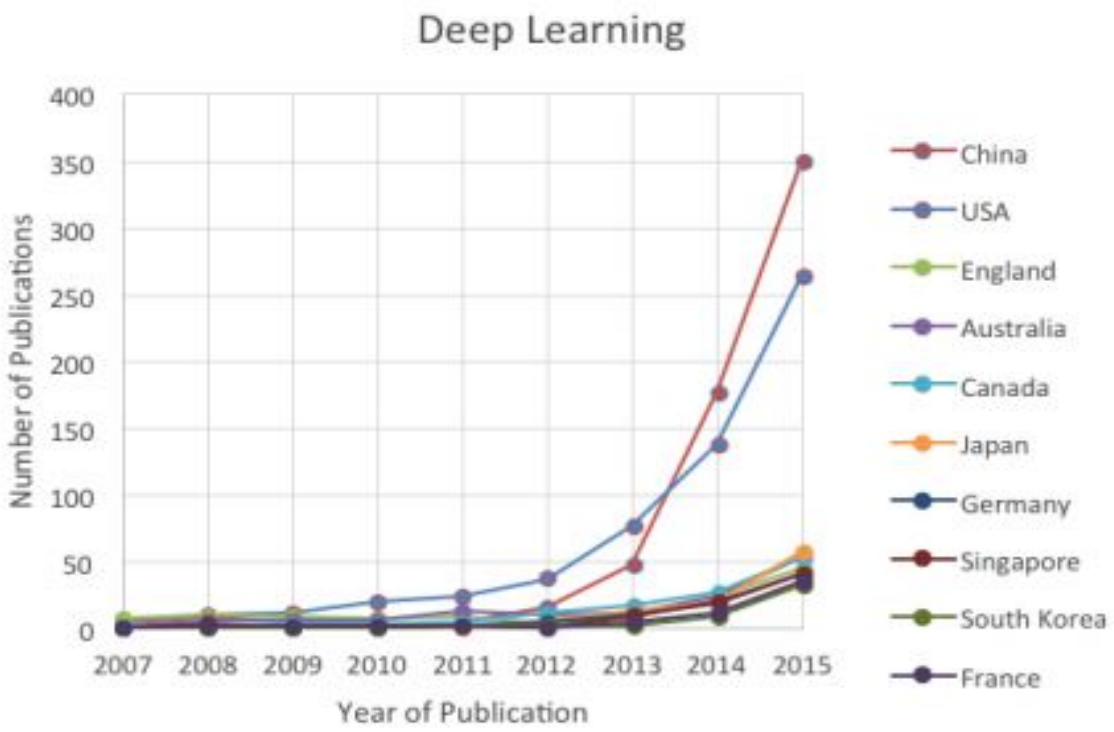
AI/ML Patent Trends

Top AI patent applicants among universities and public research organizations by # of patent families



AI/ML Patent Trends





Source: *NATIONAL ARTIFICIAL INTELLIGENCE RESEARCH AND DEVELOPMENT STRATEGIC PLAN.* A report by the National Science and Technology Council/published by the US Government under the Office of Science and Technology Policy

AI/ML Patent Trends @ Universities

- Initially, rush to stake claim on AI/ML algorithms
- Increasingly, the perceived value from protecting the algorithm is weakening; patents may not be required
- Progressively, more value is being attributed to data, variable weightings and coefficients, training modules

AI/ML Data Trends @ Universities

- Potential issues with monetizing data
- Who owns the Data?
- Is it subject to privacy and medical record protections?
- Can we differentiate or define carefully what is meant by data?
  - Layers of data: raw data; meta data; visualizations; knowledge/information concluded from research
- What is best for the data?
  - Is the data best served via a broad, open, public release?
  - Is the data commercializable?
  - Is a Data Use Agreement required or appropriate? Standardized or bespoke?

AI/ML Software Trends @ Universities

- If algorithms and models are increasingly being shared openly, what about the software implementing the model
- Is there enough perceived value in the © research code to warrant commercial licensing?
- Open source
- Equity Only Licenses

AI/ML University Perspective

- Pitfalls for patenting models/algorithms
  - Culture of sharing permeates
  - Questionable relevancy of the technique by the time a patent may issue
    - Constant algorithmic tweaking from new data feeds (requires broad specification and claims)
    - Fast-paced sprints of innovation
  - Difficult to find real gems amidst sea of disclosures (general purpose ML to do A or B or C)

Questions

Questions?

THANK YOU

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