AI/ML Inventions and Patentability

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Today’s Presenter

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Presentation Overview

- Machine Learning and Artificial Intelligence characterized
- Identifying inventions in a ML/AI project
- Evaluating inventions in a ML/AI project
- Generating a protection plan in light of evaluation
Machine Learning Definition

Automatically deriving useful signals from data
Machine Learning Forms of Learning

1. UNSUPERVISED
   Identifying classification groups without guidance

2. SUPERVISED
   Use real-world observations as a basis to predict “dependent variable” based on “independent variables”

3. REINFORCEMENT
   Results of model’s decisions used to adjust model
Machine Learning Examples

- Automatic clustering of similar images
- Derive predicted medical diagnosis from information about patent
- Determine when an image depicts a particular kind of food
- Derive predicted text from speech audio
- Derive predicted value of a home from its location and features
Machine Learning Model Types

- Neural networks
- Random forests of classification trees
- Linear regression
- Support vector machine
Machine Learning Pipeline

Data Sourcing ➔ Data Filtering, Scrubbing, Normalization ➔ Model Organization and Training ➔ Model Validation ➔ Model Application

Model Design ➔ Model Implementation ➔ Parameters
Machine Learning Pipeline

- Data Sourcing
- Data Filtering, Scrubbing, Normalization
- Model Organization and Training
- Model Validation
- Model Application

- Model Design
- Model Implementation
- Parameters
Machine Learning Pipeline

1. Data Sourcing
2. Data Filtering, Scrubbing, Normalization
3. Model Organization and Training
4. Model Validation
5. Model Application

Model Design
Model Implementation
Parameters
Machine Learning Pipeline

Data Sourcing → Data Filtering, Scrubbing, Normalization → Model Organization and Training → Model Validation → Model Application

Model Design → Model Implementation → Parameters
Machine Learning Pipeline

Data Sourcing → Data Filtering, Scrubbing, Normalization → Model Organization and Training → Model Validation → Model Application

- Model Design
- Model Implementation
- Parameters
Artificial Intelligence

DO, IN A COMPUTER, MORE OF WHAT PEOPLE DO.

Said to spring in fulfillment of an “ancient wish to forge the gods”

In the modern context, often discussed as the practical application of machine learning techniques to a real-world problem

• Can also extend to other mechanisms, such as:
  • procedural rules of behavior (“wizards”)
  • encoded knowledge applied by generalized engines (“expert systems”)
Artificial Intelligence

COMPUTER → Human-like Behavior
Artificial Intelligence Examples

- Vehicle Control
- Medical Diagnosis
- Asset Valuation
- Virtual Assistants
- General Intelligence
Identifying Inventions

PARTICIPANTS

• High-level technical person – CTO, CDO, Chief Scientist
• Mid-level technical person in key areas
• Sales person most responsible for product/product category
In Identifying Inventions, Step Through:

- Objective
- Data Production Selection
- Data Scrubbing/Preprocessing
- Model Design
- Model Construction and Training
- Model Validation
- Model Application in Service of Objective
Key Considerations

Human design of these aspects

Human design of automated systems that in turn design these aspects
Approach to Protection

- Patent
- Trade Secret
- Defensive Publication
- None
Patent Protection Proposition

- Significant cost (tens of thousands of dollars through issuance)
- Necessary to disclose significant details of invention and how to implement (at least at time of issuance)
- Infringement liability does not depend on showing copying
- Expensive to enforce (very often over $1M)
Patent Procurement Process

1. Learn about invention and prior art
2. Prepare application
3. Revise to incorporate inventor feedback
4. File
5. Examination
   A. Newness
   B. Subject matter eligibility
   C. Formal requirements
6. Issuance
7. Patent in force (while maintenance fees are paid)
Patent Procurement Process

0. SELECT INVENTION FOR PATENT PROTECTION

1. Learn about invention and prior art
2. Prepare application
3. Revise to incorporate inventor feedback
4. File
5. Examination
   A. Newness
   B. Subject matter eligibility
   C. Formal requirements
6. Issuance
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Prioritizing Inventions for Patent Protection

- Use expected value approach to valuing contingent events: multiply value of event, assuming it occurs, by the likelihood that it will occur

- Consider the following example based on raffles
### Prioritizing Inventions for Patent Protection

<table>
<thead>
<tr>
<th>Raffle</th>
<th>Payoff</th>
<th>Probability (Payoff)</th>
<th>Expected Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$200</td>
<td>1%</td>
<td>$2</td>
</tr>
<tr>
<td>B</td>
<td>$50</td>
<td>1.5%</td>
<td>$0.75</td>
</tr>
<tr>
<td>C</td>
<td>$500</td>
<td>0.2%</td>
<td>$1</td>
</tr>
</tbody>
</table>
Prioritizing Inventions for Patent Protection

- **Raffle C**: $500 with a 0.2% probability.
- **Raffle A**: $1 with a 1% probability.
- **Raffle B**: $0.75 with a 1.5% probability.

Payoff values: $50, $200, $500.
Prioritizing Inventions for Patent Protection

Payoff

probability (Payoff)

Raffle C

Raffle A

Raffle B

$1

$100

$200

$300

$400

$500

$300

$400

$500
Prioritizing Inventions for Patent Protection

• Adapt expected value approach to assess identified inventions as follows:
  • Multiply likelihood of issuance (and that invalidation attempts will fail – IPRs/CBMs under AIA, invalidity defenses to patent infringement suit)
    • How new relative to best prior art
    • How “technical,” both in operation and benefits
  • By value assuming issuance/upheld validity
    • How necessary to serving customers well
    • How easy infringement is to detect, and to prove
## Prioritizing Inventions for Patent Protection

<table>
<thead>
<tr>
<th>Invention</th>
<th>Probability (Issuance)</th>
<th>Value (Issuance)</th>
<th>Expected Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10%</td>
<td>65</td>
<td>6.5</td>
</tr>
<tr>
<td>B</td>
<td>13%</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>C</td>
<td>30%</td>
<td>40</td>
<td>12</td>
</tr>
<tr>
<td>D</td>
<td>40%</td>
<td>4</td>
<td>1.6</td>
</tr>
<tr>
<td>E</td>
<td>84%</td>
<td>7</td>
<td>5.9</td>
</tr>
</tbody>
</table>
Prioritizing Inventions for Patent Protection

value (Issuance)

Invention A

Invention B

Invention C

Invention D

Invention E

probability (Issuance)
Prioritizing Inventions for Patent Protection

- Invention A
- Invention B
- Invention C
- Invention D
- Invention E
Prioritizing Inventions for Patent Protection

- Forms of prioritization
  - Pursue/not pursue
  - Order of pursuit (but consider possible time bars)
  - Robust non-provisional/focused non-provisional/provisional
  - Invest in foreign counterparts – at all, or to a greater or lesser extent
- Benefits to pursuing diversity of risk/reward profiles
Prioritizing Inventions for Patent Protection

Invention A: homerun, if you can get it; likely to consume disproportionate resources.

Invention C: good chance of getting, with medium investment; good likelihood that both infringement and validity will be found.

Invention E: likely to have an issued patent quickly; relatively low investment in prosecution.
AI/ML Considerations for Expected Value Assessment

• The closer to the customer the invention is, the higher its likely value, and the lower its likely probability of success

• Be on the lookout for techniques for automatically designing ML solutions that might be generalizable to other ML or AI applications

• Gray area for designs created by automated design of ML aspects
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- The closer to the customer the invention is, the higher its likely value, and the lower its likely probability of success.

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- Gray area for designs created by automated design of ML aspects.
AI/ML Considerations for Expected Value Assessment

- **AI application:** agent for configuring a new car to order based solely on two-way audio interactions

- **Shallow ML technique:** particular features of audio data for use in discerning panic in a speaker’s voice

- **Deep ML technique:** automatic discovery of image features characterizing a damaged highway barrier
CONSIDER FOR INVENTIONS WITH LOW EXPECTED VALUE

Trade secret

- Develop companywide mechanism for maintaining confidentiality of particular identified sensitive information, and include invention among identified information

No external prosecution or registration burden

- And therefore no requirement to ever publicly disclose

No protection against independent or innocent discovery, or reverse engineering

- Accordingly, tends to only be worthwhile for inventions that are difficult or impossible to reverse-engineer: custodial code, compiled code, etc.
CONSIDER FOR INVENTIONS WITH LOW EXPECTED VALUE

Defensive publication

• Documented public disclosure of enabling description establishes a barrier to others obtaining patent protection, and an invalidity defense if sued

• No positive patent rights for your company

• Only effective if publication occurs before competitor’s patent application is filed
Questions?

Email us at techlaw@perkinscoie.com