IoIP

Interconnection of Intellectual Properties

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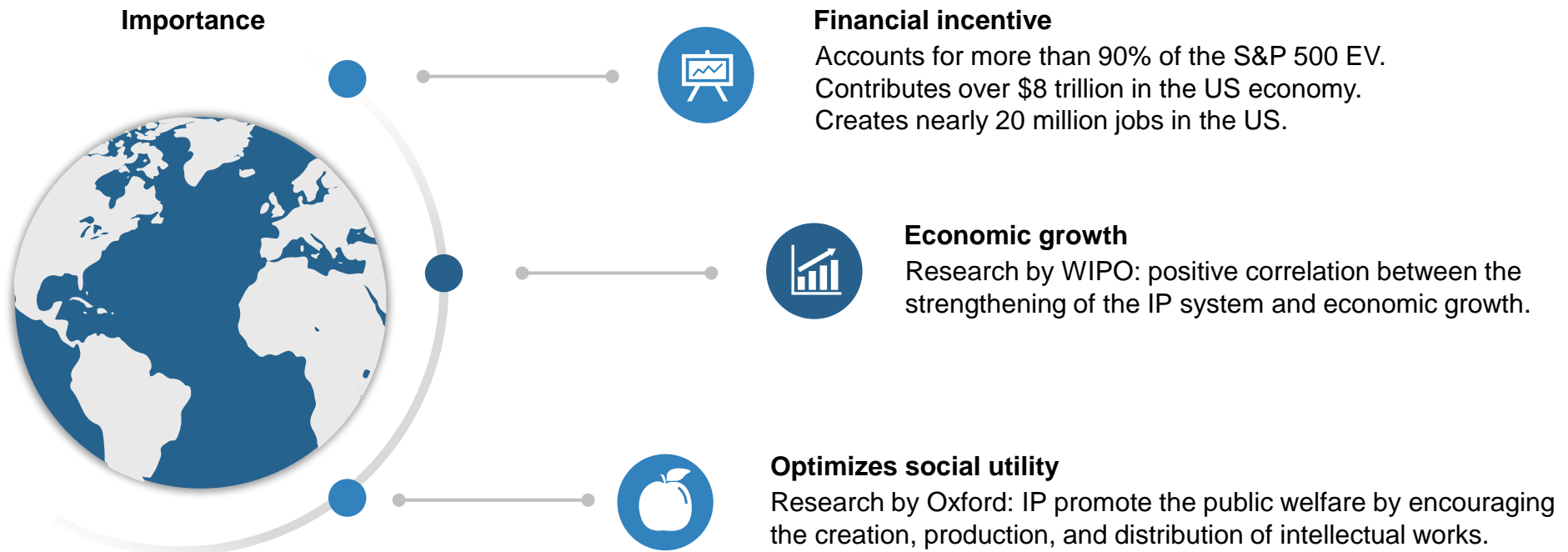
01

Background

Intellectual Property

Intellectual Asset:

Non-physical asset, including copyrights, patents, trademarks, and trade secrets.

Intellectual Property:

Intangible assets owned and legally protected by a company or individual from outside use without consent.

Importance

Financial incentive
Accounts for more than 90% of the S&P 500 EV.
Contributes over $8 trillion in the US economy.
Creates nearly 20 million jobs in the US.

Economic growth
Research by WIPO: positive correlation between the strengthening of the IP system and economic growth.

Optimizes social utility
Research by Oxford: IP promote the public welfare by encouraging the creation, production, and distribution of intellectual works.

Huge market & Profitable industrial chain

3.25 times in 30 years

Number of patent applications rose from 800,000 in 1980s to 2.57 million in 2013.

86.43 times in 42 years

The cross-border trade in IP rights, increased from $2.8 billion in 1970 to $242 billion in 2012.

7.6% increase p.a.

The number of IP-intensive enterprises in the Greater Bay Area increase from 48,400 in 2019 to 56,100 in 2021.

1.4 billion trade

Hong Kong's exports IP by trade to mainland China $1.4 billion in 2012.

IP Valuation

IP Financing

IP Insurance

IP Due Diligence

Matching Service

Importance & Application of IP Valuation

Important for a number of areas
property management, commercialization and financing… …

## First step in realizing the full potential of an intangible asset
Express the contribution of IP to a business in a generally understandable economic value.

Specific application examples

1 Determine the actual price for the company's commercial purposes.

2 Helping companies comply with financial reporting requirements and tax planning.

3 Properly assess the value of the intellectual property involved in the event of disputes, such as lawsuits.

4 Develop new revenue streams from underutilized IP and raise awareness among employees of the importance of IP.

Traditional IP Valuation Methods
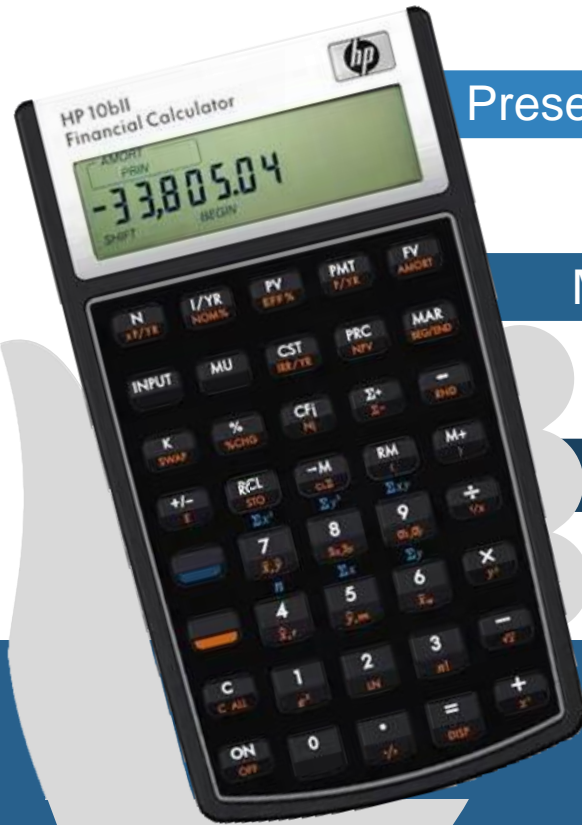
Present Earning Value Method — Discounting the reasonable expected income during the economic life of IP into the present value with an appropriate rate.

Market Comparison Method — Refers to the recent transaction prices of the same or similar intellectual properties in the market.

Cost Method — Estimate the current cost of re-acquisition of intellectual property. Then deduct the estimated depreciation due to technical update factors to get the appraisal.

Problems:

1. Uncertainty about the future value of intellectual property.

   Mainly due to the instability of IP whose particularity makes itself possible to be invalidated.

2. The regulations and methods for intellectual property valuation are not exhaustive.

   The information currently available is insufficient to advise policy-makers on good practice.

02

Platform & Implementations

Platform made for Digital Patents.

Instant evaluation, reducing many cumbersome processes.

Register

Show [6 ▾] entries   🔍 Search...   ＋ Add Patent

Patent ID	Patent	Applicant/ Proprietor	Date	Market Value (HKD)	Quality Ranking (1 - 10)
HK0462	A COAXIAL CABLE MEDIA SWITCH AND METHOD FOR TRAFFIC SWITCHING	Broadnet Corporation	18/10/2012	$698561.64	8
MO0006	BUCKET CRANE WITH CONVEYOR	TERAOKA SHONIN Inc.	12/05/2013	$60258.31	9
GD9876	STRUCTURE SOUND INSULATION TEST DEVICE	Supreme NAP Acoustics(Huihai) Ltd.	15/09/2014	$1256852.36	8
HK1239	CAME DEVICE, RECORDING MEDIUM AND CAME SYSTEM	BANZAI CO., LTD.	06/10/2015	$122569.12	10
MO0013	ULTRAVIOLET SHADOW BOX	Nikiam Kidd	17/10/2018	$6985632.12	7
GD2079	HINGE WITH POSITION ADJUSTABLE	LAP HING YEUNG'S INDUSTRIES (QIANCHUAN) CO., LTD	24/11/2019	$23658.21	7

Previous   1   2   3   Next

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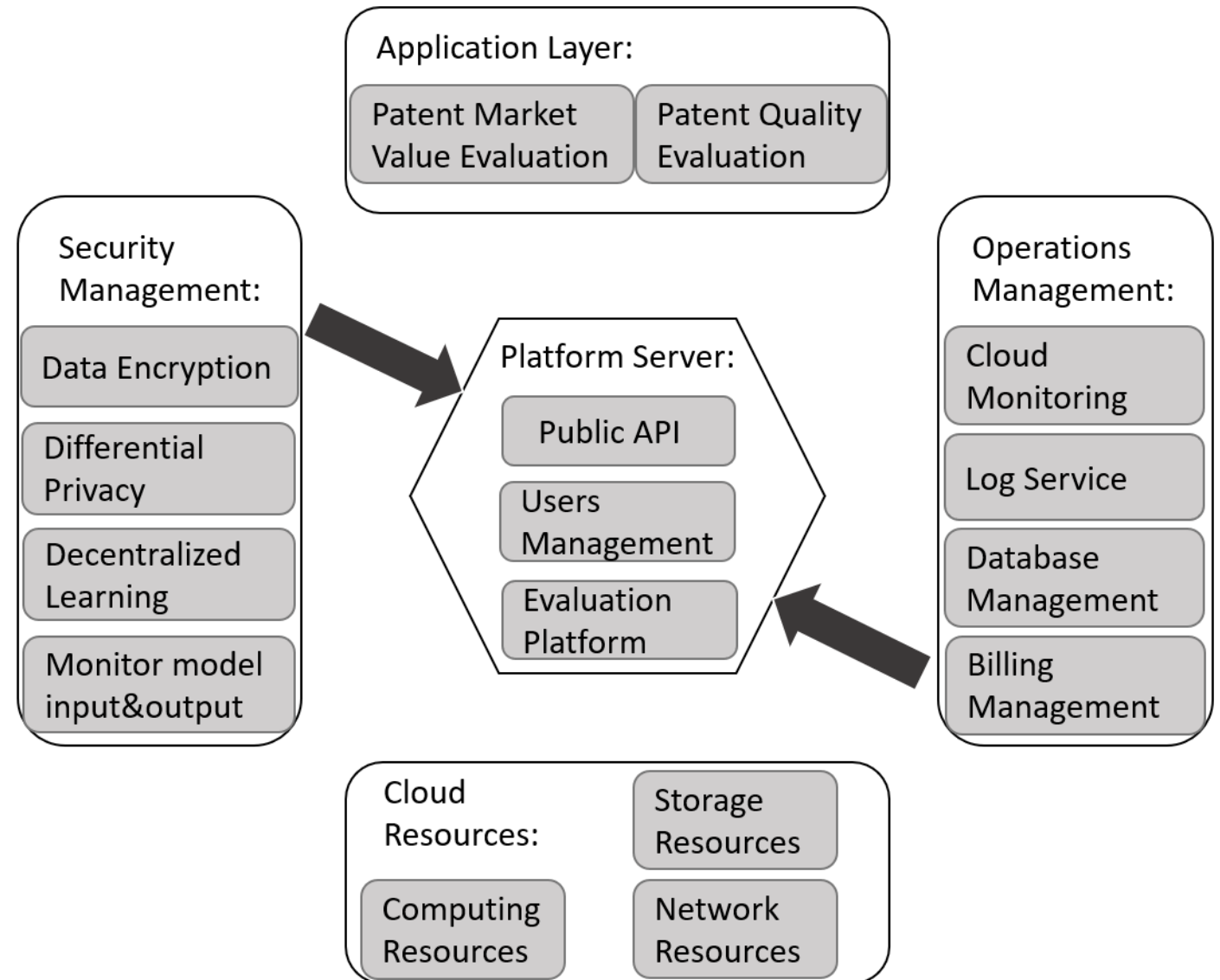
Overall Pipeline
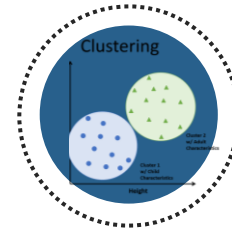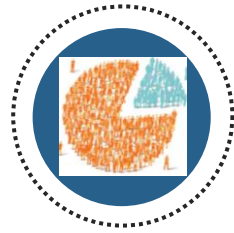
Searching	Segmentation	Abstracting	Clustering	Visualization
Searching, filtering, and downloading related patents	Segmentation, cleaning, and normalization of data	Summarization of patent content in terms of claims, topics, functions, and technologies	Clustering assigns groups or classifies the groups	Interpret the patent where the technology or business trends and relations are predicted

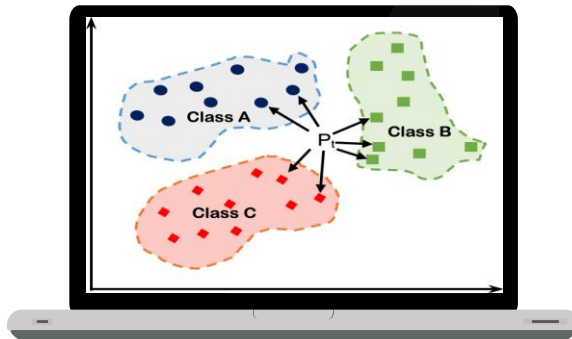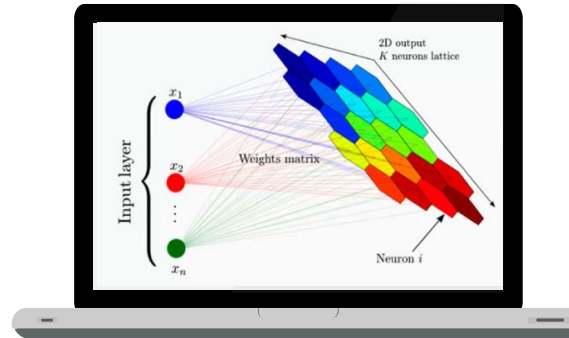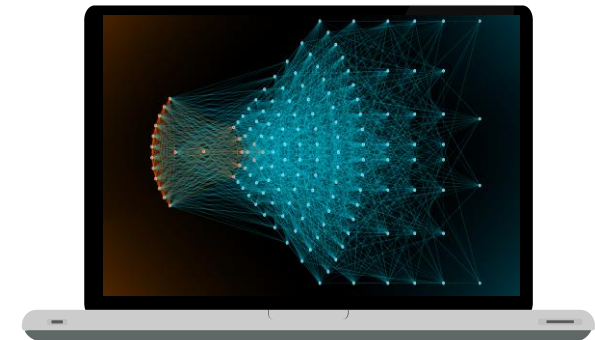# Machine Learning Theory

Data Dimension Reduction

Self-Organizing Map

Classification

Regression

Support Vector Machine (SVM)

Neural Network

Patent Analysis Process

The data are:
1. Collected
2. Cleaned
3. Prepared

Information are extracted

Knowledge Discovery:

1. Visualization
2. Evaluation
3. Making strategic decisions

Processing Stage

Pre-Processing Stage

Post-Processing Stage

Data Analysis:

1. Classification
2. Clustering
3. Insights
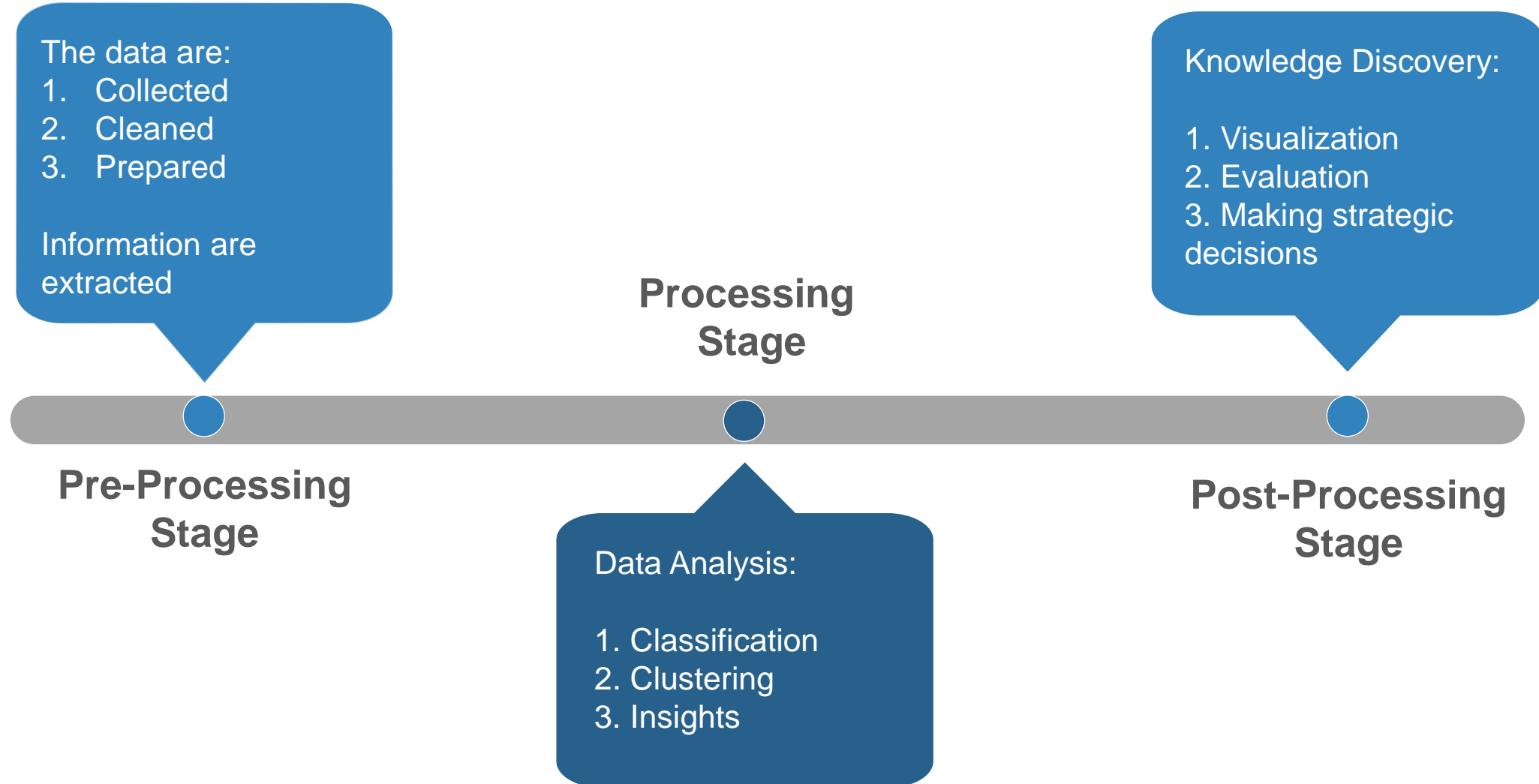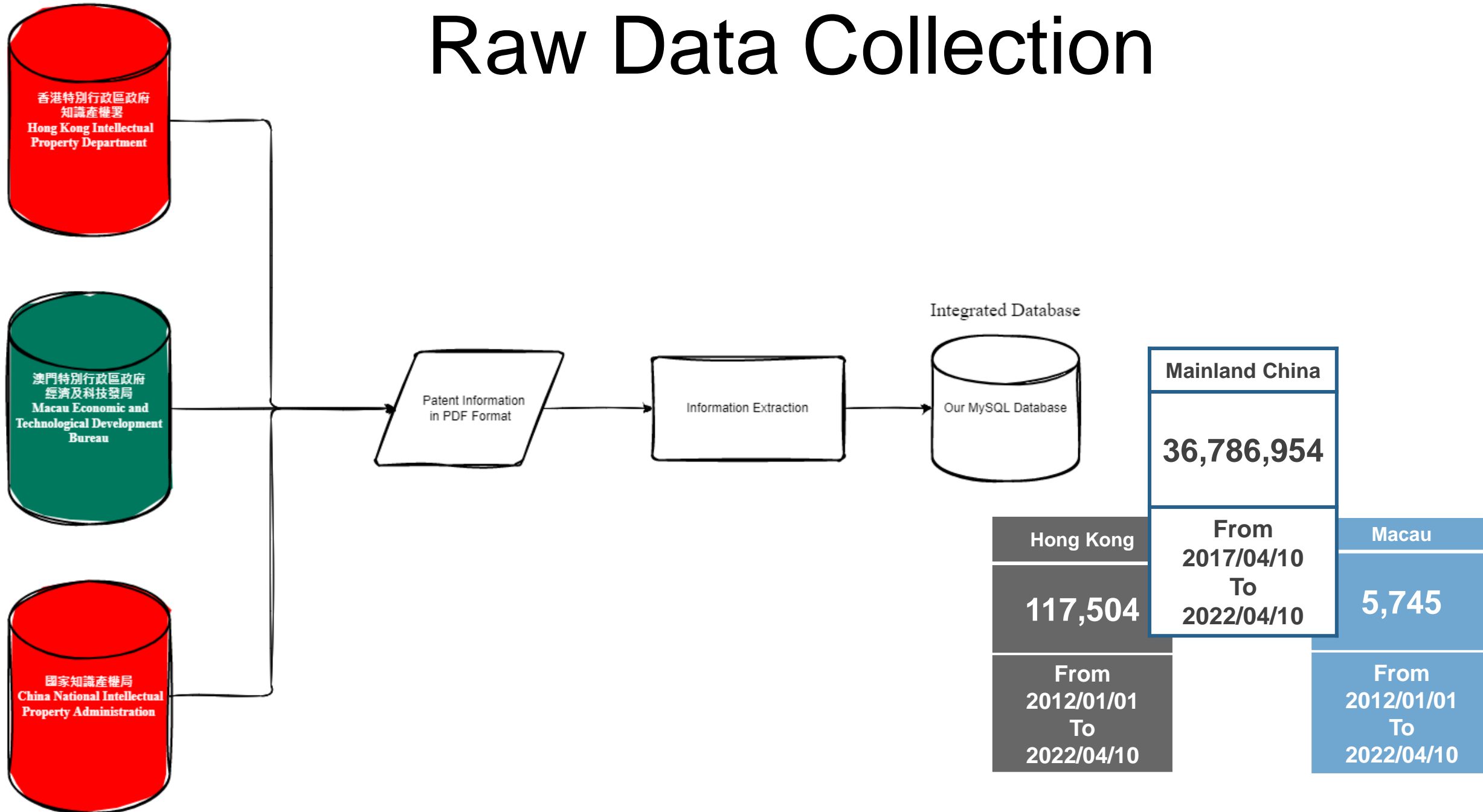
Patent Samples Demonstration

Mainland China

(19) 中华人民共和国国家知识产权局

(12) 发明专利申请

(10) 申请公布号 CN 106724808 A
(43) 申请公布日 2017.05.31

(21) 申请号 201710230046.6
(22) 申请日 2017.04.10
(66) 本国优先权数据
　　201720355261.4　2017.04.06　CN
(71) 申请人 宁波欧普电器有限公司
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　　马堰村
(72) 发明人 孙文焕 凌均云
(51) Int.Cl.
　　A47J 27/21(2006.01)
　　A47J 36/00(2006.01)

权利要求书2页 说明书5页 附图5页

(54) 发明名称
　　一种具有两段壶体的电热水壶
(57) 摘要
　　本发明公开了一种具有两段壶体的电热水壶，包括壶体、密封圈；壶体包括上段壶体和下段壶体，上段壶体的下端口从外部套接下段壶体的上端口；上段壶体的下端口的内表面设有向内的翻边；下段壶体上端口处环周设有向壶体内凹陷的连接槽，还设有C型的卡环，所述卡环环周嵌置在连接槽中；卡环的外表面还设有由上向下的，向外凸起的勾齿，勾齿环绕卡环间隔设置，勾齿根部与卡环一体成型连接，勾齿的根部至端部之间与卡环保持间隙，所述的翻边抵接在勾齿的下端面；通过在连接槽内设置卡环及在上段壶体下端口设置向内的翻边，并在卡环外表面延伸出勾齿，勾齿可以充分利用卡环的高度和厚度，达到较高的受压后的侧向刚度，确保上段壶体和下段壶体之间的连接刚度。

CN 106724808 A

Hong Kong

香港特別行政區政府知識產權署專利註冊處
Patents Registry, Intellectual Property Department
The Government of the Hong Kong Special Administrative Region

專利註冊紀錄冊
REGISTER OF PATENTS

基本資料 Basic information

狀況: Status:	申請有效 Application in force	
專利類別: Patent Type:	轉錄標準專利 Standard Patent (R)	
[11]	發表編號: Publication No.:	HK1245144
[21]	申請編號: Application No.:	18104870.7
[54]	發明名稱: Title of Invention:	用於抑制組蛋白去乙酰酶的組合物及方法 COMPOSITION AND METHOD FOR INHIBITING HISTONE DEACETYLASE
[51]	分類: Classified to:	A61K, C12N, A61P
	法律程序所用語文: Language of Proceedings:	英文 English

日期 Dates

[43]	專利說明書首次發表日期: Date of First Publication:	24-08-2018
[22]	提交日期: Filing Date:	13-04-2018

當事人 Parties

[71/73]	申請人/專利所有人: Applicant/ Proprietor:	幹細胞生物科技公司 STEMBIOS TECHNOLOGIES, INC. 2530 Corporate Place Suite A112, Monterey Park CA 91754 UNITED STATES/UNITED STATES OF AMERICA
[72]	發明人: Inventor:	詹姆斯·王 WANG, James

Macau

權 利 要 求 書

1、一種百家樂紙牌遊戲用桌子系統，包括桌子，在桌子的上面表示有：對戰進行區，供發牌員分發紙牌以使假想的兩人進行對戰；以及籌碼投注區，

5 　針對各個遊戲參加者所設定，與針對所述兩人的所述對戰的預測的種類對應設置，包括所述遊戲參加者基於自己的預測投注籌碼的的多個投注框；其中，還包括：

　紙牌種類輸出部，輸出由發牌員分發的紙牌的種類；

　投注顯示部，被配置為在所述桌子的所述上面表示顯示面，將各個所述

10 遊戲參加者的所述籌碼投注區作為映像進行顯示；

　投注區顯示控制部，基於所述紙牌種類輸出部的輸出，對應於紙牌的分發狀態依次改變所述投注顯示部中的所述籌碼投注區的顯示狀態；

　對戰履歷輸出部，基於所述紙牌種類輸出部的輸出，輸出關於所述對戰的履歷；

15 　經歷保存部，能夠隨時間推移且能夠進行賬票管理地保存由所述對戰履歷輸出部輸出的履歷；

　所述投注區顯示控制部能夠改變預測項目的投注框的數量、種類。

2、一種百家樂紙牌遊戲用桌子系統，包括桌子，在桌子的上面表示有：對戰進行區，供發牌員分發紙牌以使假想的兩人進行對戰；以及籌碼投注區，

20 針對各個遊戲參加者所設定，與針對所述兩人的所述對戰的預測的種類對應設置，包括所述遊戲參加者基於自己的預測投注籌碼的的多個投注框；其中，還包括：

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　投注顯示部，被配置為在所述桌子的所述上面表示顯示面，將各個所述

25 遊戲參加者的所述籌碼投注區作為映像進行顯示；

　投注區顯示控制部，基於所述紙牌種類輸出部的輸出，對應於紙牌的分發狀態依次改變所述投注顯示部中的所述籌碼投注區的顯示狀態；

　投注指定部，針對各個所述遊戲參加者進行配置，基於所述遊戲參加者的指示指定籌碼的金額和投注籌碼的投注框；

30 　籌碼像顯示部，基於所述投注指定部的指示，在所述投注顯示部上顯示表示所投注的籌碼的籌碼像，作為投注到所述籌碼投注區中被指定的投注框
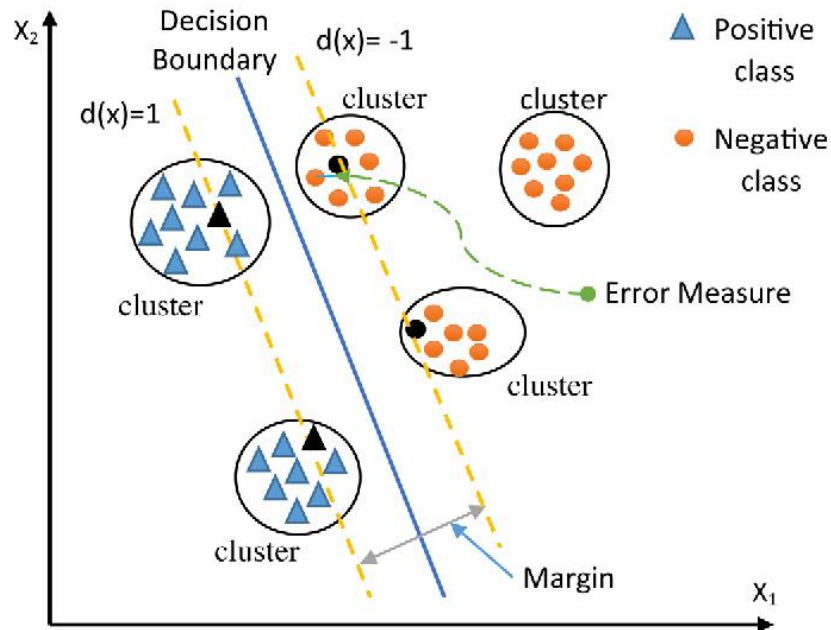
Mainland China　　　　**Hong Kong**　　　　**Macau**

Classification and Clustering of Patent Groups

Machine Learning Techniques:

- **Support Vector Machine (SVM)**
  Genetic Algorithm

IPC is a hierarchical patent classification system consisting of 8 sections, 128 classes, and 648 subclasses.

A. Human Necessities
B. Performing Operations; Transporting
C. Chemistry; Metallurgy
D. Textiles; Paper
E. Fixed Constructions
F. Mechanical Engineering; Lighting; Heating; Weapons; Blasting
G. Physics
H. Electricity

Sections List

Market Valuation

**Technique: Neural Network Regression**

Step 1: Extract useful data from MySQL database as our training data.

Step 2: Use the data to train the deep neural networks model. The output value is the market value of each patent we want to predict, presented in dollar amount units.
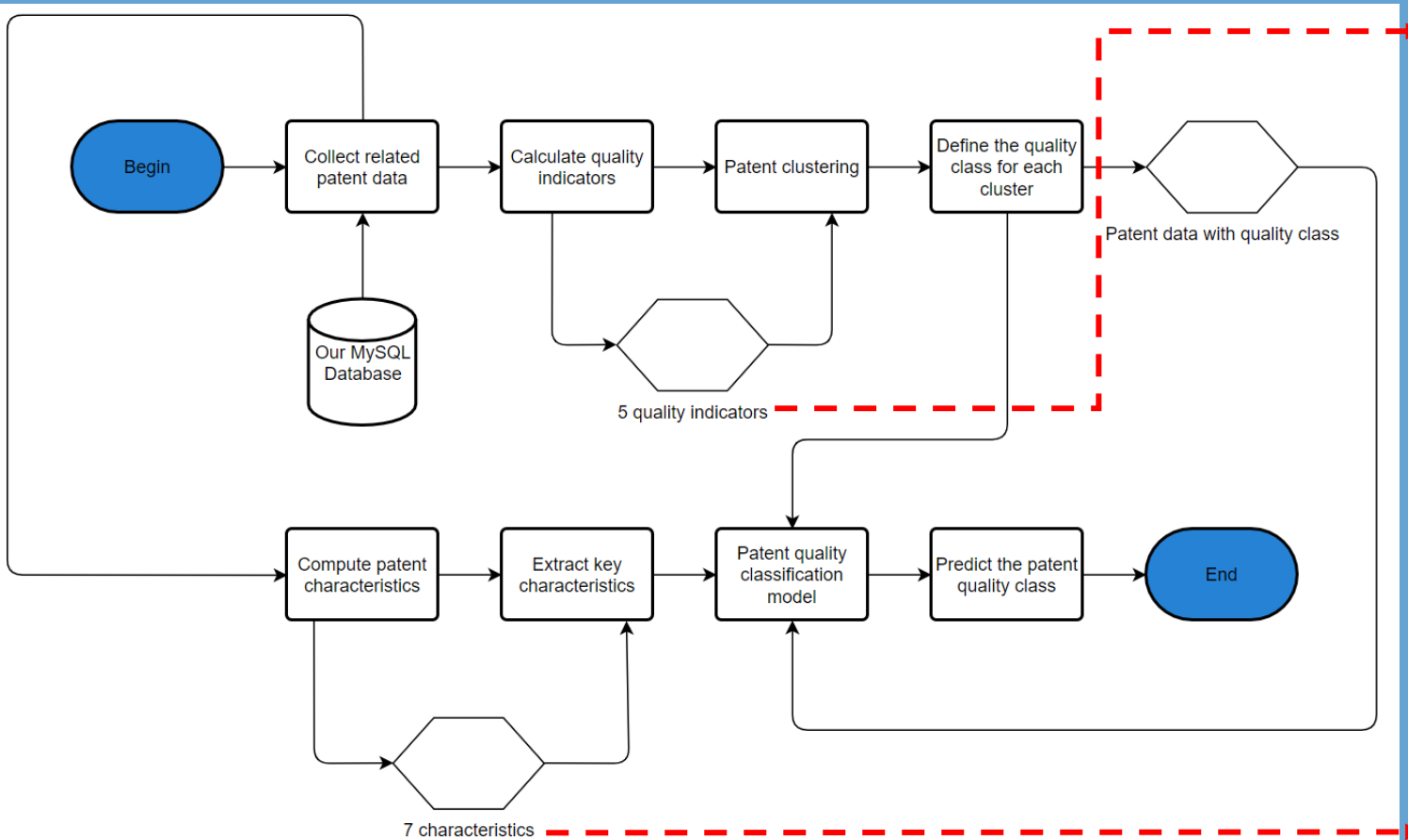
Step 3: Test the performance of the network.

Step 4: Input a random patent by our customers.

Step 5: Output the predicted market value of the patent.
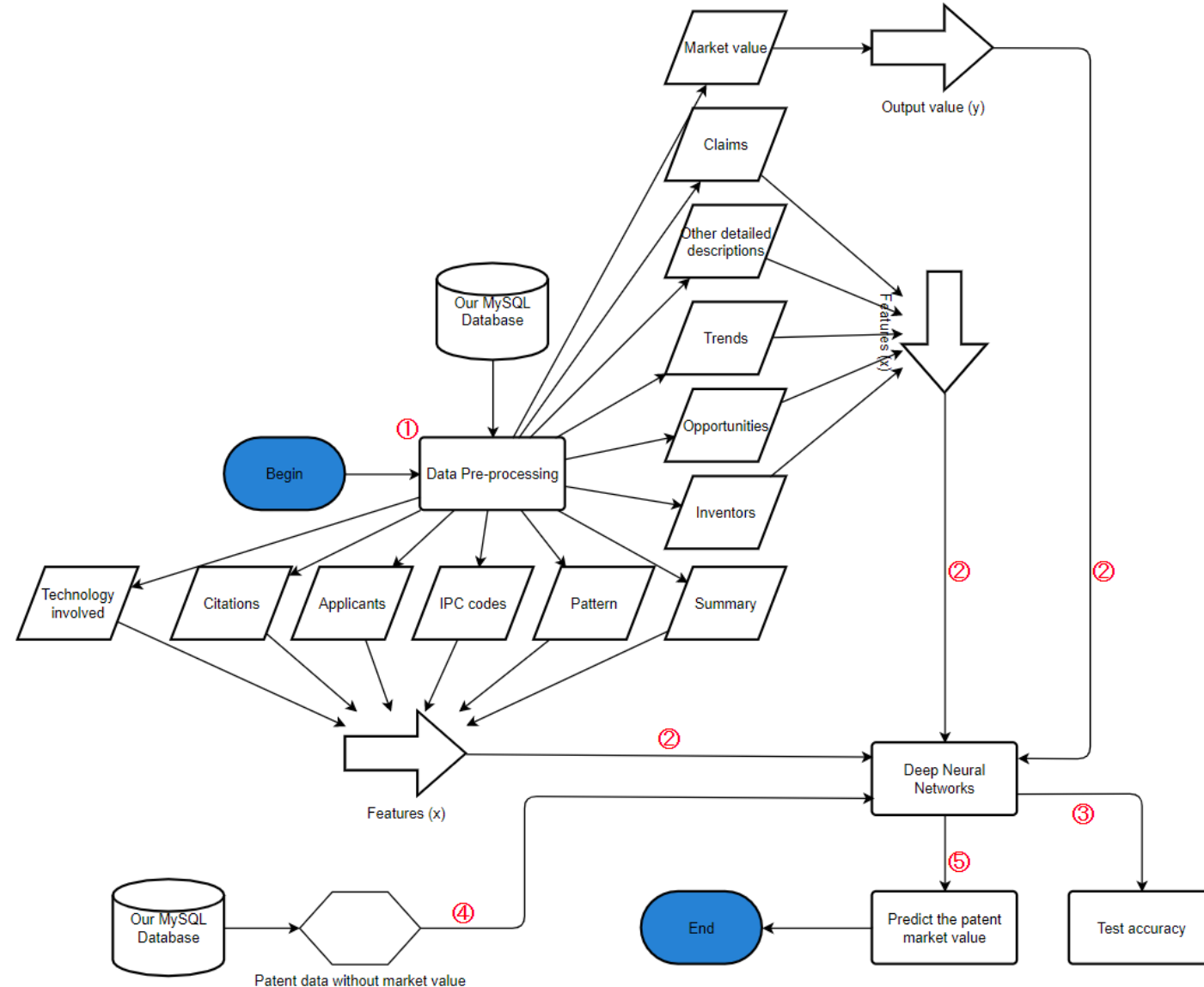
Patent Quality Evaluation

Flow Chart

Quality Indicators

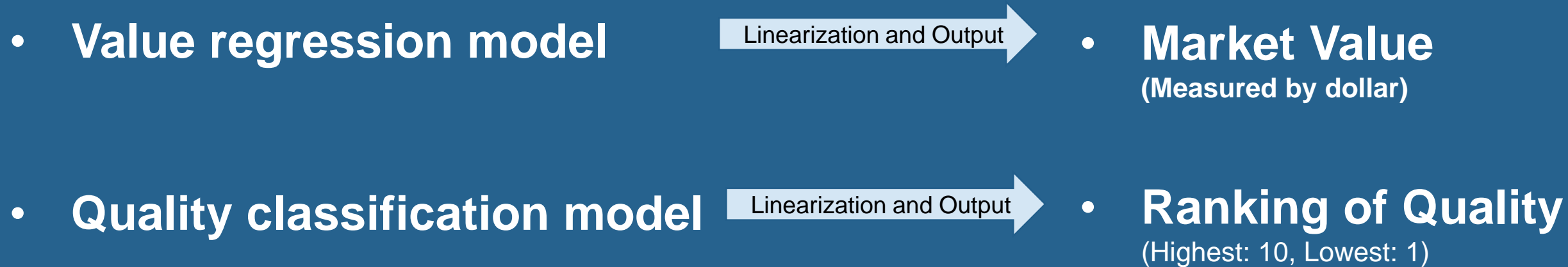| |
|---|
| Legal events related to a patent |
| Number of patent family |
| Number of countries where a patent family is granted |
| Number of citations the patent has received |
| Number of non-patents who cite the patent |

Quality Indicator List

Characteristics

Number of other patents that the patent cited
Number of patent owners
Number of technical areas the patent protected
Number of classes in the patent
Number of inventors
Number of priority countries advocated in the patent
Duration between application date and approval date

Characteristic List

Optimization in Machine Learning

**Optimization Techniques: Loss function + Gradient descent**

- **Value regression model** → Linearization and Output → • **Market Value** (Measured by dollar)

- **Quality classification model** → Linearization and Output → • **Ranking of Quality** (Highest: 10, Lowest: 1)

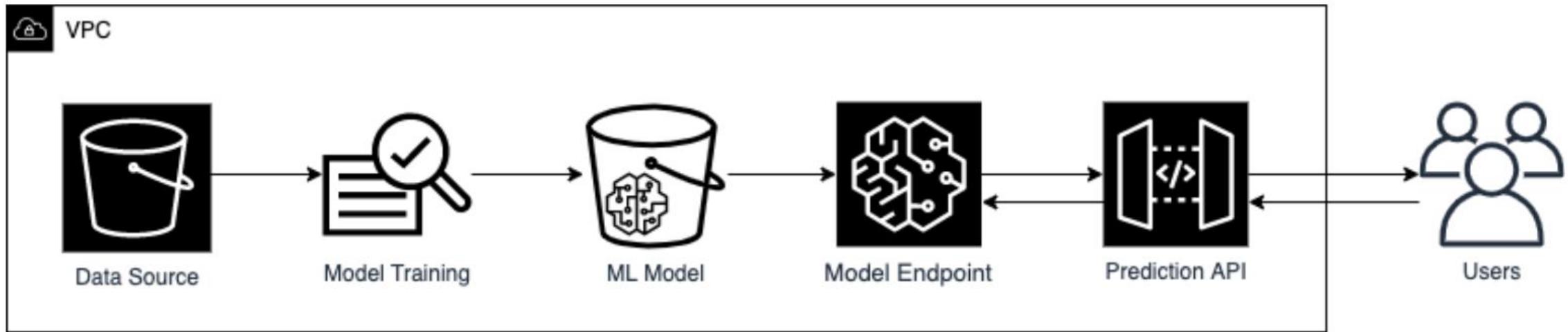# Visualization in Machine Learning

Tool: Python program

Purpose:
- interpret the patent
- predict technology, business trends and relations
- topical analysis
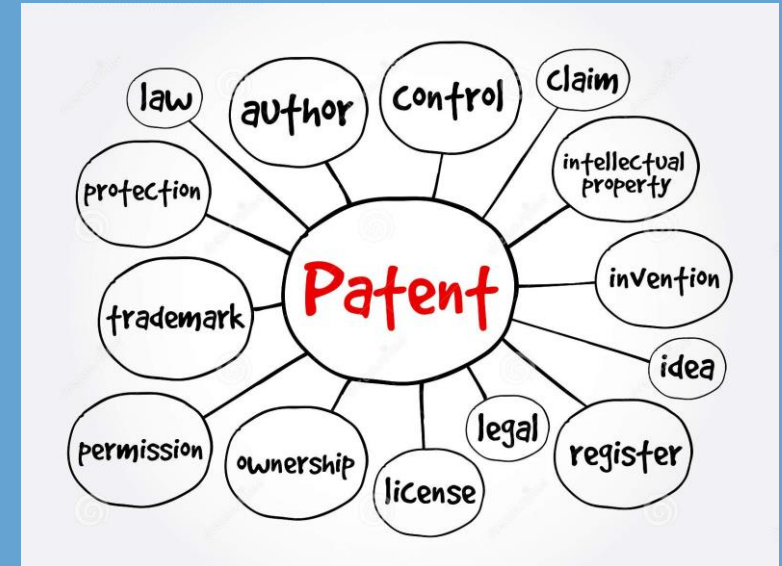
Data Security in Machine Learning

Example of a basic machine learning workflow

Methods to ensure data security during machine learning:

1. Data encryption
2. Differential privacy: adding small amounts of statistical noise during training to conceal the contributions of individual parties whose data is being used.
3. Decentralized learning--Federated learning: keep raw training data remains within its local node

03

Feasibility Analysis

Benefits Analysis

--Compared with traditional methods

Higher ability for the data analysis

The ability of precise data and information analysis is much higher than human.

Convenient, quick, less expensive

Compute the result faster, with less paperwork and manual work, as well as lower cost.
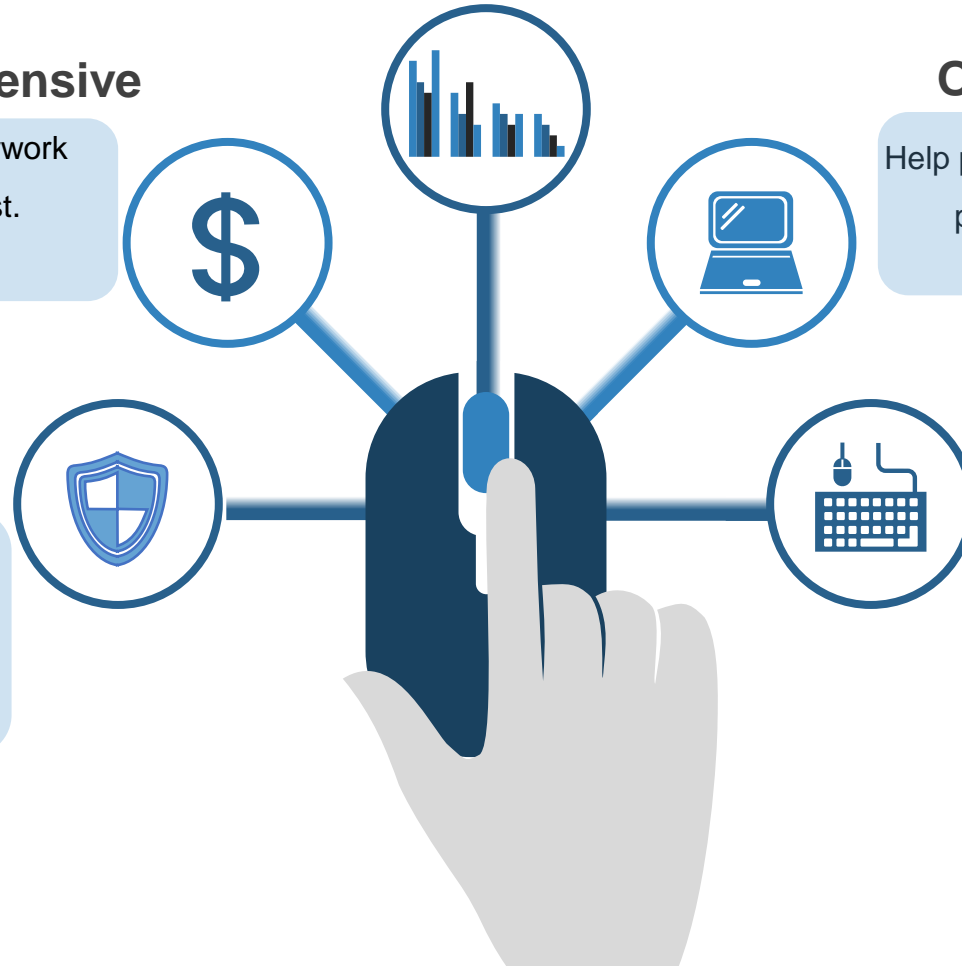
Objectivity and consistency

Help professional appraisers determine the value of patents more objectively and consistently.
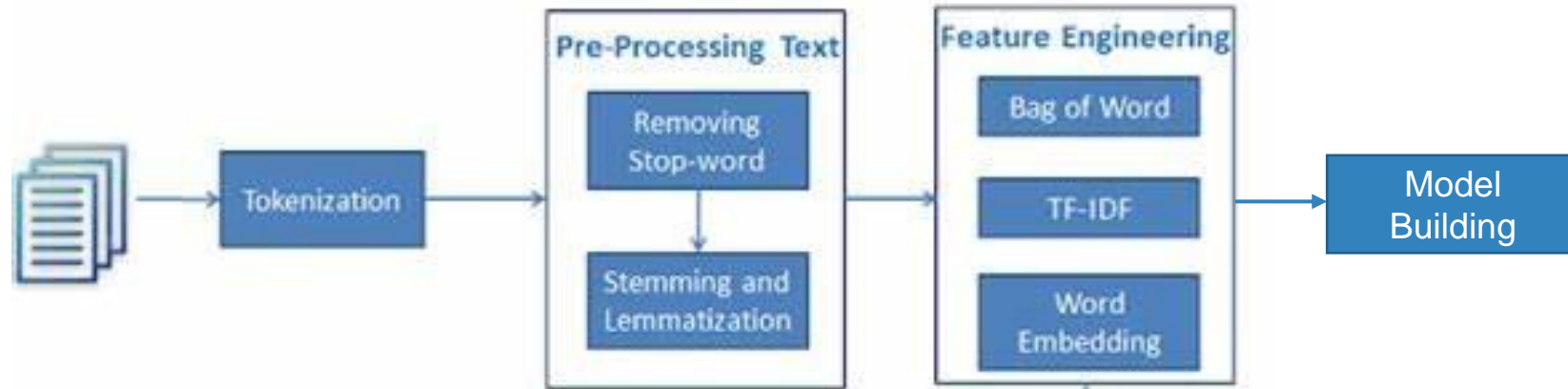
Accuracy and integrity

Adopt reasonable data and without profit motive, unlike appraisal institutions' usage of basic parameters without a basis and intention to finish work to occupy market share.

Speculative avoidance

Acts as a sword to cut down overly "hyped" IP and as a shield, protecting a valuable contribution even if fundamental in nature.

Technical Feasibility – NLP as example

Pre-Processing Text
- Removing Stop-word
- Stemming and Lemmatization

Feature Engineering
- Bag of Word
- TF-IDF
- Word Embedding

Tokenization

Model Building

Example:

"Why do birds suddenly appear every time you are near?
Just like me, they long to be close to you.
Why do stars fall down from the sky every time you walk by?
Just like me, they long to be close to you. "

"why do bird suddenly appear every time you are near
just like me they long to be close to you
why do star fall down from the sky every time you walk by
just like me they long to be close to you"

"知识产权书"

"知識/產權/書"

words	occurrence	Importance (computed by TF-IDF)
you	4	Low
every	2	Low
long	2	Relatively low
suddenly	1	High
知識	1	Relatively low
產權	1	Relatively low
書	1	Relatively low

Very unique to this document!

Legal feasibility

In some countries and regions such as Japan and the United States, it shows a strong and promising positive trend towards IP appraisal utilizing machine learning.

- *"The Japan Patent Office announced publicly that it is investing in the use of artificial-intelligence technology to automate screening patent applications, identify similar prior art, and automate classification of patent application by fields".*

- *United States Patent and Trademark Office(USPTO) believes "artificial-intelligence technology significantly outperforms humans and traditional statistical techniques between negotiation in the inventor–examiner interaction".*

Potential Problems

01 Data validity

There can be chances that the training data are of poor quality, and of low representativeness, resulting in over-fitting, under-fitting, weakened generalization ability, and insufficient accuracy.

02 Prediction accuracy

Because valuation is very complex and needs a lot of human judgments, so the amount of final value may not be very accurate.

Possible Solutions

- Enrich the amount of data, that is, the volume of patents.

  1. Government intellectual property dataset(main source);

  2. Historical patent data from our customers;

  3. Data sharing with other companies of the same mode

- Seek expert support: recruit professionals in IP valuation

04

Commercial Analysis

Project plan timeline
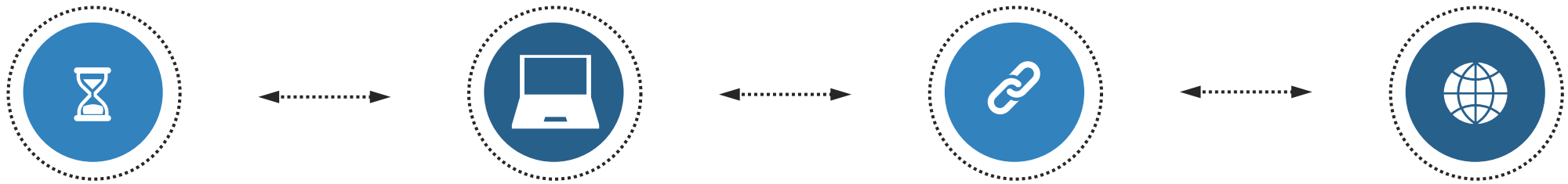
A Idea generation
--15 Days

Come up with the ideas
our IP valuation software
and corresponding ML
algorithm

B Development
--5 months

Implementing the idea
from aspects like
recruiting, supplier
management, and
software development

C Marketing test
--1 month

Private introduction to
some target banks and
persuading to adoptions
of our software and
further improve our model

D Commercialization
--1 to 2 month

After improvements,
releasing our software to
all potential customers

Financial Funding

STAGE 6 — GOING PUBLIC
STAGE 5 — EXPANSION
STAGE 4 — GROWTH
STAGE 3 — GO TO MARKET
STAGE 2 — DEVELOPMENT
STAGE 1 — IDEA/CONCEPT

Mature Stage

Expansion of market, with mature technology and considerable return

What need: Bigger office, more staff, more equipment
Funding Source: Private Equity & Loans & Public Markets

Start & Growth Stage

Further improving model and trial sales, required capital increase significantly

What need: Database (Bloomberg, US$2,000 monthly), Office Space ($8000 monthly), Sales staff salary......
Funding Source: Venture Capital & Business Angel

Seed Stage

Valuation model development and testing phase

What need: An idea, a team, a computer.
Funding Source: Own resources & Family & Friends

Competitive analysis

- *Big Four: provide all types of valuation including intangible assets*

- *FTI Consulting: combine financial, econometric and choice modeling*

- *Black Stone IP, LLC: focused on valuing and trading tech and IP assets*

- *Alix Partners: have valued intellectual property in a wide range of industries*
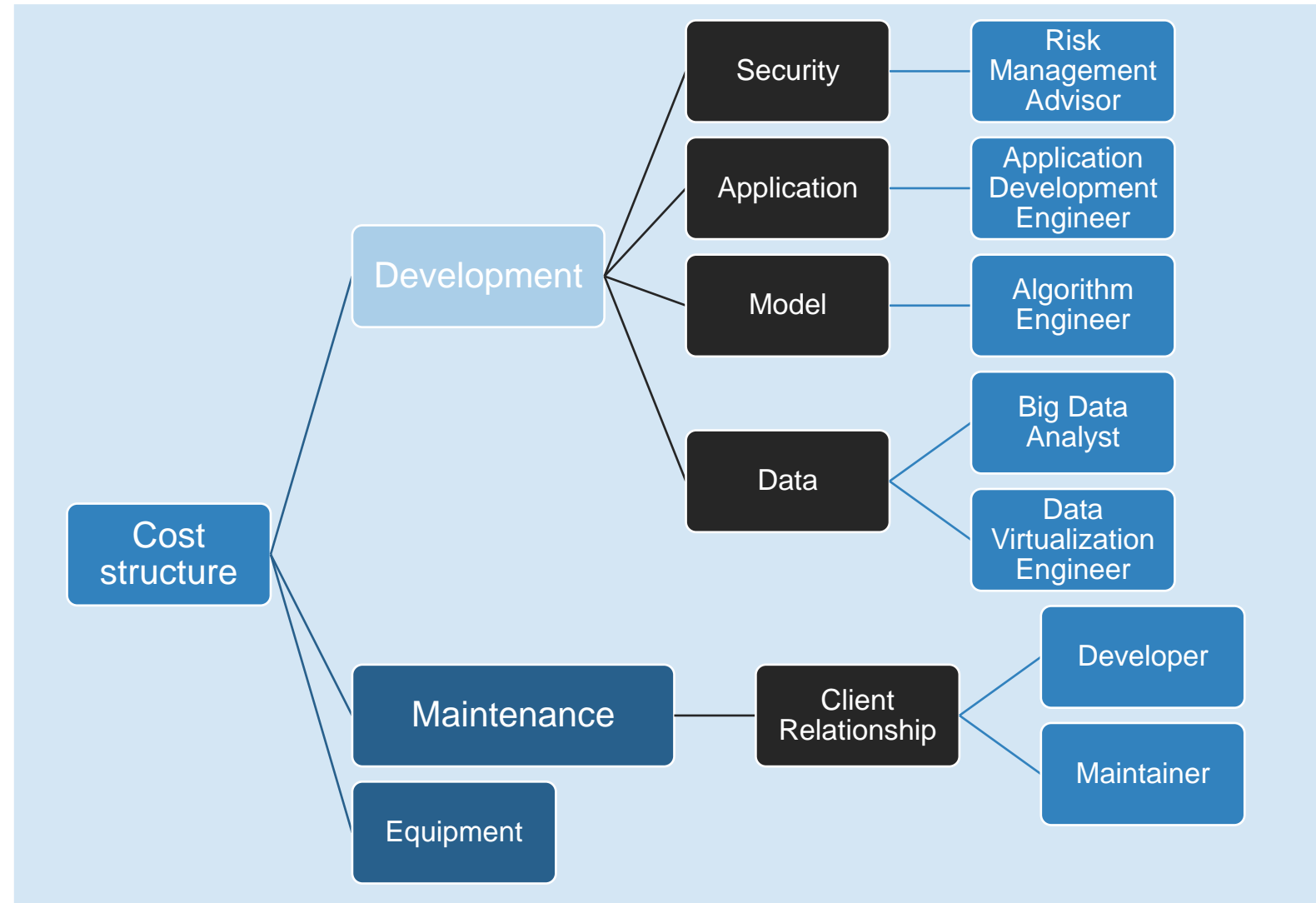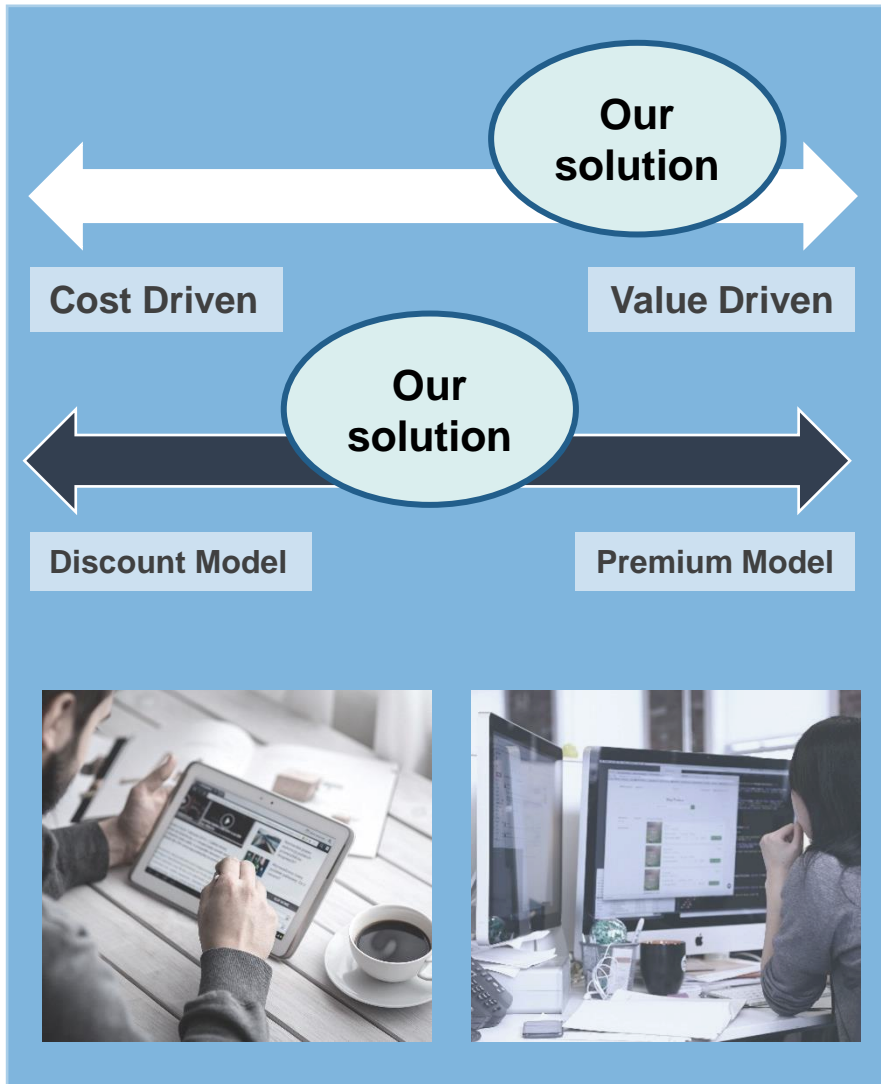
A list of some top IP Valuation Firms
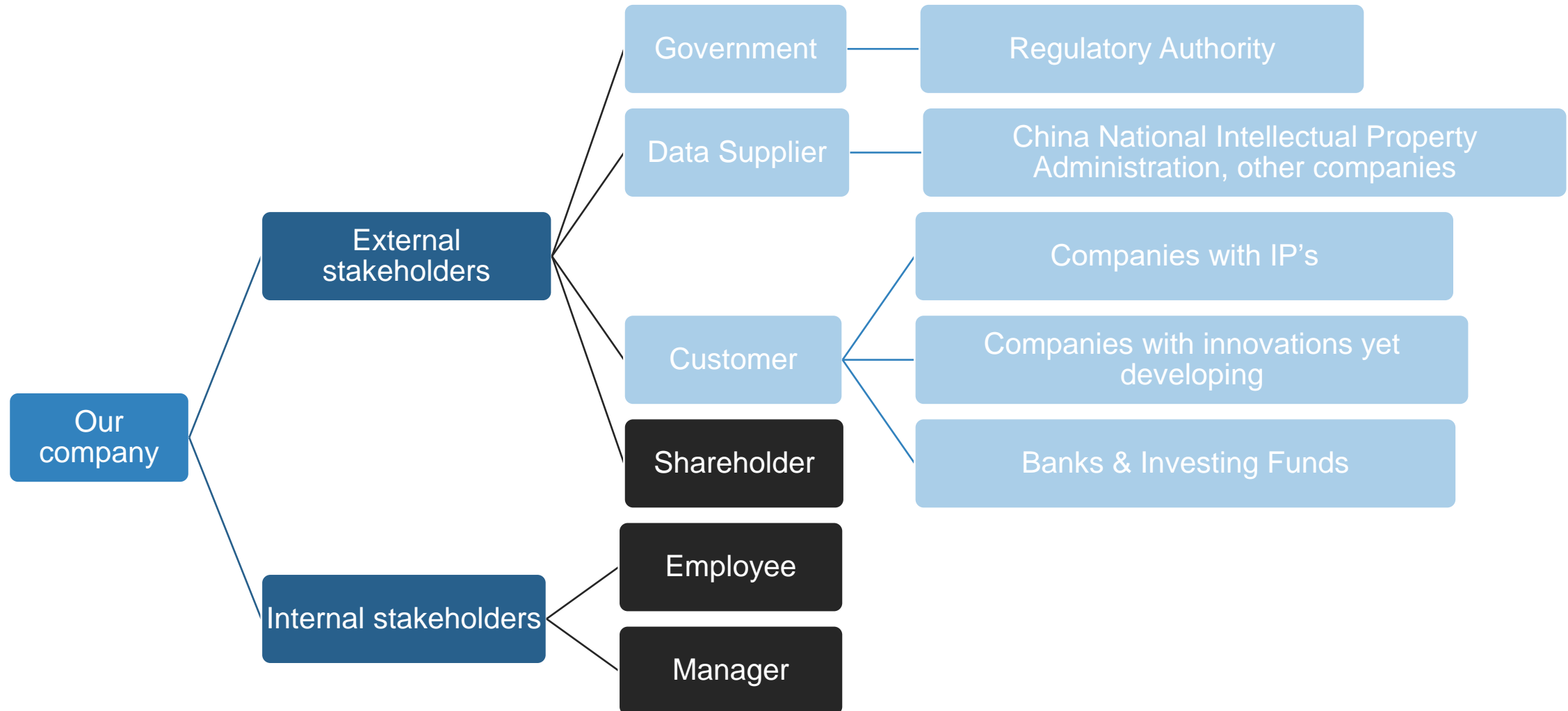
We are competing with a variety of big companies

But…

None of them is using ML techniques at present
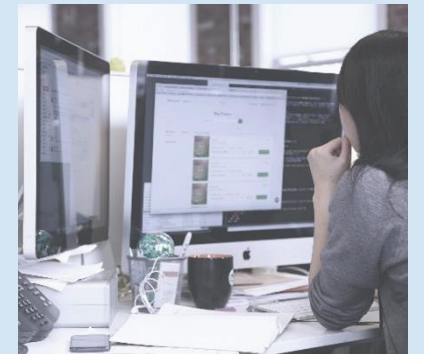
# Cost Analysis

Potential Stakeholders

Strategic Road Map

Marketing objectives

Short-term: within 3 months	Mid-term: within 5 years	Long-term: future 15 years
• Tap the market of Intelligent patent valuation platform in GBA • Raise the reputation	• Hold 50% or more of the market shares in GBA. • Ranked among the top 5 in the domestic industry. • Develop international costumers.	• Ranked among the top 50 in the global industry. • Listed on the Hong Kong Stock Exchange.
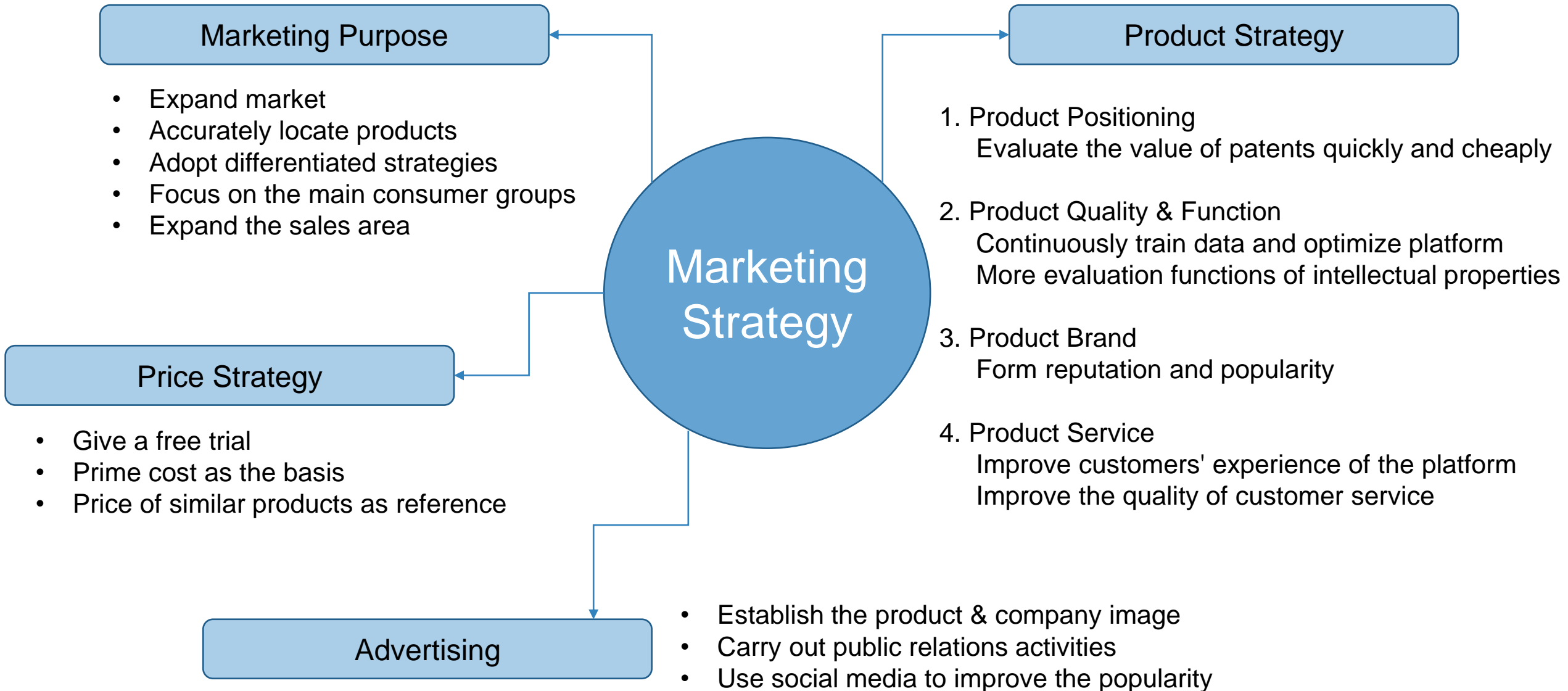
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[1] Ebrahim, T. Y. (2018). Automation & predictive analytics in patent prosecution: USPTO implications & policy. *Ga. St. UL Rev., 35*, 1185.

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Thank You