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SILICON VALLEY FIRST CUP OF COFFEE SEMINAR SERIES

UPCOMING SEMINARS:

Artificial Intelligence (AI) Boot Camp

January 12	Computer-Implemented Inventions in Biotechnology and Healthcare, Patentability from European and US Perspective
January 13	M&A and Investment into AI Companies
January 19	AI in Healthcare, An Overview of Key FDA Policies and Developments
January 20	Patent and Trade Secret Protection for Inventions That Use AI
January 21	AI in Hiring and Recruiting
January 28	AI and Copyright

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SILICON VALLEY FIRST CUP OF COFFEE SEMINAR SERIES

UPCOMING SEMINARS:

Artificial Intelligence (AI) Boot Camp

February 2	The Ethics of Artificial Intelligence for the Legal Profession
February 3	AI and Data Privacy
February 4	Patents for Medtech AI: Opportunities and Pitfalls
February 9	IP Landscape of AI Hardware Startups
February 10	The Risks of Bias and Errors in AI-Enabled Decision-Making
February 11	AI in Digital Advisory Offerings: Regulatory Considerations
February 16	Bias Issues and AI

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PATENTS VS TRADE SECRETS FOR INVENTIONS THAT USE ARTIFICIAL INTELLIGENCE

David V. Sanker, Ph.D.
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January 20, 2021

Presenters

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Short Background

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1983 – 1989: Mathematics Ph.D. at UC Berkeley
1989 – 1992: Assistant Professor of Mathematics
1992 – 2004: Software Engineer
2004 – 2007: J.D. at UC Berkeley
2007 – 2017: IP Associate, Morgan Lewis
2017 – 2021: IP Partner, Morgan Lewis

Presentation Overview

1. Background in Artificial Intelligence
2. Background in Patents
3. Background in Trade Secrets
4. Protection of Inventions and the Data used by Inventions

Background in Artificial Intelligence

The term “Artificial Intelligence” is very broad, encompassing at least (i) Machine Learning, (ii) Natural Language Processing (NLP), (iii) Speech Recognition and Generation, and (iv) Image Recognition.

Most inventions that use AI are using machine learning, so the presentation today focuses on machine learning.

Background in Artificial Intelligence

For training a machine learning model, users must provide a structured set of training data.

There are many different machine learning algorithms. These can generally be split into supervised training techniques and unsupervised training techniques.

Background in Artificial Intelligence

Unsupervised learning is used for training data that has not been classified or labeled. The training process partitions the set of training data into groups of related elements.

For example, if the training data is a set of people and the music they like, unsupervised learning can group together people who have similar music preferences, and thereby make music recommendations. In this example, neither the people nor the music preferences need to be labeled.

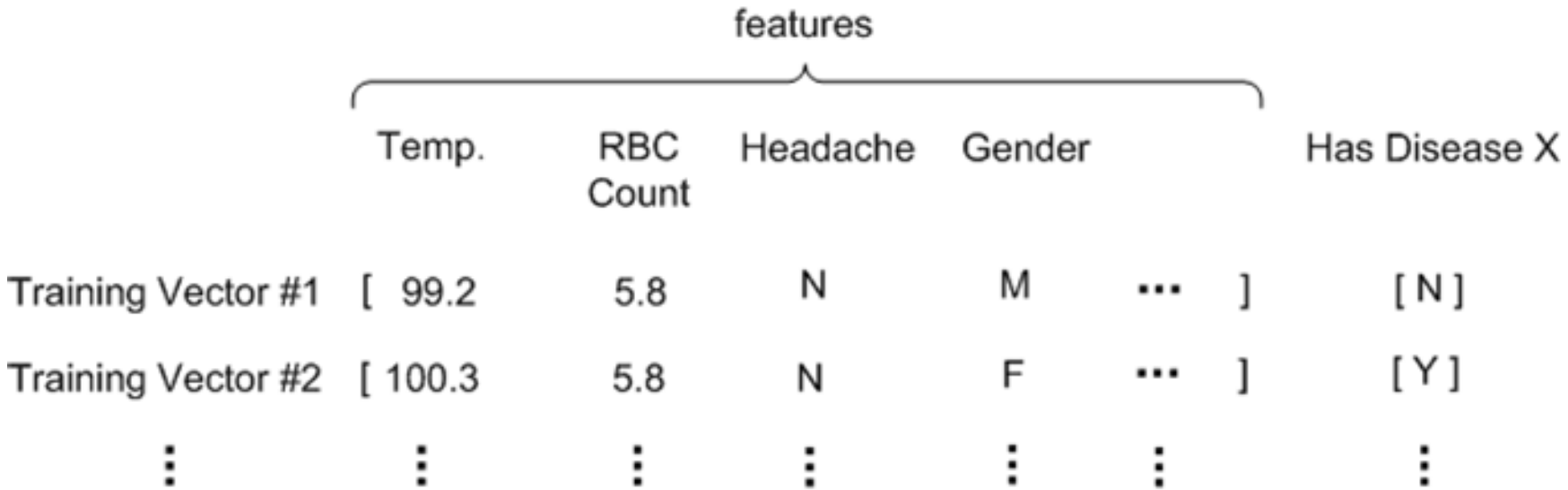
Background in Artificial Intelligence

For supervised learning, the training data is classified or labeled by people before it is input into the machine learning algorithm.

Using the labeled training data, the machine learning system learns how to classify according to the labels.

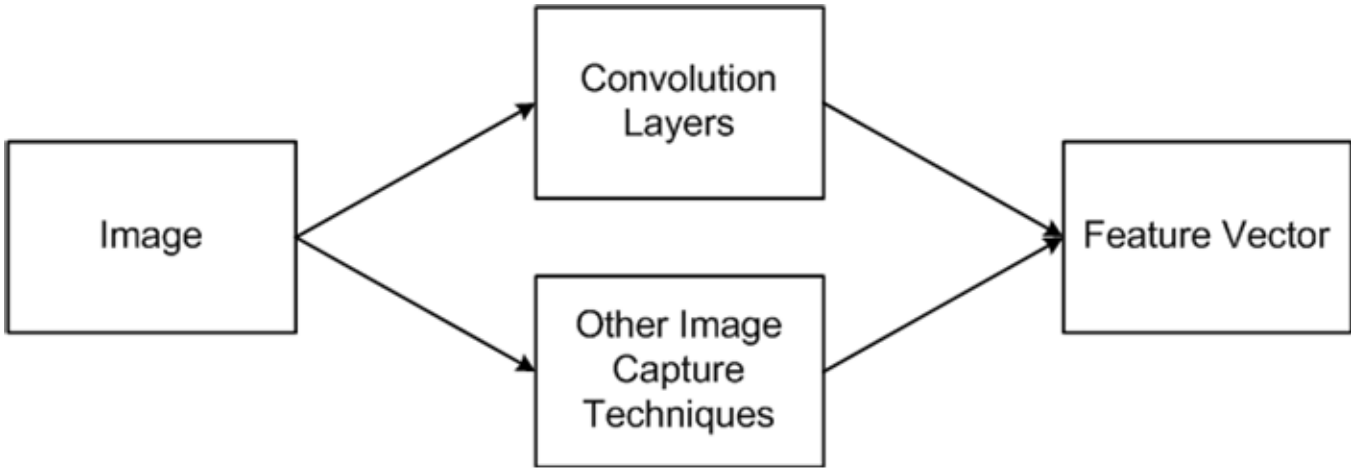
Background in Artificial Intelligence

Example of Supervised Learning

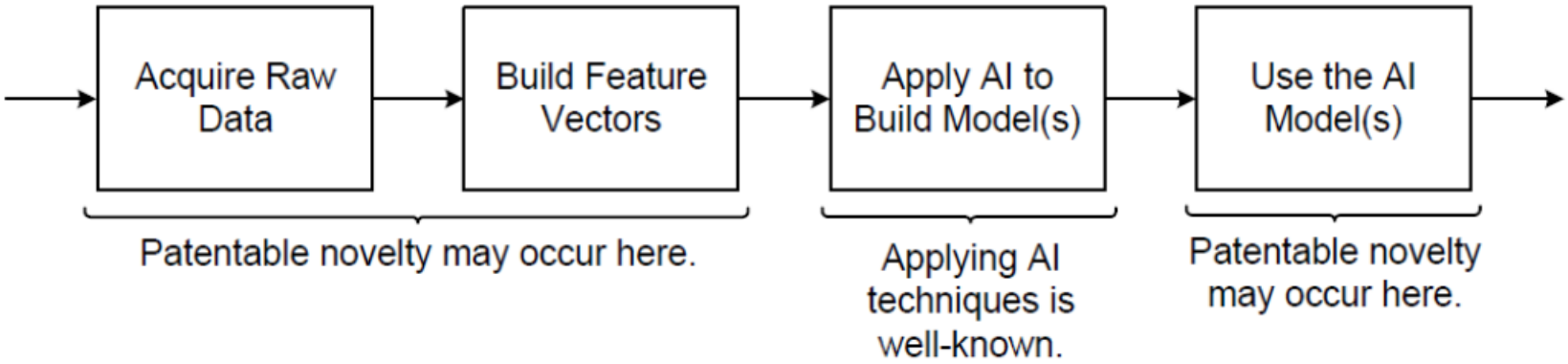


Background in Artificial Intelligence

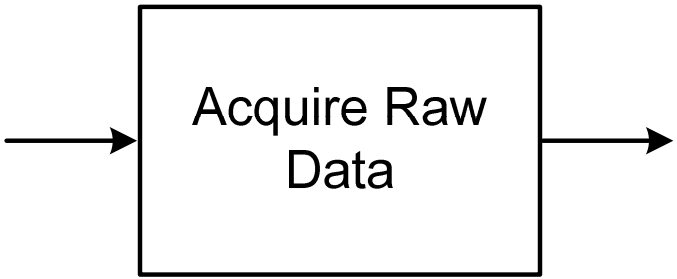
Supervised Learning with Images



Inventions That Use AI – Simplified Framework

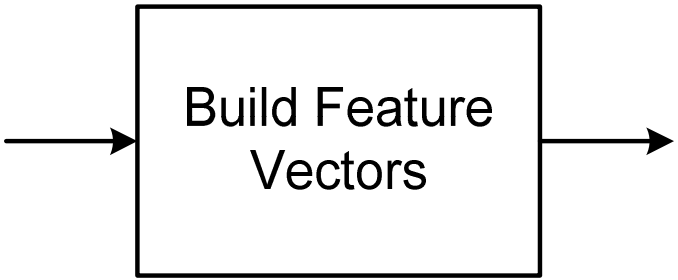


Inventions That Use AI – Simplified Framework



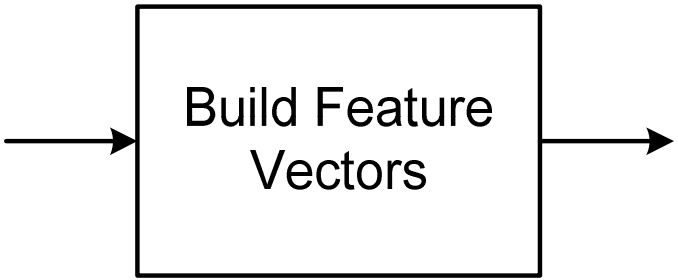
- Are any of the data elements new? New depends on context.
- Are any of new data elements non-obvious?

Inventions That Use AI – Simplified Framework



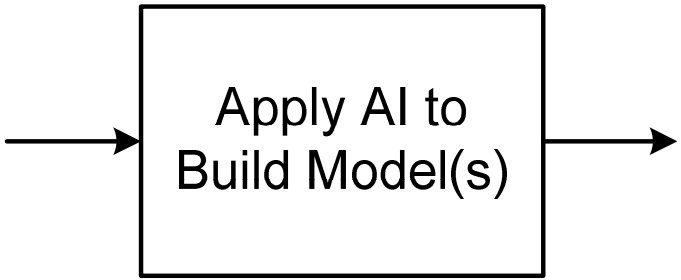
- Have the raw data elements been combined in new ways?
- Simple Boolean combinations of data elements can be handled by the AI engine, but there are many types of calculation that are beyond what current AI engines can do.

Inventions That Use AI – Simplified Framework



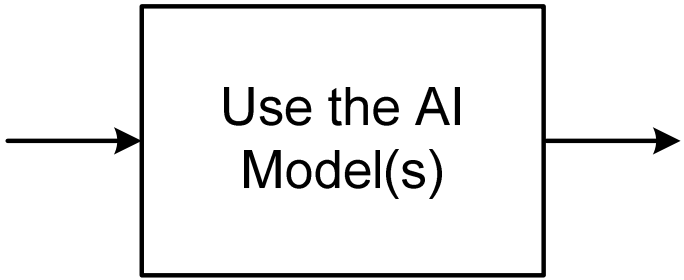
- Suppose the raw data values are r_1, r_2, r_3, …
- The simplest approach is to use these as the features: $f_1 = r_1$, $f_2 = r_2$, etc.
- But you can create more complex features, such as $(r_1 + r_2) / r_3$

Inventions That Use AI – Simplified Framework



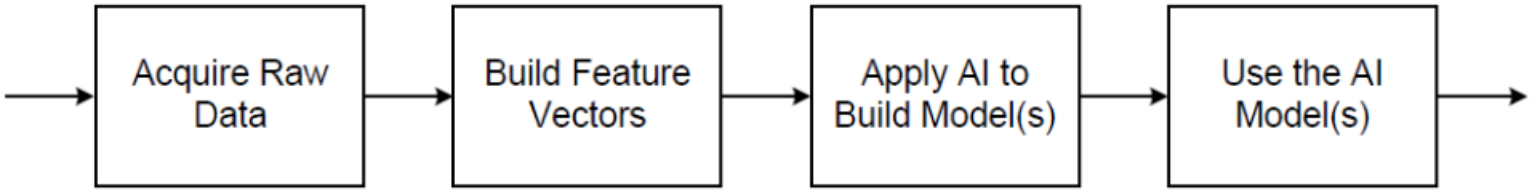
- Unless you have invented a new AI Algorithm (or a meaningful variation), this step does not affect patentability.

Inventions That Use AI – Simplified Framework



- After applying AI, do you use the output in a new way?
- For example, the AI output may be just one piece of data that is used as part of the determination of what action to take next.
- In some cases, the output of the AI is part of a novel User Interface.

Hypothetical Example #1 (Spam Filtering)



Use standard indicators of spam (e.g., domain of sender, existence and counts of certain keywords)

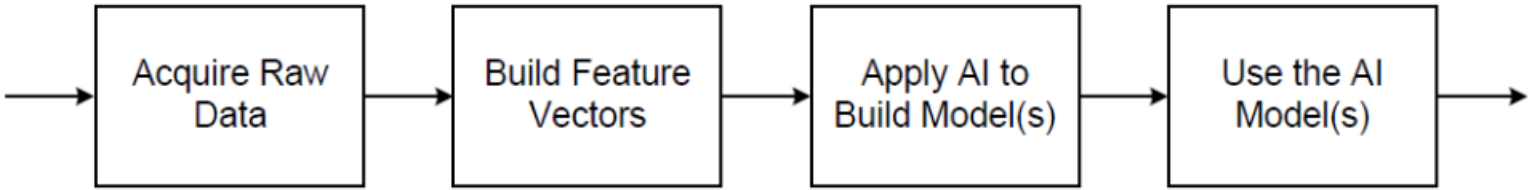
Use the data as collected

Apply standard AI

Designate new items as spam according to the model

Not Patentable.

Hypothetical Example #2 (Network Security)



Collect data at many nodes in the network, including source and destination of packets, as well as packet size, volume, and type

Probably not novel

Combine data from two or more nodes (e.g., data from nodes that have no direct link)

The unique combinations can create novelty

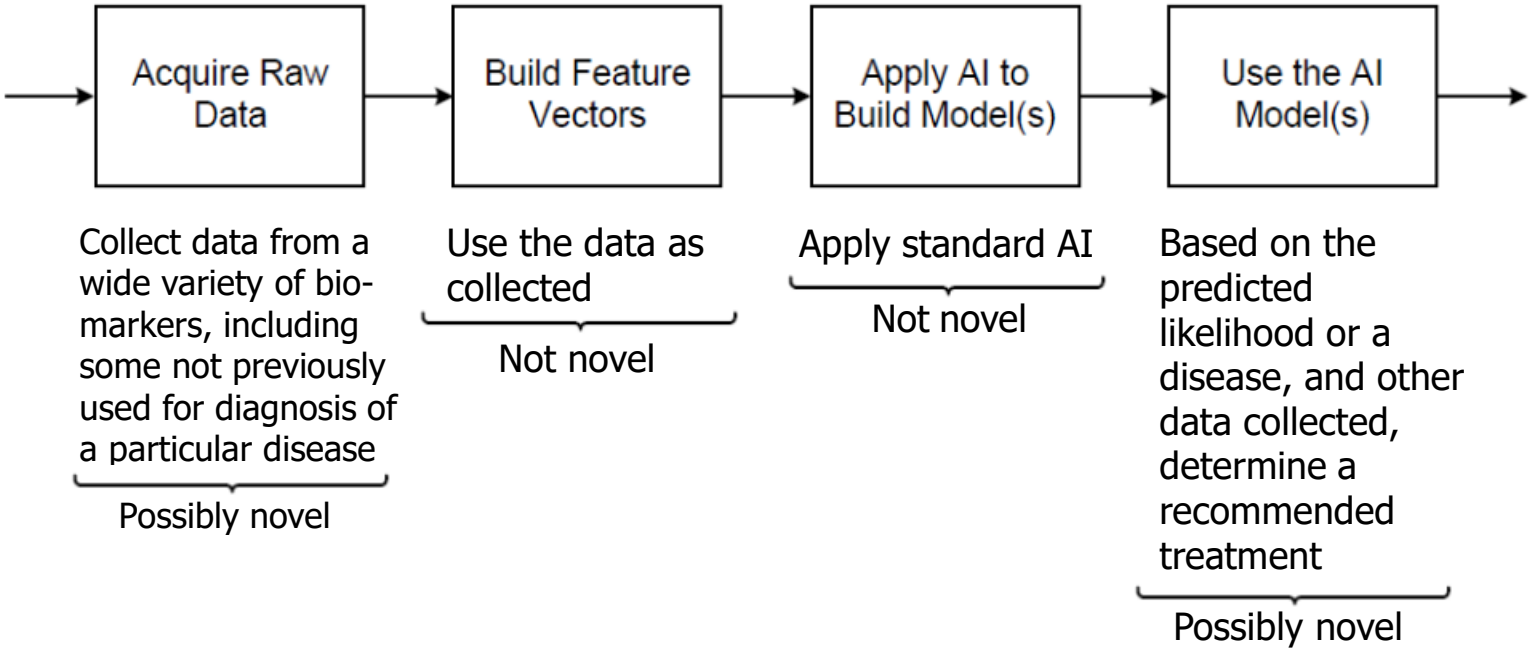
Apply standard AI

Not novel

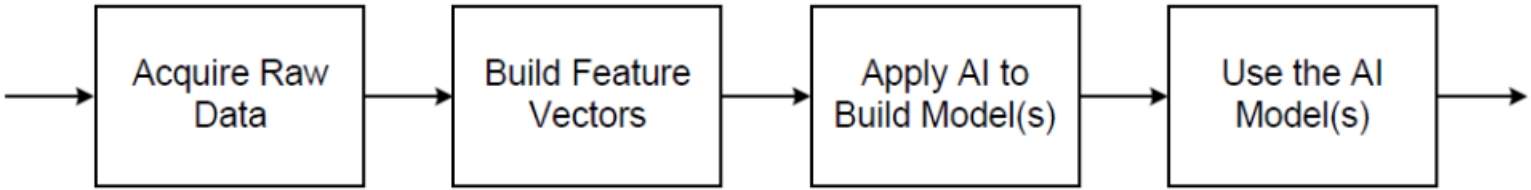
Notify if intrusion suspected

Not novel

Hypothetical Example #3 (Biological Testing)



Hypothetical Example #4 (Assembly Line)



Sensors determine quantity and properties of individual products at multiple points on the assembly line

Probably not novel

Combining some of the data points may create novelty

Possibly novel

Apply standard AI

Not novel

Provide a unique user interface to graphically review the flow (e.g., using a colored heatmap to illustrate developing weaknesses in the flow)

Possibly novel

Background in Patents

1. Section 101 – Patent Eligibility

   - This used to be a trivial hurdle
   - Now, many inventions are being rejected for being allegedly directed to an "abstract idea"
   - I am preparing two articles on this topic:
     - ✓ A Quantitative Approach to Overcoming Subject Matter Eligibility Rejections
     - ✓ Overcoming Subject Matter Eligibility Rejections for Inventions that use Artificial Intelligence

Background in Patents

2. Section 102 and 103 – Novelty

- You can't get a patent on something that is known or an obvious combination of things that are known.
- At this point, the tools of AI are well-known, and it is fairly obvious to apply AI almost everywhere.
- See boxes 1, 2, and 4 in the simplified framework.

Background in Patents

3. Section 112 – Claim Drafting

- The claims need to be supported by the specification and figures.
- The claims have to be sufficiently clear.

Background in Trade Secrets

What is protectable as a trade Secret?

- Trade secret protection applies broadly to business, financial, and technical information, including software source code, when

  (i) the information is not generally known or ascertainable,

  (ii) the information provides independent economic value or business advantage, and

  (iii) reasonable efforts are taken to preserve secrecy.

Background in Trade Secrets

What is protectable as a trade Secret?

- Trade secret protection is theoretically unlimited in time, and does not require any government approval. Protection can continue as long as the information is kept secret.

- Even when a company takes strict measures to keep information secret, trade secret protection can be lost due to reverse engineering or independent derivation by others.

General Rules for Selecting Patents or Trade Secrets

1. Is there an invention?

   - There are many things worth protecting that would not be classified as “inventions”, such as data.

   - The determination of what is “patent-eligible” can depend on the assigned Examiner.

General Rules for Selecting Patents or Trade Secrets

2. Will the invention be publicly visible?

- If people can see the invention, then patent protection is the only option (e.g., a software user interface).
- Reverse engineering is completely legal, so even if the invention is encapsulated in a device (such as a chip used in a smart phone), good engineers and good testing equipment can generally uncover the invention.

General Rules for Selecting Patents or Trade Secrets

3. How easy is it to detect infringement?

- This question generally addresses the same issue as visibility, but expressed in a different way.
- If it is too difficult (or impossible) to identify infringement (even with reverse engineering of potentially infringing products), then a patent would not have much value.
- Infringement evidence can be acquired during litigation discovery, but it could be very costly to pursue litigation only to find there is no infringement.

Use Trade Secret Protection When …

1. There is no human inventor

   - 35 U.S.C. § 100: (f)The term "inventor" means the **individual** or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention.

   - 35 U.S.C. § 101: **Whoever** invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

   - This rule may change in the future, but for now, you cannot patent an invention when there are no human inventors. *See* "Can the US Patent and Trademark Office handle 'artificial inventors'?",*Daily Journal*, September 30, 2019 and "USPTO cannot handle 'Artificial Inventors.' Now what?", *Daily Journal*, June 25, 2020.

Use Trade Secret Protection When …

2. The human contribution is just input data to AI

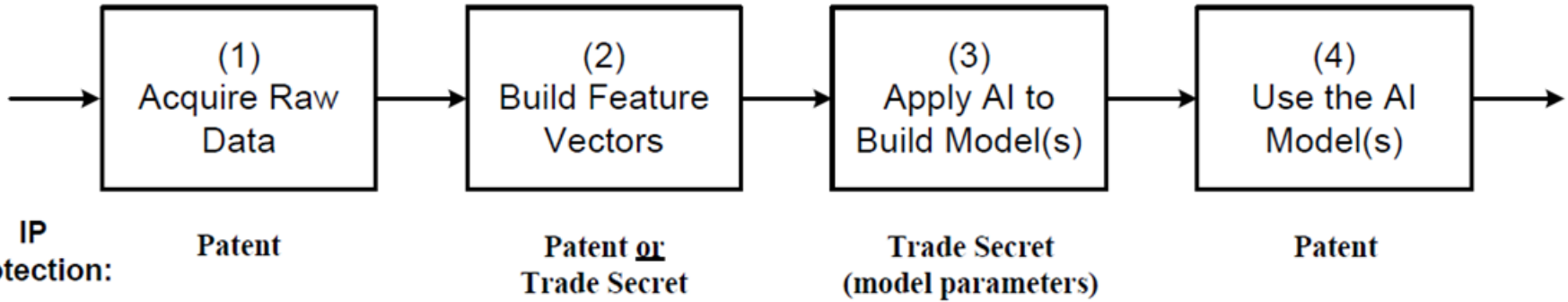
- Some inventive AI platforms are substantially automated, but require some initial input parameters to get started.
- Example 1: Use an AI system to formulate a metal alloy, starting from an initial specified composition.
- Example 2: Use an AI system to formulate an integrated circuit (IC) chip based on a supplied sample.

Use Trade Secret Protection When …

3. The non-AI concepts are an "Abstract Idea"

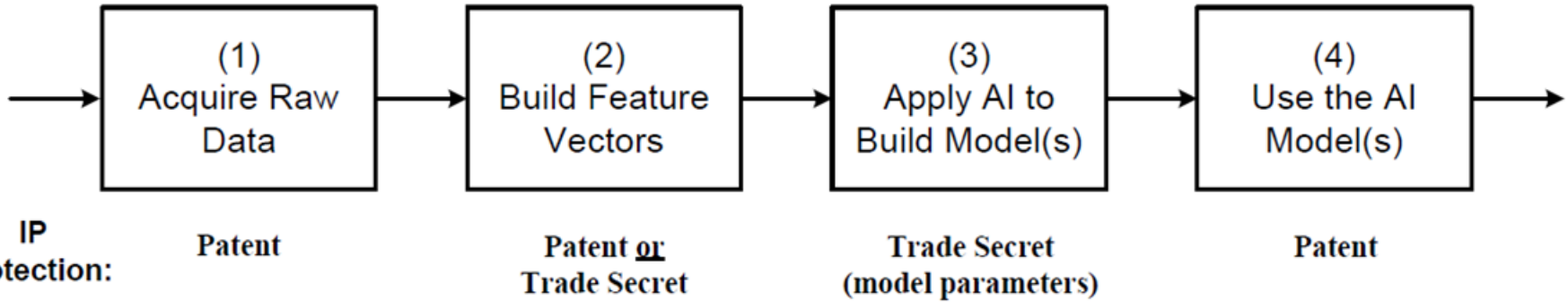
- After the Supreme Court decision in *Alice v. CLS Bank* (2014), Examiners routinely reject patent claims under 35 U.S.C. § 101, asserting that the claims are not even eligible for patent protection.
- Some Examiners reject claims as "Abstract Ideas" even when the claims recite novel, non-obvious, technical inventions.
- Look for technical details and features that are not routine.

Protection Based on Where the Novelty Occurs



- If the novelty is the specific raw data elements, it is difficult to keep as a trade secret.
- If the novelty is the construction of calculated features, it is more likely that the calculation can be kept secret.
- If the novelty is in the use of the AI models (e.g., a user interface), it is typically visible, so trade secret protection is generally not possible.

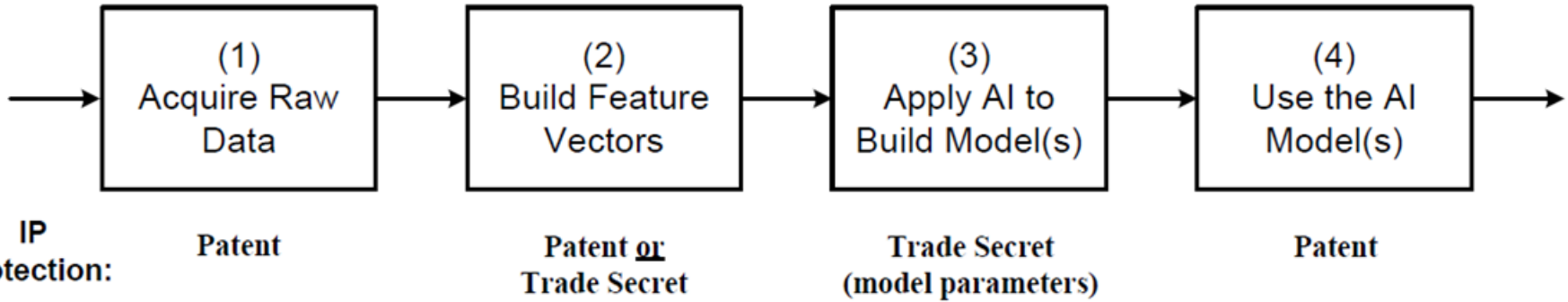
Protection Based on Where the Novelty Occurs



- Example 1: A company uses AI to develop a new way to diagnose coronavirus infection using a set of data elements, including blood pressure, temperature, and a few blood characteristics. Also included is one unexpected data element. The company prepares a software application that is widely distributed.

Patent, Trade Secret, or Neither?

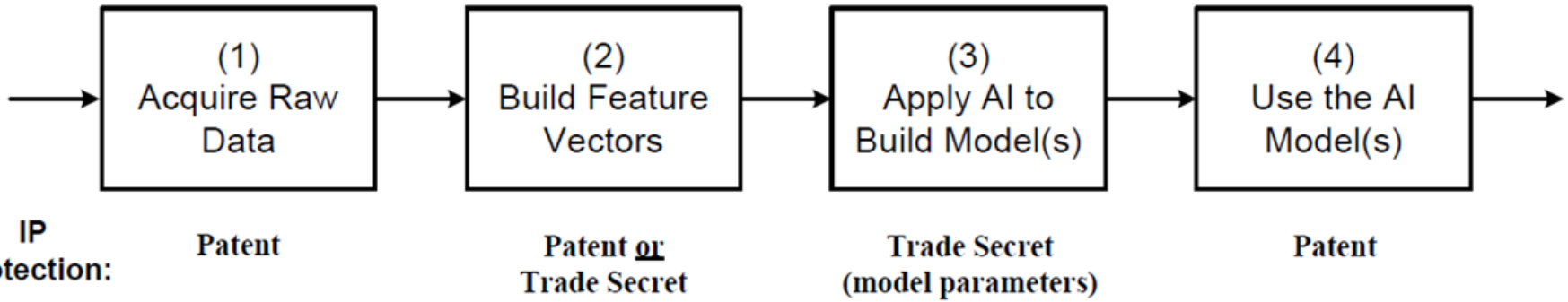
Protection Based on Where the Novelty Occurs



- Example 2: A company uses AI to develop a new way to implement cybersecurity. The new technique uses known raw data elements, but performs some novel calculations to build features that have not been previously used. The results of the AI analysis are presented in a user interface on the device where the application is running.

Patent, Trade Secret, or Neither?

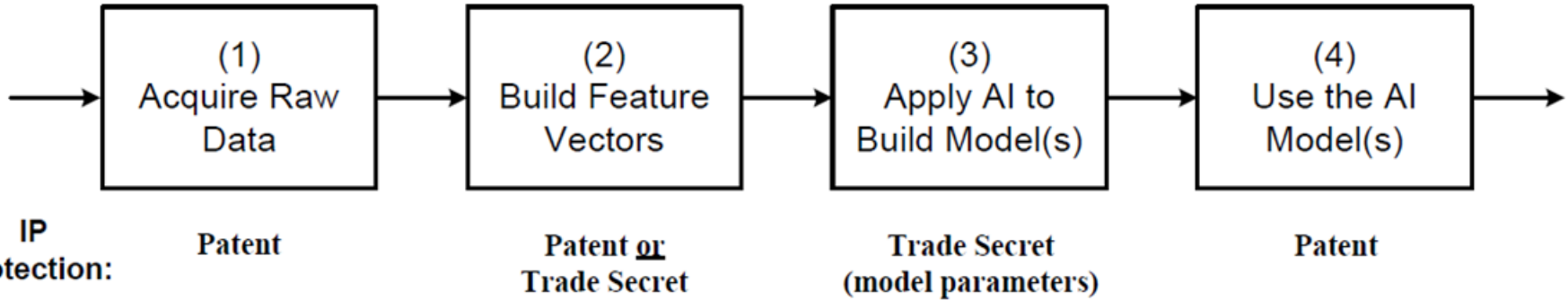
Protection Based on Where the Novelty Occurs



- Example 3: Same as Example 2, except that the collected raw data elements are transmitted to the cloud where the novel calculations to build the features are performed. The AI model(s) are applied, and the results of the analysis are sent back to the device where the application collected the raw data (or sent to another device, such as an administrator).

Patent, Trade Secret, or Neither?

Protection Based on Where the Novelty Occurs

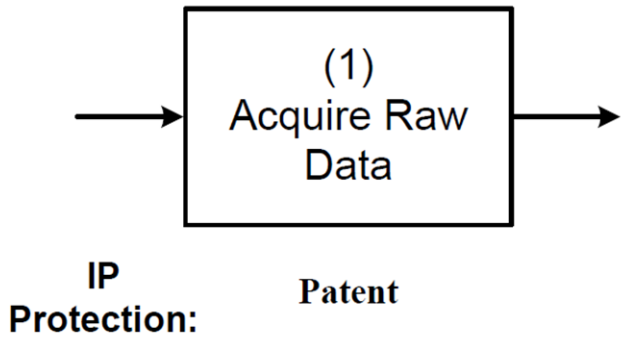


- Example 4: A company uses an AI platform to optimize industrial production. The input consists of lots of data about the machines in use, throughput rates at each of the machines, and testing results. The output consists of an optimized plan for layout of the machinery, utilization, and testing.

Patent, Trade Secret, or Neither?

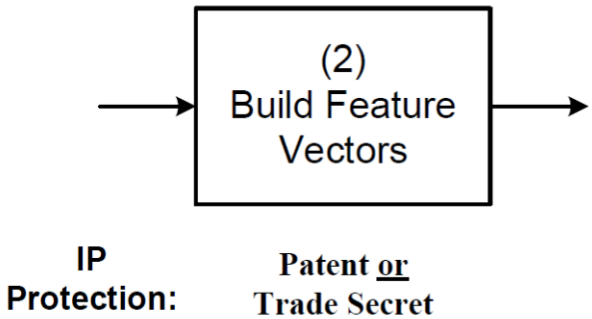
Detecting Infringement of Misappropriation

- When a patent protects the novel raw data elements:
  - Detecting infringement is typically straightforward because the inputs used by infringers are visible.



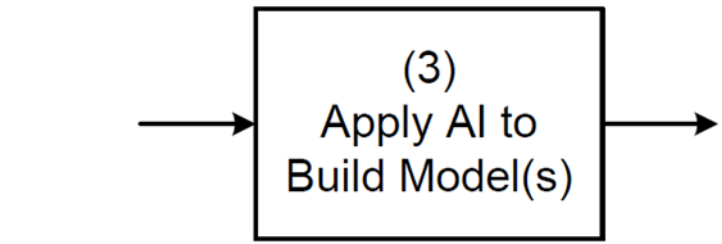
Detecting Infringement of Misappropriation

- When patent or trade secret protection covers some "creative" features calculated from the raw data:
  - It may be difficult to establish infringement or trade secret misappropriation because calculations may be hidden. This is particularly true if the calculations are performed "in the cloud" or other location not directly accessible.
  - Indirect evidence may be necessary to form the basis for a legal complaint.



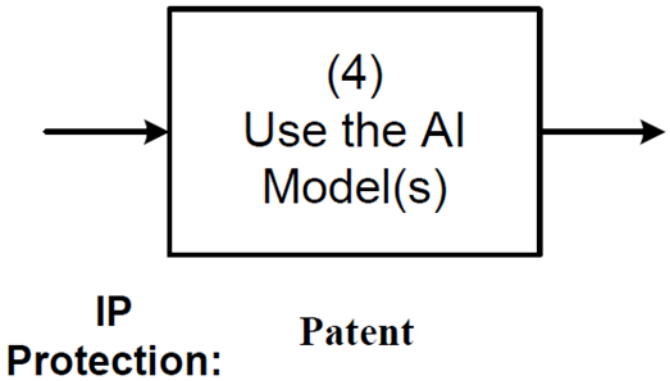
Detecting Infringement of Misappropriation

- When trade secret protection covers the constructed AI model (e.g., weights for nodes in a neural network):
  - A trained AI model is valuable, so it can be kept as a trade secret. A competitor is likely keeping their AI models secret too, so proof of misappropriation will generally require discovery.
  - Indirect evidence may be necessary to form the basis for a legal complaint.



Detecting Infringement of Misappropriation

- When a patent covers use of AI output:
  - The usage of AI output is generally visible, so it is usually not difficult to establish infringement



Limits on Trade Secret Protection of "Black Boxes"

- Given enough inputs/output to a black box, testing may reveal what is occurring inside the black box.
- For example, early physicists did not know the interior structure of atoms. However, they were able to determine the structure by blasting enough atoms with high speed particles and observing the results.
- If competitors can discern what you are doing by processing enough inputs and outputs, trade secret protection is at risk.

Worst Case Scenarios for Trade Secret Protection

1. A competitor figures out the trade secret using reverse engineering and/or black box testing. They are able to use the invention freely.
2. A competitor independently develops the same invention, and files a patent application. Even though the competitor was later, you did such a good job protecting your trade secret that your work is not available as prior art. The competitor gets an issued patent and may sue you.
3. A competitor figures out your trade secret by reverse engineering and/or black box testing, and improves on it. The competitor files a patent application on the improved system. It is a useful improvement that you would like to use. Because you have no patent (and no trade secret protection at this point), you have a weak bargaining position to license the improvement.

A Hybrid Approach in Some Cases

What can you do when the choice between patents and trade secrets is not clear?

- If the protection is desired just in the United States, prepare and file a patent application, including a non-publication request.
- Continue to protect the invention as a secret.
- At some point in the future (e.g., when the patent application is allowed), decide which protection is better. This is typically 2 – 3 years, which can be enough time to get better information.

Other Issues for AI Inventions

1. How does AI affect obviousness analysis (e.g., what is the level of "ordinary skill in the art" when there are advanced AI tools and inventors)?

2. How are patent offices going to adapt to the increasing use of AI? For example, could trade secret protection avoid patent office uncertainty?

3. What constitutes "reasonable measures" to maintain secrecy? Could black box testing combined with an AI system figure out your invention?

How About Protecting Data Instead of an Invention?

- Phrasing the question as "Patents vs. Trade Secrets" assumes that the greatest value is the AI process. That is not always true.

- A system that uses AI may not be patentable. It may be obvious what type of data to use, how to apply the AI, and how to use the output of the AI.

- As a practical matter, it may be impossible to protect a system as a trade secret. If usage of the system allows users to see the inputs and outputs, the system is not very secret.

How About Protecting Data Instead of an Invention?

- In some cases, the best protection is to keep the training data as a Trade Secret.

- Protecting your training data is particularly important when there is substantial work in the first box of the framework. It may take a lot of time and effort to collect and/or classify the raw data.

- The training data is used to build the AI models, so the training data itself is not publicly visible during subsequent usage.

- The training data can be supplemented over time, giving you the opportunity to retrain the machine learning model. You can reuse your secret data.

How About Protecting Data Instead of an Invention?

- In some cases, you can keep the model data as a Trade Secret. A trained machine learning model is just a bunch of parameters.

- Protecting the model data is possible regardless of patentability and regardless of whether it is feasible to protect the process as a trade secret.

- One downside risk is reverse engineering the data for the AI models using enough "black box" testing.

Publications on Patents and Trade Secrets for AI Inventions

- In 2020, I published two articles in Intellectual Property Magazine on this topic of Patents and Trade Secrets for AI inventions.

- Both articles are available from my Morgan Lewis bio under Publications. *See* morganlewis.com/bios/dsanker.

Questions?

Coronavirus COVID-19 Resources

We have formed a multidisciplinary **Coronavirus/COVID-19 Task Force** to help guide clients through the broad scope of legal issues brought on by this public health challenge.

To help keep you on top of developments as they unfold, we also have launched a resource page on our website at **www.morganlewis.com/topics/coronavirus-covid-19**

If you would like to receive a daily digest of all new updates to the page, please visit the resource page to **subscribe** using the purple "Stay Up to Date" button.

Morgan Lewis

Biography

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Drawing on 12 years of experience in software development, David V. Sanker, Ph.D. works with clients to build strong patent portfolios in a variety of areas, including artificial intelligence (AI), machine learning, natural language processing, data visualization software, large-scale database architecture and storage infrastructure, data analytics software, and touch screen technology. As AI tools have become widely available, inventions that use AI have become an increasing portion of his work, including inventions in industrial automation and life sciences.

Biography

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Serving as the leader of Morgan Lewis's semiconductor practice and as a member of the firm's fintech and technology practices, Andrew J. Gray IV concentrates his practice on intellectual property (IP) litigation and prosecution and on strategic IP counseling. Andrew advises both established companies and startups on Blockchain, cryptocurrency, computer, and Internet law issues, financing and transactional matters that involve technology firms, and the sale and licensing of technology. He represents clients in patent, trademark, copyright, and trade secret cases before state and federal trial and appellate courts throughout the United States, before the US Patent and Trademark Office's Patent Trial and Appeal Board, and before the US International Trade Commission.

Our Global Reach

Africa
Asia Pacific
Europe
Latin America
Middle East
North America

Our Locations

Abu Dhabi
Almaty
Beijing*
Boston
Brussels
Century City
Chicago
Dallas
Dubai
Frankfurt
Hartford
Hong Kong*
Houston
London
Los Angeles
Miami
Moscow
New York
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Orange County
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Princeton
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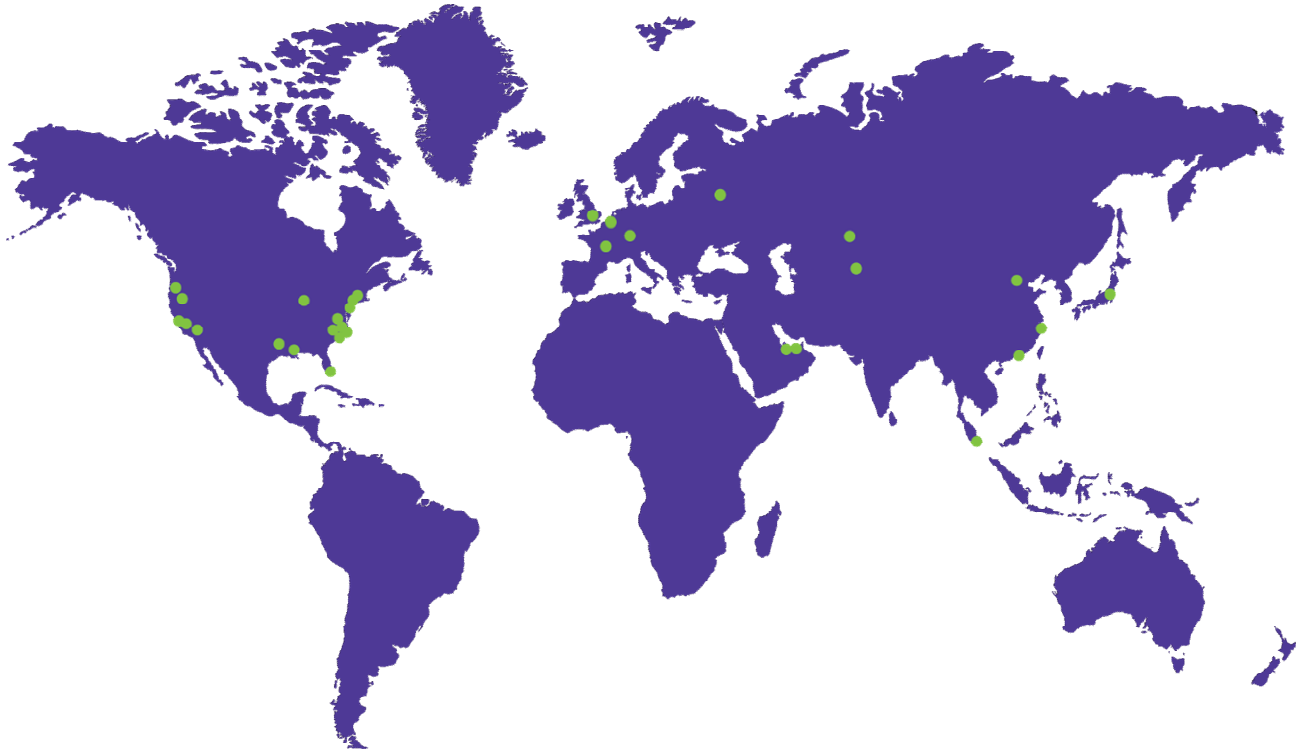

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THANK YOU