Patent **Quality and Value** Rankings

Applying High-Quality Data,
Monetizing High-Value Patents

InQuartik

2023 Version

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Introduction:

Breaking the "All Patents Are Created Equal" Myth and Removing the Subjective Guesswork From Patent Evaluation

The "Quantity First" Myth Is Coming To an End

The debate over quality vs. quantity has been around for as long as patents themselves. Though it's becoming more apparent that quality is a relatively more dependable metric than merely relying on quantity, most patent professionals, however, fall into the infinite loop of evaluating the patent's strength by quantity instead of quality. To get to the bottom of this myth, we may need to reconsider the traditional idea of patent evaluation entirely. Before doing this, let's take a look at the current approach and the story behind it.

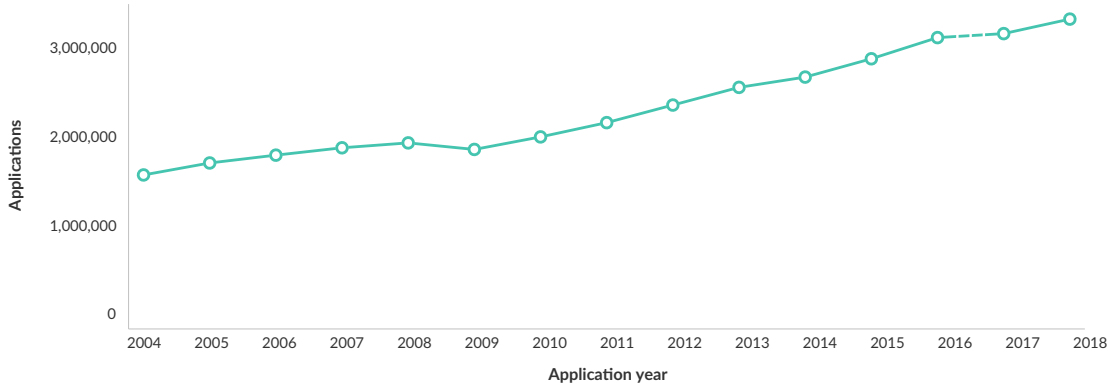
Patent systems were established with the ultimate goal of fostering economic growth and technological developments by rewarding those individuals — the inventors — willing to share their wisdom with society.

Just as technology and global economies have boomed over the decades, so has the number of patent filings. A look at the statistics (Figure 1) from the *World Intellectual Property Organization* offers us a glimpse into this trend.

We can see that the number of patent applications has surpassed 3.3 million. There is certainly no doubt that this rich disclosure of knowledge has brought a significant number of benefits to our day-to-day lives. The rapid pace of innovations, however, also introduced several downsides.

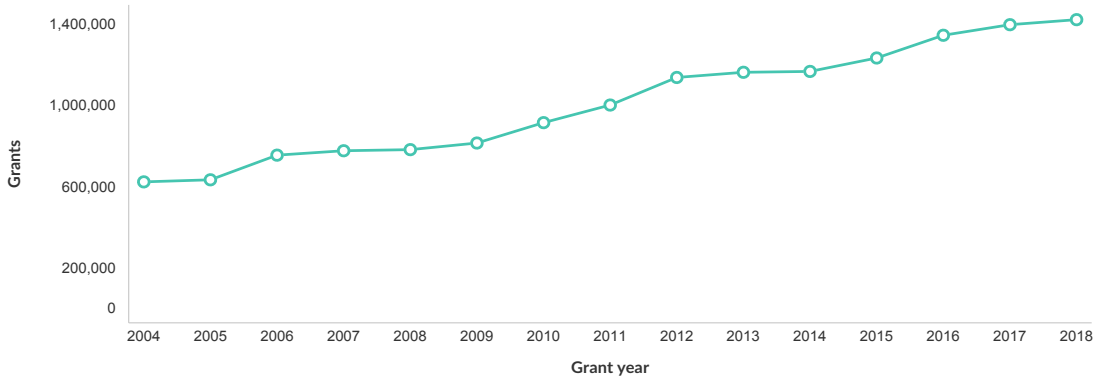
A greater number of patent filings may not necessarily indicate that more innovations successfully making it through the patent office's scrutiny for novelty and non-obviousness (see Figure 2).

Figure 1. Global trend of patent applications



Source: WIPO

Figure 2. Trend of patents granted worldwide



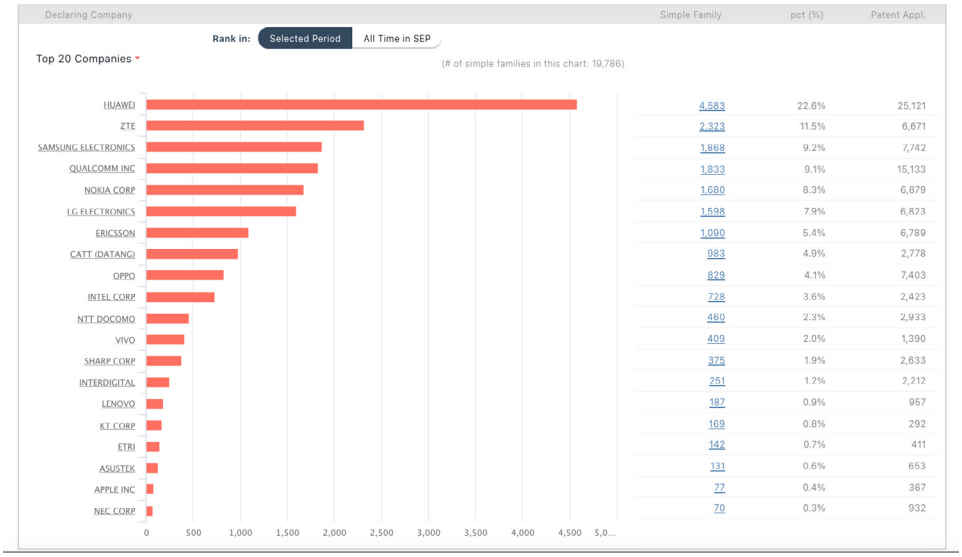
Source: WIPO

The number of patents granted, as we see here, reached 1.42 million in 2018. Comparing the number of patents granted to the number of patents filed, there is a considerable gap where a significant number of patent applications were not granted due to patentability issues — thus giving us a strong indication that filing more patents does not necessarily equal having higher technical capabilities. *Therefore, it would be safe to say that a quantity-based evaluation cannot give us in-depth insights into a patent portfolio's quality.*

Let us now take a look at one of the greatest global trending topics of recent times: 5G. This cutting-edge telecommunication standard will change the world entirely — from personal mobile services to mega factories at scale. The question of "who is leading the 5G race" has been a constantly asked question and a long-standing dispute for almost half a decade.

If we evaluate the leading position by counting the standard-essential patents (SEPs) declared at the ETSI (*European Telecommunications Standards Institute*) IPR database, we can see the following rankings in Figure 3.

Figure 3. The top ETSI SEP declaring companies



Source: *Patentcloud's SEP OmniLytics*, updated on July 9th, 2021

Many — such as the media, who do not possess enough knowledge of tech entities — tend to report or evaluate a company's position in the 5G race based on the quantity of its declared SEPs. Still, we need to ask, what is the potential risk of evaluating a patent portfolio by considering quantity only?

Back to the literal meaning of standard-essential patents. A standard-essential patent means that a patent must correspond to a "standard" and be "essential" for it to be recognized as a SEP. However, the current ETSI declaration process is more than excessive, causing the "over-declaration" phenomenon that induces various issues in patent licensing negotiations.

Possible reasons for over-declaration:

- ETSI requires that any patent applicants with patents that "might be essential" should submit them to ETSI.
- As technology evolves, some patents might lose their essentiality.
- Patent claims are narrowed down or rejected during prosecution; the essentiality may be reduced or diminished during this process.
- Some patent applicants tend to declare as many as SEPs as possible to gain a competitive edge on future negotiations.

Merely depending on a quantity-based assumption to evaluate the strength of the patent portfolio seems unreliable. Large portfolios may not directly result in a higher value for the patent holder, in fact; most patents create no value at all and remain dormant until they are either abandoned, lapsed, or simply expire.

This approach is also grounded on the wrong assumption that all patents are created equal, making it a form of evaluation far from "intelligent."

As an attempt to fix this stagnant situation, the first online patent databases appeared in the '90s. Although they provided accessible and consolidated patent data to everyone for the first time, the overall data quality was poor and lacking in depth.

With the issue of data utilization here to stay, and without comprehensive data to rely on, patent intelligence stayed focused on quantity-based evaluations.

As practitioners in the patent field are already well aware, the number of patents in a portfolio is an extremely weak indicator of its actual strength.

To sum up, the quantity-based method for analyzing patent data stems from the presumption that "all patents are created equal" and underutilizes patent data. This has resulted in the false assumption that "quantity equals value" which leads practitioners away from the facts and valuable insights.

However, several hurdles need to be overcome before people can shift from a quantitative approach to a qualitative approach for patent evaluation.

Traditional Patent Evaluation Methods and the Challenges Faced

The financial valuation process

The concept of patent price and the corresponding valuation models were first developed for accounting and financial reporting purposes.

These valuation models — which were initially developed to meet the Generally Accepted Accounting Principles (GAAP) and the International Financial Reporting Standards (IFRS) — were later leveraged in decision-making and patent asset management and transaction practices.

Traditional evaluation methods used for asset management and transactions typically relied on the judgment of the stakeholders (i.e., inventors, applicants, agents, and examiners), based on their knowledge, experience, and the particular case they were facing.

Later on, different aspects of the market, technology, and patent practices started to be considered. However, due to the insurmountable costs associated with the time needed to perform such an evaluation, this traditional method could only really be used on a case-by-case basis and performed on specific patents for specific decision points.

Computer algorithms

To increase the speed and efficiency of patent evaluations, computer algorithms were developed to emulate patent practitioners' evaluation methods, such as the work by CHI Research in the '90s.

Many patent data and analytics service providers also created evaluation indicators based on their understanding of patent quality, value, and price.

Assumptions, foundations, and key parameters were utilized to formulate secret "recipes." These early approaches and indicators often had difficulty overcoming several significant challenges.

> The main fallacy is that these methods often aggregate multiple distinct elements into a single indicator, making such an indicator vague and unclear.

Whether such an indicator reflects the true patent value or not, the reason as to "why" the patent is of any value is often not provided. To establish credibility, the "recipe" or each distinct element used by patent practitioners to evaluate patents must be transparent to the user. However, unsurprisingly, most of the entities behind these indicators are unwilling to divulge the secrets of their trade.

> Even if the "recipes" are disclosed, proving the relevance of the aggregation and the multiple considerations, this method remains problematic, simply because there is no single meaning that can be used to explain the indicator.

This lack of consistency in interpretation has caused controversy among patent professionals of different backgrounds and experience levels, ultimately leaving clients confused and unable to identify reliable references.

In contrast to the aggregated indicator approach, some vendors or researchers have set up simple parameters, such as using the number of forward citations or the number of family members for evaluation.

However, these simple parameter approaches have forced users to conduct assessments offline by aggregating up the parameters themselves, since it is even harder to tell the relevance and weight of the contribution of each parameter.

As a result and unsurprisingly, practitioners reverted to case-by-case evaluations.

A More Meaningful and Useful Method for Patent Evaluation

Before introducing a better way to evaluate patent assets, we should take a moment to discuss the three concepts that patent practitioners have introduced over the years in an attempt to deal with the phenomenon mentioned above. The concepts are depicted in Figure 4.

Quality

The notion that quality is tied up with the patentability requirements arise from Title 35 of the United States Code, particularly in Section 101 (utility and eligibility), Section 102 (novelty), Section 103 (non-obviousness), and Section 112 (adequately described):

> If a claimed invention is eligible, novel, non-obvious, and described with clarity, it is deemed to have at least a baseline (or minimum) quality.

Quality patents must feature a claim language that is carefully crafted to ensure accuracy and logic, as this will broaden their scope and consequently slim down the chances of competitors performing a design-around.

Despite the slightly different definitions, the concept of patent quality is widely accepted as the foundation of value and price.

Value

Should a patent be practiced without authorization, its owner may decide to enforce it before a court. This confidence in patent enforcement provides the foundation for patent transactions, such as selling, licensing, and pledging.

The expected value earned from these transactions is widely agreed upon as being the commercial or monetary value of the patent as an asset.

We should point out that a heavily researched and well-written patent may meet all the patentability requirements but have very little value. The covered invention, for example, might be outdated or related to an obscure technology that only the inventor is interested in developing.

> Patent value — either realized from enforcement, transaction, or other commercial practices — goes well beyond the four corners of a patent by also considering commercial viability, market conditions, and industry position.

For patent holders who are managing patent assets, the patent value does not necessarily need to be a specific monetary figure. At this stage, it is far more important for them to understand the potential monetary return of the patent, especially when deciding whether to maintain, activate, or discard it.

Price

Once a commercial activity occurs, both parties need to determine a specific amount for the monetary value — this is when they resort to patent price.

The concept of patent quality determines whether a patent can be deemed an asset or not according to its validity and enforceability.

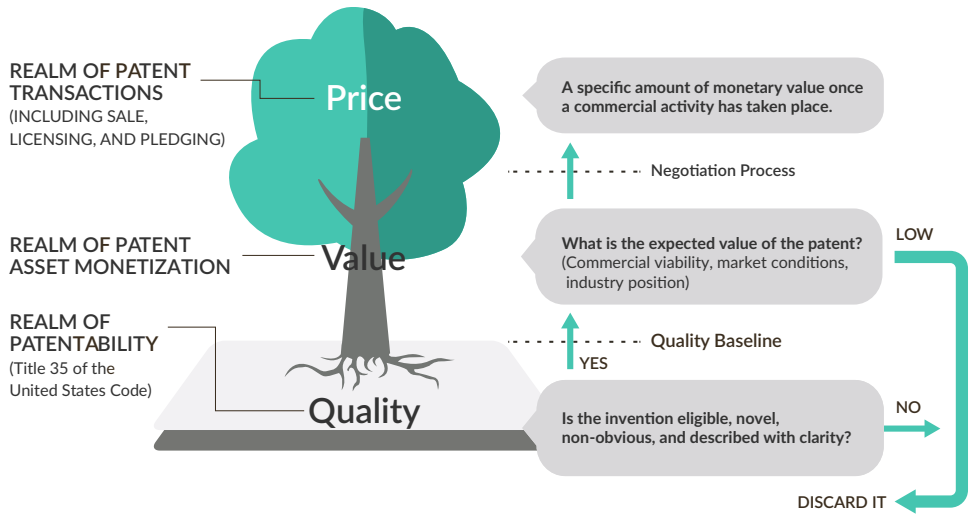
> The price of a patent is generally formulated through negotiation or litigation based on the cognition that each party holds on the value of the patent-at-issue.

It should be clear by now that, although practitioners may advocate different approaches, it is widely agreed that **patent quality, value, and price are separate — yet highly dependent on one another — factors.**

Patentcloud's Quality and Value Rankings

With the emergence of big data and machine learning technology, data modeling for predicting the tendency of a specific event involving patents has now become possible. As long as the big data provides sufficient information for machine learning to extract useful patent data, this technology may provide an analysis that resembles patent value.

Figure 4. The relationship between patent quality, value, and price



InQuartik's team of researchers and data scientists leveraged machine learning technology to uncover the strength, or other indexes, of patent data. Consequently, we have a more meaningful and useful method for evaluating patents via InQuartik's Patentcloud platform, including the exclusive and proprietary *Patent Quality and Value Rankings*.

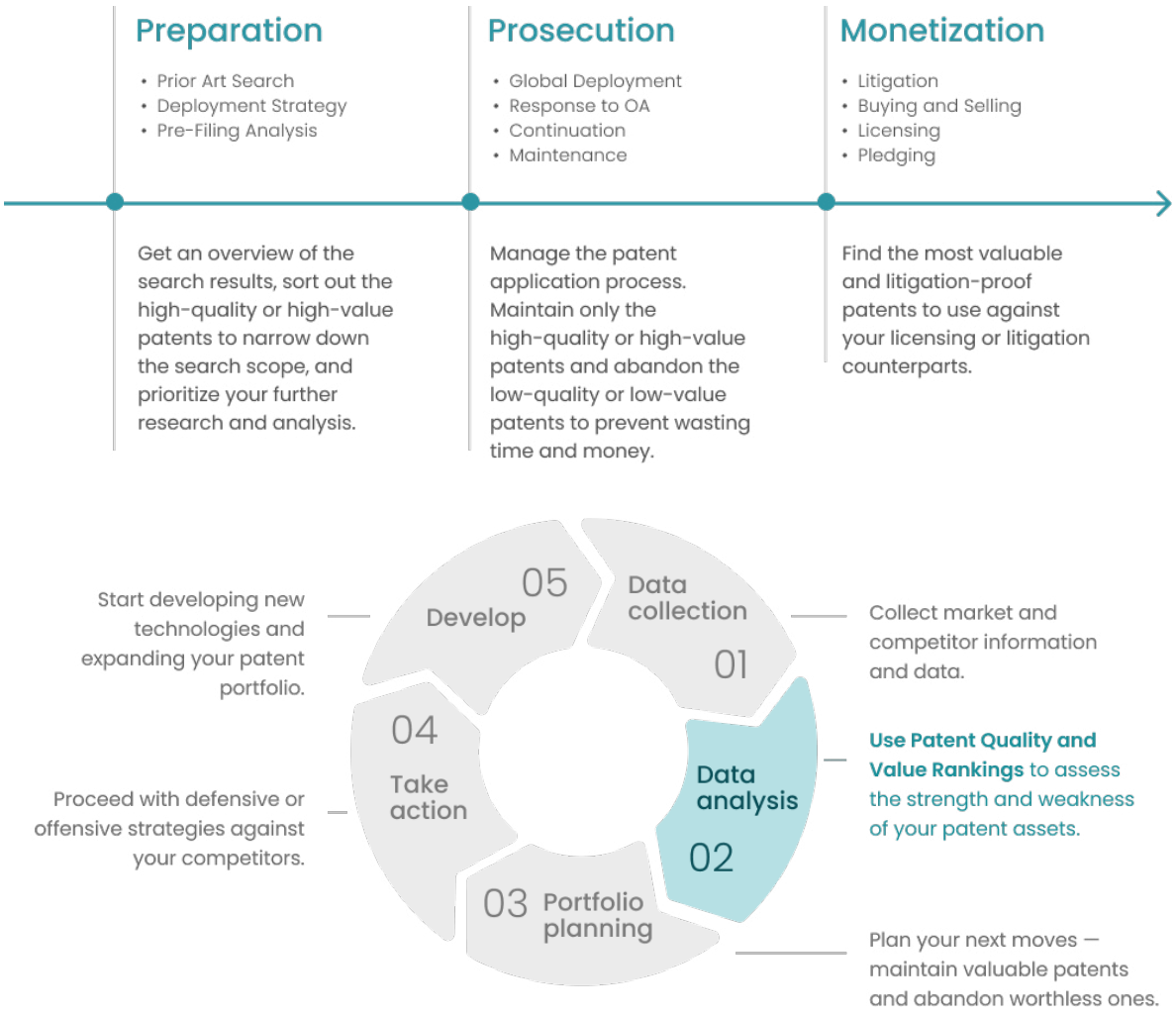
The *Patent Quality Ranking* focuses on indicating the relative eventuality of prior art references being found for a patent, which can threaten its validity.

The *Patent Value Ranking* focuses on reflecting the relative tendency of a patent to be practiced or monetized after its issuance.

By separating these two indicators, users can leverage the *Patent Value Ranking* and the *Patent Quality Ranking* independently for different decision points in the patent lifecycle, and even obtain patent intelligence for insights in all kinds of patent portfolio management activities, such as patent clearance, evaluation on continuation, and patent due diligence.

These rankings are not meant to replace a case-by-case evaluation of a specific patent; they are intended to serve as an effective filter or additional dimension when dealing with patent data and provide actionable intelligence.

Figure 5. The Quality and Value Rankings in patent lifecycle management and patent portfolio management

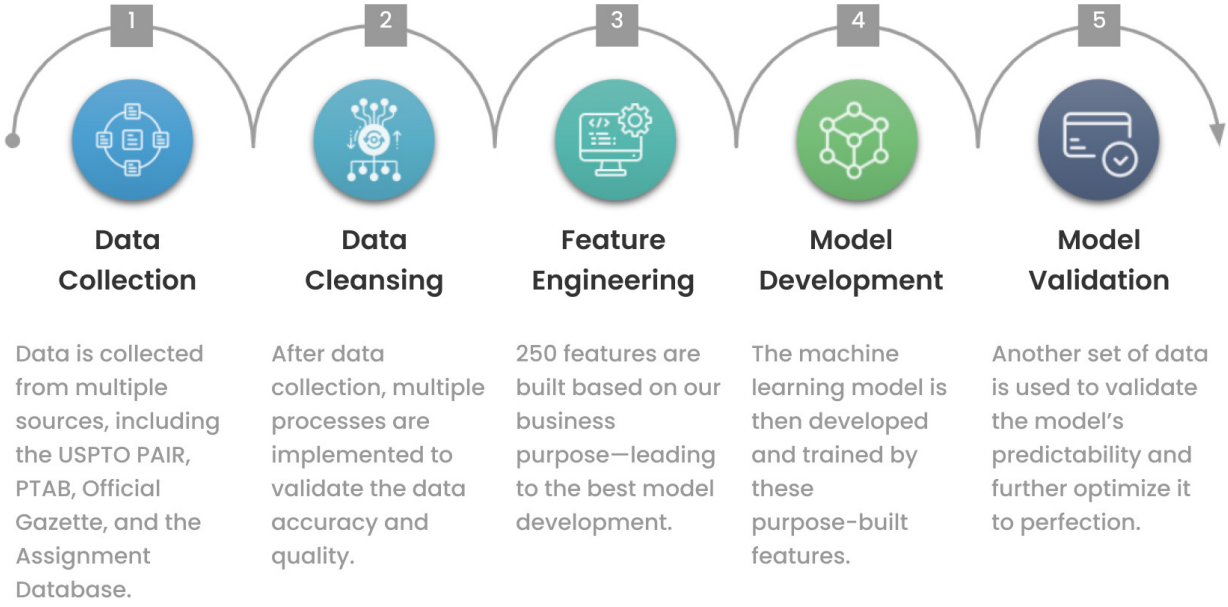


The Principles Behind:

How Machine Learning Gave Us a Better Approach To Patent Evaluation

After discussing the traditional way to evaluate patents and its major shortcomings, let us dig deeper into the matter by analyzing in detail the machine learning technology that enabled InQuartik's engineers to introduce a more reliable approach.

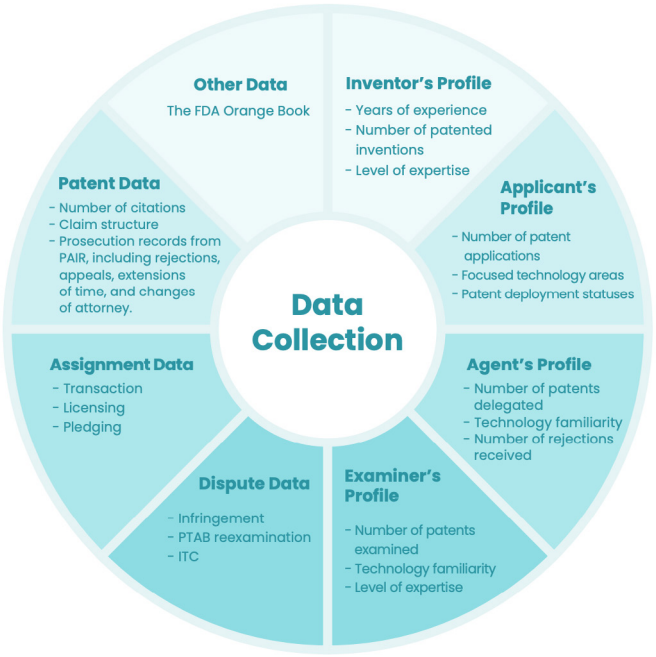
Figure 6. InQuartik's machine learning model



Data Acquisition

As illustrated in Figure 7 below, the machine learning process behind *Patentcloud's Quality and Value Rankings* begins with acquiring patent data from multiple sources such as bibliography data, assignment data, and patent prosecution history which are used to train the model so that the AI can learn how to predict a patent's quality and value.

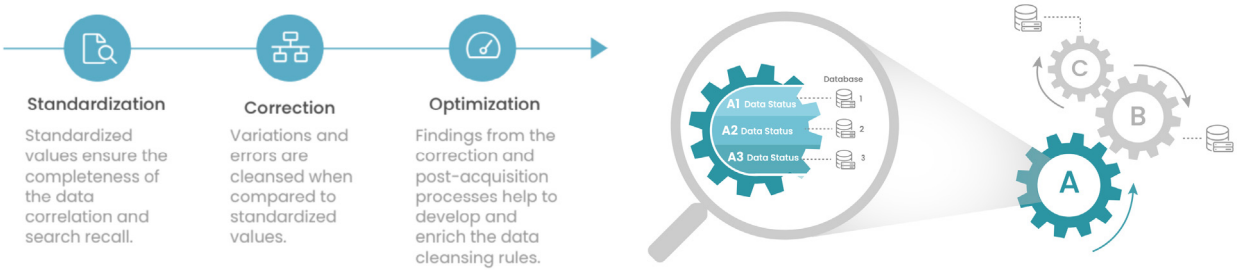
Figure 7. Multiple patent data sources



Data Cleansing

After data collection, multiple processes are implemented to validate the data accuracy and quality, as illustrated in Figure 8. Moreover, our data scientists perform several data processing algorithms to inspect and correct the data with various data sources or with the same data fields from different sources.

Figure 8. The data cleansing process after data acquisition



Feature Engineering

A feature is an individual measurable property or characteristic of an event being observed. Each feature is composed of multiple data to represent a specific input for the Patentcloud machine learning algorithm.

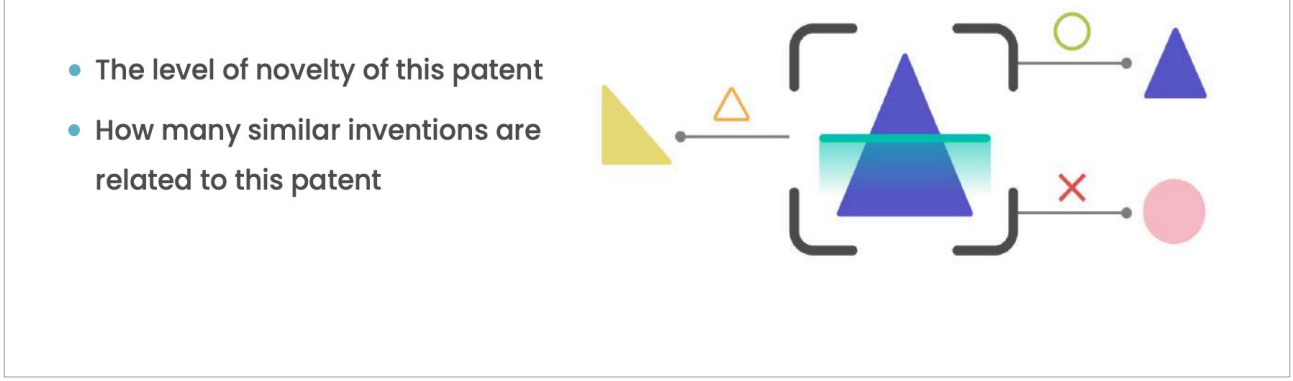
For example, we use Natural Language Processing technology to perform Semantic Search on all available patents and analyze the semantic variables among these patents to discover:

- A patent's level of novelty
- How many similar inventions are related to this patent

After rigorous data cleansing and feature engineering, InQuartik's data scientists worked with patent professionals to identify a set of 250 defining features.

These features mainly relate to the experience of the stakeholders (i.e., inventors, applicants, agents, and examiners), backward and forward citations, claim structure, assignment records (transaction, licensing, and pledging), and the prosecution history (i.e., rejections, amendments, and change of attorneys) of patents.

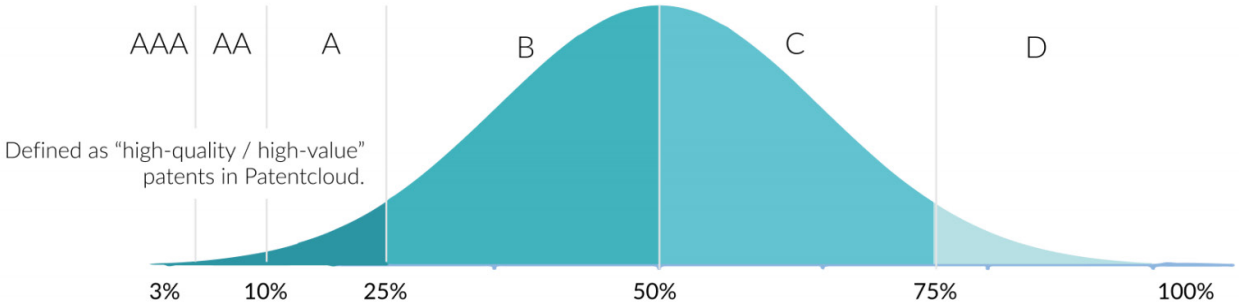
Figure 9. Illustration of feature engineering



Model Development

After repetitive training, the model will eventually be capable of predicting a patent's quality and value by giving each patent a score. Nevertheless, the absolute scores would be too challenging to interpret. The next step is to assess the similarity of each patent with the high-quality or high-value models identified above and provide the resulting relative rankings as Figure 10 indicates:

Figure 10. The relative ranking structure of Patentcloud's Patent Quality and Value Rankings



Model Validation

Following the initial model building phase, InQuartik's data scientists continued their collaboration with patent professionals to validate the results and optimize the models. In particular, to continuously track the significance of the correlation between the models and the events they are trying to predict, the team built two monitoring systems — one for patent infringement cases to validate value and the other for patents abandoned during prosecution to validate quality.

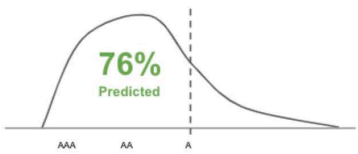
Validating Value Rankings — Patent infringement cases

We used 88,340 U.S. patents involved in infringement cases since 2000 to validate the value model.

While not knowing that these patents are involved in infringement cases, the Patent Value Ranking model rates 76.62% of these patents as those with an above A value ranking, proving the model's ability to predict potential monetization activities.

Table 1. Examining the value model using U.S. patents involved in infringement cases

Total amount	>A	AAA	AA	A	B	C	D	p-value
88,340	76.62%	27.30%	24.91%	23.41%	15.33%	6.43%	2.61%	<0.001



Note: Infringement case data was collected between 2000-01-01 ~ 2023-01-06
Source: InQuartik

Validating Quality Rankings — Abandoned USPTO patent applications

We used 1,701,228 U.S. patent applications abandoned during prosecution since 2001, to validate the quality model.

While not knowing that these applications were abandoned, the Patent Quality Ranking model rates 83.68% of these patents as those with a below C quality ranking, proving the model's ability to predict potential abandonment and invalidity events.

Patents Listed in the FDA Orange Book

Apart from the infringement cases and abandoned patent data mentioned above, we also selected other common forms of patent practice for further validation. These other forms are good indicators for validating the model's predictability since it is relatively easy to map predictability values to real events.

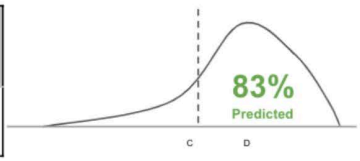
To further validate the Patent Value Ranking model, we brought in the patent data listed in the FDA Orange Book to examine the value distribution of the list.

If a patent related to an approved drug is listed in the Orange Book, it should have a higher value ranking on average. By importing the patent list into *Patentcloud's Due Diligence*, we can view the Quality and Value Dashboard below (Figure 11).

Patentcloud's Due Diligence can process up to 50,000 patents and get results in seconds. From *the Quality of High-Value Patents* dashboard, we can see that most of the patents in the FDA Orange Book — 92.9% to be precise — are ranked above grade A. This validation further verifies the applicability of *Patentcloud's Value Rankings*.

Table 2. Examining the quality model using U.S. patents abandoned during prosecution

AAA	AA	A	B	C	D	<C	p-value
0.22%	0.98%	3.68%	11.45%	22.58%	61.10%	83.68%	<0.001



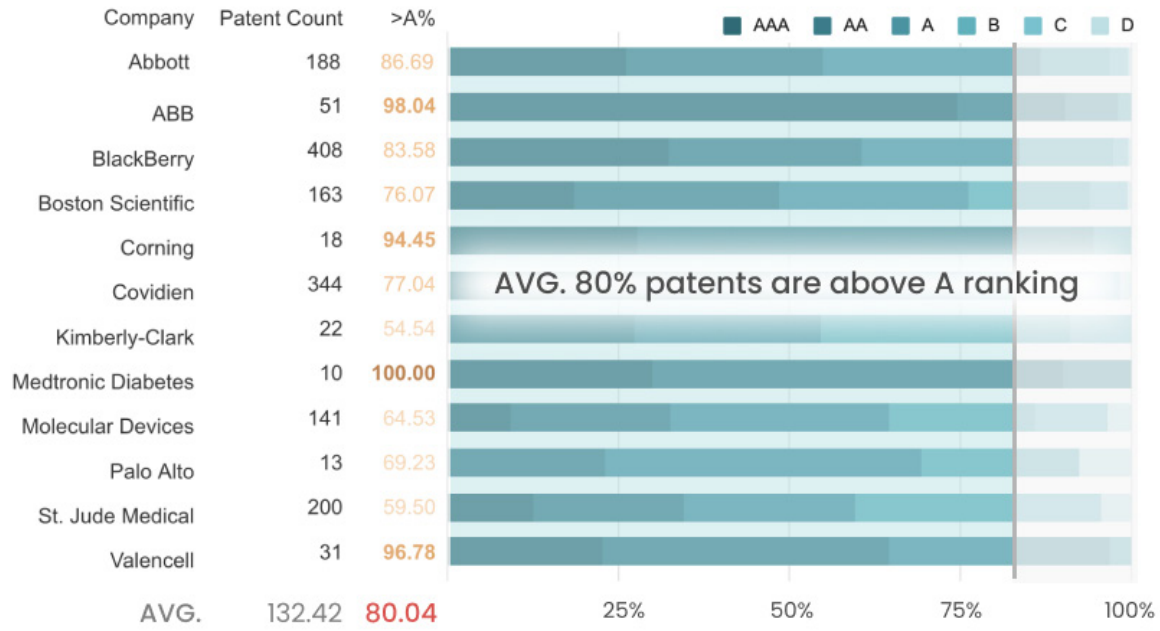
Note: Data for U.S. patent applications abandoned during prosecution was collected between 2001-03-15 ~ 2023-01-06
Source: InQuartik

Figure 11. The value ranking of the U.S. patents listed in the FDA Orange Book

Benchmarking S&P 500 Companies With Virtual Patent Marking

InQuartik's data scientists also used *Patent Quality and Value Rankings* to benchmark the value of the patent portfolios of S&P 500 companies that have virtual patent marking. The chart below shows how many high-value patents a company has, which may reflect the company's intrinsic value and competitive strength.

Figure 12. Benchmarking S&P 500 companies with virtual patent marking



The Self-Evolving Model

A statistical approach is further involved in training the model through parallel computing of the variables. These variables range across all stages of a patent's lifecycle — from application to post-grant activities. This approach, in reality, is quite important for all kinds of patent analysis and decision-making. Since data from post-grant events (such as assignments) will be evaluated, the rankings may be changed dynamically according to the event that occurred.

> *Patent Quality and Value Rankings* are systems that evolve inherently and dynamically and are determined based on all of the data available both at the time of publication (or issuance) of the patent as well as post-publication (or post-issuance) events.

For instance, if a patent is filed in an IPR petition or used in a patent infringement litigation, its value score will increase and may lead to a higher value ranking. Also, if a patent is registered in the newly issued Orange Book, its value ranking could increase.

If a patent is filed in an IPR petition, the model will adjust its quality score according to the petition's final judgment. Whether the patent is accepted, partially accepted, or rejected, it will lead to some changes in the quality ranking.

Finally, after building this meticulously designed model and involving many factors and indicators in data and analysis validation, the *Patent Quality and Value Rankings* can now be obtained while browsing the patent data in *Patentcloud's Patent Search.*

Figure 13. Data scope considered for Patent Quality Ranking and Patent Value Ranking

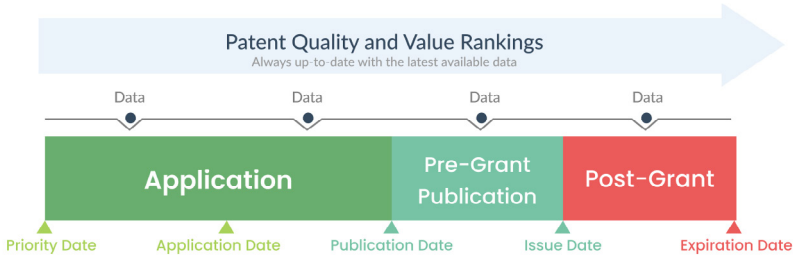
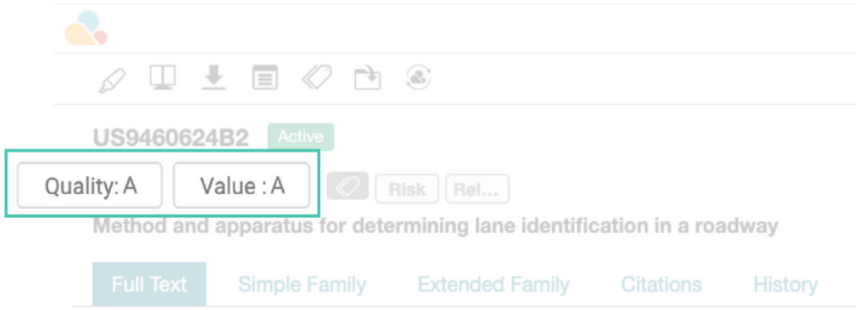


Figure 14. The Quality and Value Rankings in Patentcloud's Patent Search



Limitations

Patentcloud's Quality and Value Rankings are an attempt at predicting the likelihood of future events involving patents. The rankings have both strengths and limitations.

Firstly, they should be leveraged exclusively within the correct context as their definitions may not always align with the various "literal meanings" of the terms "Patent Quality" and "Patent Value" in different scenarios.

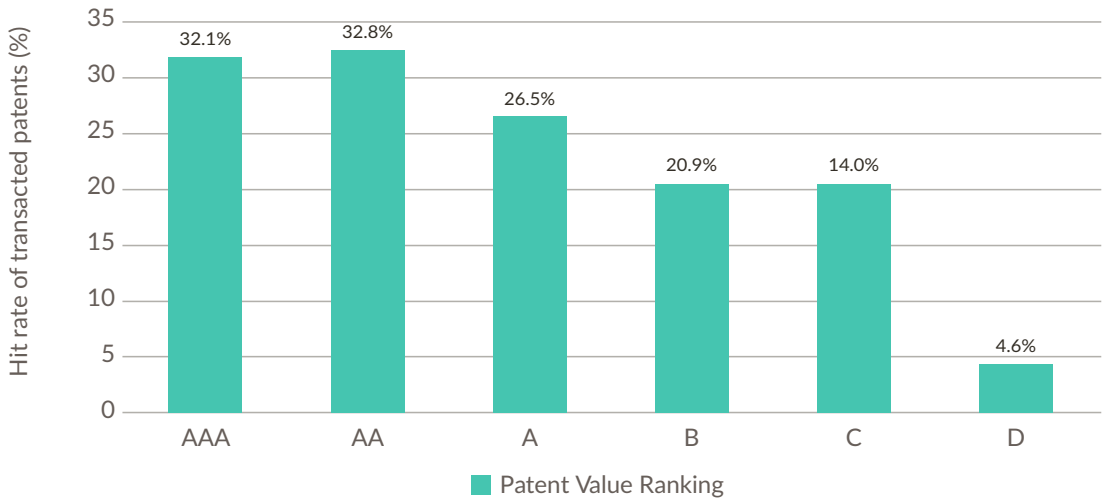
For example, even though the *Patent Value Ranking* relates to the likelihood of patents being practiced or transacted, it does not consider the market size of the products practicing a patent or the cost-effective enhancement of the products practicing a patent.

Additionally, a higher *Patent Value Ranking* does not necessarily mean that a specific patent will be litigated or transacted — patents are rarely litigated or transacted at all.

However, the rankings provide greater confidence when identifying patents that have been subject to litigation or transaction within large portfolios.

As shown in Figure 15 below, over 30% of the AA/AAA-ranked patents have been transacted after their issuance:

Figure 15. Patent value model validation using U.S. transaction patent data



The details are found in Table 3 below.

Table 3. Patent value model validation using U.S. transaction patent data (in detail)

Active U.S. patents from Jan. 2020 to Aug. 2018	AAA-ranked	AA-ranked	A-ranked	B-ranked	C-ranked	D-ranked
All active patents (#)	161,754	246,753	490,878	788,597	793.143	1,051,719
Transacted patents	51,964	80,984	129,996	165,132	111,281	48,060
Hit rate (%) of transacted patents	32.1%	32.8%	26.5%	20.9%	14.0%	4.6%

Note: To filter out inter-affiliate company transaction data, only patents transacted more than twice have been included in the data set.

However, even though there is a significant difference (about six times) between the best and the worst quality patents, around 2/3 of the AA/AAA-ranked patents may never be involved in transaction or litigation.

It is clear that the higher the relevance between the definition of the rankings and the scenarios in which they are applied, the higher their effectiveness.

For contexts requiring different assumptions of "Patent Quality" and "Patent Value," the rankings may still be applicable, but other relevant indicators should be considered and combined for better results.

Best Practices:

Using Patent Quality and Value Rankings for Analysis

Actionable analytics must clearly answer the questions that decision-makers have in mind — what they need is objective information rather than vague assumptions. However, as we saw above, some of the indicators traditionally used are a mere aggregation of data relating to the inventor's expertise and the patent's novelty, breadth of rights, and other criteria. They cannot be regarded as valuable insights since they do not provide any information about why the patent is graded as high-value.

Example 1: Wearable Medical Devices — An Overview of Patent Landscaping

Patent landscapes are used in competitive benchmarking to identify the major applicants or patent owners in a given technology field.

A conventional listing may include "poor value" patents, many of which may have never been practiced or have even been abandoned. The more patents of this kind that an applicant or patent owner has, the higher the possibility of overestimating their technological strength.

Apart from these false-positive issues, there could also be false-negative issues, wherein the high-value patent applicants or patent owners end up being overlooked simply because they have been buried in the overwhelmingly large number of patents.

Using *Patent Quality and Value Rankings* to analyze patent landscape charts can help in this scenario. Filtering out the patents ranking A and above from the original landscape is a way to address the false-negative issues and let the analyst focus on the portfolio.

Let us dive deeper by looking at an excellent patent landscaping analysis, "Wearable Medical Devices in Monitoring Bio Data," conducted by our enterprise partner — Wispro Technology Consulting Co., to try to sort out the patents worth analyzing in the wearable medical devices patent field.

In this report, Wispro's experts collected patents from 40 major companies that produce wearable medical devices and 95 devices submitted to the U.S. FDA for approval. The report ultimately collected 514 patent applications.

Figure 16 below — created with data collected by Patentcloud —provides an overview of the 495 patent applications:

From the chart, we can see that around 22% of the patents are both of high quality and high value. While maintaining the simplicity of quantity-based patent intelligence, *Patentcloud's Patent Quality and Value Rankings* can function as an effective filter to extract the signal from the noise, especially when considering the overwhelming number of patent applications filed each year.

Figure 16. Identifying the high-quality and high-value patents in wearable medical devices

Source: Wispro

Example 2: The Race for Advanced Chip Manufacturing — Competitive Intelligence Analysis

Patent Quality and Value Rankings can also be used to conduct competitive intelligence analysis. For in-house patent portfolio managers, it is a great way to realize the strengths and the weaknesses of their patent portfolio, giving them enough insights to improve their patent portfolios; for investors, it easily depicts the competitive landscape and the position of each company, enabling them to make well-informed decisions.

By reviewing the report "*Competitive Intelligence Analysis of IC Foundries*" conducted by Wispro, we can assess the patent portfolios of major global IC foundries from the perspective of patent quality and value.

In this report, Wispro's experts collected patents with the following criteria:

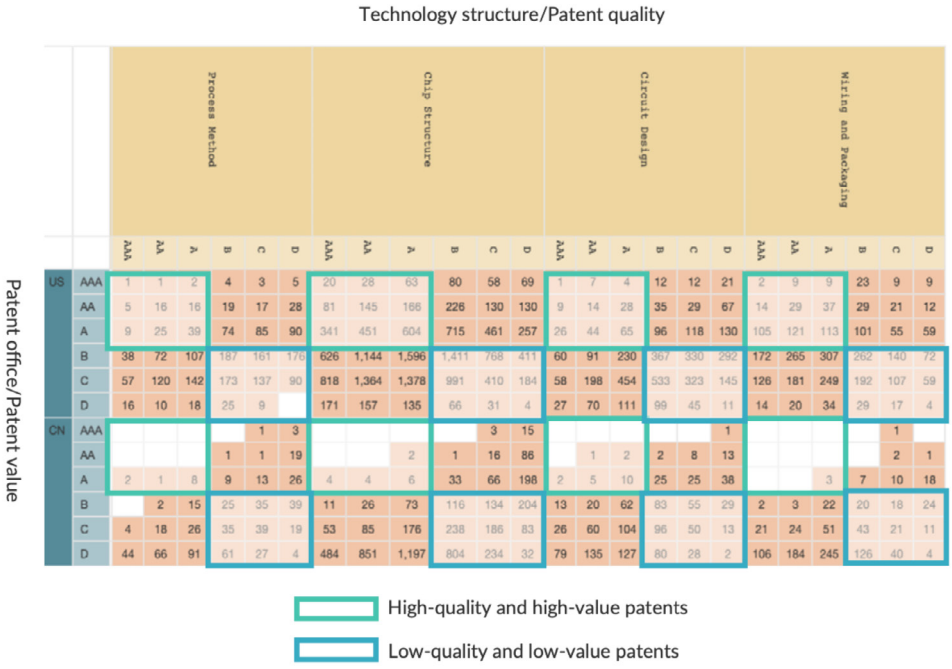
- Jurisdictions: US & CN
- Legal status: published or granted
- Assignee: TSMC, Intel, Samsung Semiconductor, and GlobalFoundries

Let us try to identify the major technologies in the chip manufacturing patent field first. After data collection, the experts further categorized the patents with different metrics. In this case, nearly 20,000 patents were categorized by technology structure and patent office. By utilizing the two-level, pivot table-like *Patent Matrix Dashboard*, we can form a patent landscape by examining the patent quality and the patent value at the same time with the above two metrics (see Figure 17).

Assessing the quality and value of patent portfolios brings several benefits. It allows decision-makers to identify low-performing patents — In other words, low-quality and low-value patents (below C-ranked) — they can then consider divesting these patents to reduce maintenance fees.

On the flip side, high-performing patents — patents with higher *Patent Quality and Value Rankings* (above A-ranked) — deserve to be monetized more often than the other patents.

Figure 17. The patent landscape of patent portfolios from major IC foundries



Source: Wispro

Let us dive deeper by examining the patent portfolio of each IC manufacturer. Candidates such as TSMC, Intel, Samsung Semiconductor, and GlobalFoundries step into the game since they are the most well-known and possess the highest market ratio.

Focusing on these top applicants could complement the previous approaches: Setting the filters to show patents ranked above A will result in a list of applicants with more valuable patents in terms of practicing and monetizing potential.

Based on the classification of technology structure and identification of high-quality and high-value patents above, Wispro's experts produced the results seen in Figure 18 below:

Figure 18. A competitive analysis of world major IC manufacturers

Emerging Technology	Company	tsmc		intel		SAMSUNG		GLOBAL FOUNDRIES	
	office	US	CN	US	CN	US	CN	US	CN
Non-planar Transistor	Application count	3,714	896	1,415	356	2,159	362	4,446	274
	High Quality &Value ratio	17.0%	0.6%	14.7%	0.0%	1.1%	0.0%	7.7%	0.4%
EUV Technique	Application count	453	81	249	19	574	42	350	19
	High Quality &Value ratio	9.0%	1.3%	0.8%	0.0%	0.2%	0.0%	3.7%	0.0%
System in Package (SiP)	Application count	3,461	474	1,259	180	4,303	261	985	47
	High Quality &Value ratio	16.6%	0.2%	6.6%	0.0%	0.4%	0.0%	4.8%	2.1%

Source: Wispro

The "Emerging Technology" shown here is an alternative way of categorizing the patents according to the technology structure categorization above. From the chart, we can see that TSMC does not always have the most patent applications among all the technologies in every patent office, but it has the highest overall high-quality and high-value patent ratio compared to its competitors.

We can also see that GlobalFoundries has the most U.S. patents in non-planar transistors, and Samsung has the most U.S. patents in EUV technique and system in package. However, neither of these two companies possesses more qualitative and valuable patents than TSMC — it is no wonder that TSMC continues to lead in advanced chip manufacturing technologies.

> By leveraging *Patent Quality and Value Rankings*, we can successfully identify the key players in the IC manufacturing technology field and narrow down the pool of patents for a preliminary review.

Example 3: ETSI SEP Evaluation — Gain the Upper Hand in the 5G Era

It is crucial for companies investing in new technical fields related to 5G to understand the ETSI SEP declaration activities in a timely manner. How do the declaration activities affect the daily operation of a business?

How do different stakeholders in the 5G race — such as product developers, licensees, and investors — know the counterpart's competitiveness and trustworthiness? From the perspective of patent quality and value, *Patent Quality and Value Rankings* enables stakeholders to make better decisions.

1. Product developers: Setting up an FTO search scope

Patent infringement risk is one of the defining elements of commercial success; an FTO search is the standard process for identifying and controlling these risks.

As the 5G industry moves towards maturity, the technologies involved in a product or a Technical Specification (TS) often become more sophisticated, making it harder to determine the relevance of a specific patent to a product or a TS.

As a result, the scope of a patent clearance search can become vague, and some companies — especially in Asia — may even give up on controlling patent risk and simply allocate a budget for taking licenses.

With *Patentcloud's SEP OmniLytics*, it is clear to see the SEP declaration status by each 3GPP Technical Specification in Figure 19.

Figure 19. Top SEP declaring specifications in ETSI's database

3GPP Spec

All 3GPP Spec (# of simple families in this chart: 20,249)

	3GPP Spec	Spec Title	Simple Family
1.	TS 38 331	NR; Radio Resource Control (RRC); Protocol specification	9,243
2.	TS 38 213	NR; Physical layer procedures for control	9,011
3.	TS 38 211	NR; Physical channels and modulation	7,936
4.	TS 38 212	NR; Multiplexing and channel coding	7,600
5.	TS 38 214	NR; Physical layer procedures for data	7,133
6.	TS 38 300	NR; NR and NG-RAN Overall description; Stage-2	4,937
7.	TS 38 321	NR; Medium Access Control (MAC) protocol specification	4,649
8.	TS 23 501	System architecture for the 5G System (5GS)	1,736
9.	TS 38 322	NR; Radio Link Control (RLC) protocol specification	1,659
10.	TS 38 101	NR; User Equipment (UE) radio transmission and reception; Part 3: Range 1 and ...	1,342

Source: *Patentcloud's SEP OmniLytics*, updated on July 9th, 2021

Patent Quality and Value Rankings can help set the scope of an FTO search when the 5G technology becomes more complicated, and the number of related patents that need to be examined continues to increase.

Take TS 38 331 for example, by importing the declared SEPs into *Patent Vault*; we can instantly utilize the *PatentMatrix Dashboard* to get a glimpse of the patent quality and value distribution, along with the patent office (only the IP5 are displayed) and legal status (only active statuses are displayed) information (see Figure 20).

While there would still be thousands of relevant patents, *Patent Quality and Value Rankings* can be useful in limiting the search scope, so that any preliminary review can start with the patents that have relatively higher quality and value.

On the other hand, by identifying the patents with *Patent Quality and Value Rankings* lower than D (the bottom 25%), practitioners can somewhat narrow down the scope. If a patent holder takes the D-ranked patents against the product, it should be possible to settle the risk by invalidating them.

Figure 20 .The patent office/patent quality and legal status/patent value distribution of TS 38 331

		CN - China						US - United States						EP - EPO						KR - Korea						JP - Japan						TW - Taiwan					
		AAA	AA	A	B	C	D	AAA	AA	A	B	C	D	AAA	AA	A	B	C	D	AAA	AA	A	B	C	D	AAA	AA	A	B	C	D	AAA	AA	A	B	C	D
Active	AAA			1	2	7	25		1	4	6	6	16					3	11		1	7	12	10	3		1	1	6	11	18	2	2	11	1	1	
	AA		1	4	13	33	38	2	3	12	23	46	111				2	10	52	1	4	20	27	19	7	1	3	9	15	31	29	10	4	5			
	A	9	30	52	68	61	71	5	17	63	177	202	341			2	23	67	117	4	5	16	28	36	16	4	11	26	71	90	60	34	19	16	10	5	
	B	9	9	36	40	43	150	17	40	120	251	405	488	1		11	74	118	122	15	10	26	40	49	33	12	36	40	131	122	63	21	20	42	26	7	1
	C	6	13	34	51	47	141	15	52	131	256	313	365	1	3	11	66	123	151	68	24	34	41	46	33	6	18	23	15	11	3	5	2	7	6	9	6
	D	43	137	278	516	740	1,057	30	48	111	209	235	254	3	23	138	337	241	64	171	45	36	44	20	7	20	21	28	5	3	7	3				1	2
Exam.	AAA			1							1		17				1	4	31			2	2	3	4		17	47	3	6	3	1	4	5	3	1	
	AA	1		2	2	1	1				3	11	73			2	11	38	94		2	12	9	21	23	2	32	65	5	14	8	4	13	11	7	2	
	A	13	22	45	50	8	2	1	1	2	16	57	285		6	31	77	156	131	2	3	5	20	46	26	21	133	166	22	22	7	2	10	4	3	2	
	B	25	107	164	156	28	4	1	2	11	106	291	673	10	89	230	508	456	266	9	7	20	54	69	30	11	84	127	55	35	24	4	9	2	3		
	C	26	81	179	147	19	1	2	5	21	78	245	448	55	126	298	275	171	65	87	11	27	37	35	4	3	14	11	2	3			34	11		1	
	D	51	244	1,243	1,979	39	12		1	4	30	73	69	105	151	190	95	56	6	241	4	10	74	55	28	8	39	24	12	8		1	13	7			

Source: InQuartik

2. Licensees: Reach a fair trade

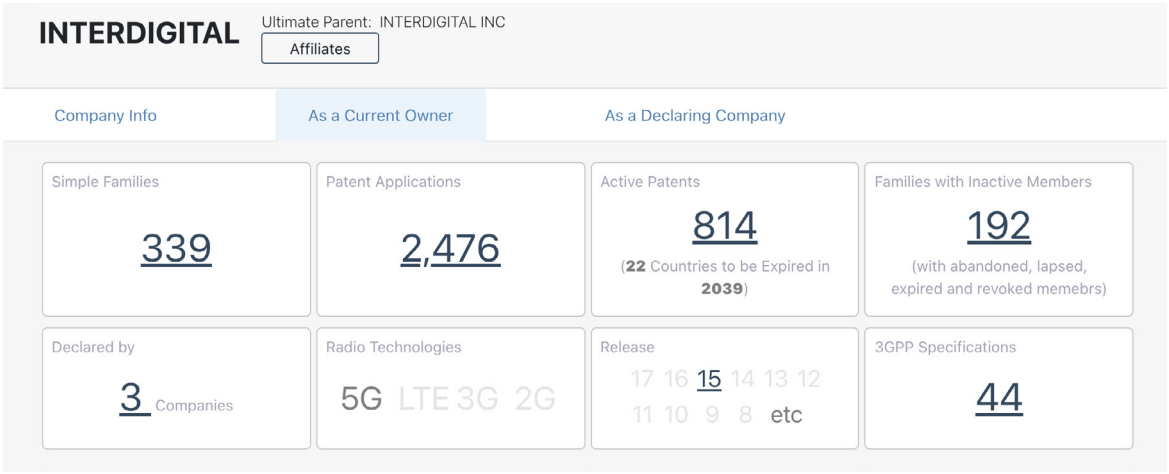
Many companies find themselves unprepared when licensors knock on their doors to ask for royalties — they simply do not have a way of knowing if the royalties asked for are fair or not.

This phenomenon is amazingly common in SEP-related products. Licensors tend to overclaim their patent portfolio and make a bundle deal — a licensing program that blends with only a limited amount of quality and valuable patents, making it harder for licensees to identify the diamonds in the rough.

However, with the help of *Patentcloud's SEP OmniLytics* and the *Patent Quality and Value Rankings*, one can assess the true quality, value, and the declaration status of a licensor's declared patent portfolio, immediately consolidating the information needed in the negotiation strategies against the proposed licensing program.

By viewing a company's profile in *Patentcloud's SEP OmniLytics*, one can immediately acquire a preliminary overview of a company's declaring status. Let us get into **INTERDIGITAL**'s profile shown in Figure 21 and take a look at its declaring status:

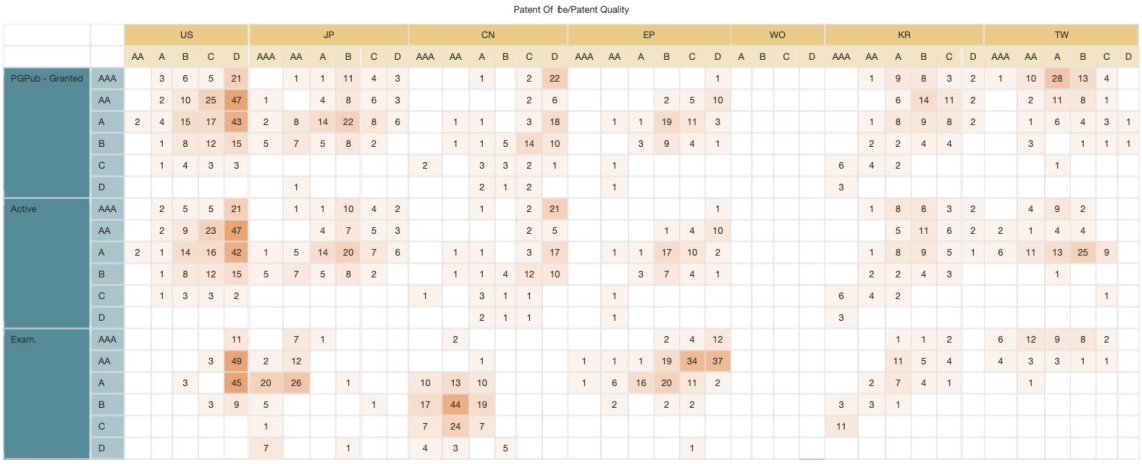
Figure 21. INTERDIGITAL's profile in Patentcloud's SEP OmniLytics



Source: *Patentcloud's SEP OmniLytics*, updated on July 9th, 2021

We can save all of the SEPs into a *Patent Vault* folder and obtain an analysis chart on the patent quality and the patent value via the *PatentMatrix Dashboard* (Figure 22):

Figure 22. The patent office/patent quality and legal status/patent value distribution of INTERDIGITAL



Source: *Patentcloud's Patent Vault*, data updated on July 9th, 2021

With this kind of analysis chart, licensees can utilize the following information:

- The patent office coverage: The SEP portfolio contains applications in multiple patent offices. Try to find the applications outside your product's selling markets and exclude them from the licensing program.
- The legal status: Some of the SEPs do not have an active status. If the SEPs are abandoned, expired, or still under years of examination, they should not be used for claiming royalties.
- The quality and value of patents: Watch out for the quality and value of the SEPs with the help of *Patent Quality and Value Rankings* — to filter out the number of valuable SEPs from the worthless ones.

3. Investors: Find valuable investment targets

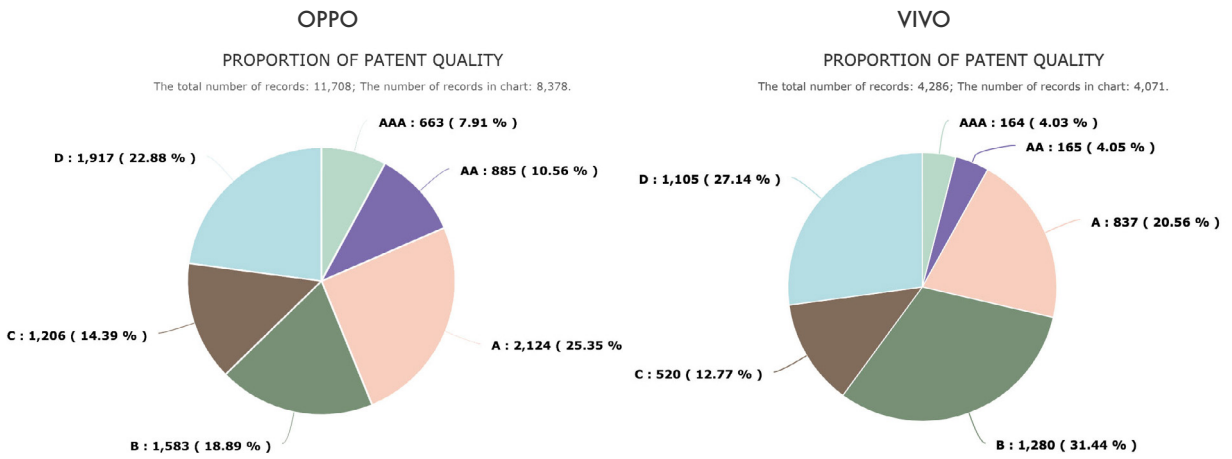
Patent Quality and Value Rankings can also be beneficial to patent portfolio assessment, especially in the case of patent transactions or M&A.

Except for subject-matter expert reviews concerning the current or future adoption in the industry, *Patent Quality and Value Rankings* can provide an instant overview of the portfolio and offer a quick comparison to other portfolios (competitive benchmarking) or even the whole technical field (for analyzing the positioning of the portfolio itself).

Let us look at the SEP portfolio of two Chinese mobile phone brands — OPPO and VIVO — and their respective subsidiaries. A pie chart displaying the proportions of the *Patent Quality and Value Rankings* (Figures 22 and 23) may offer a glimpse into the desirability of the portfolio:

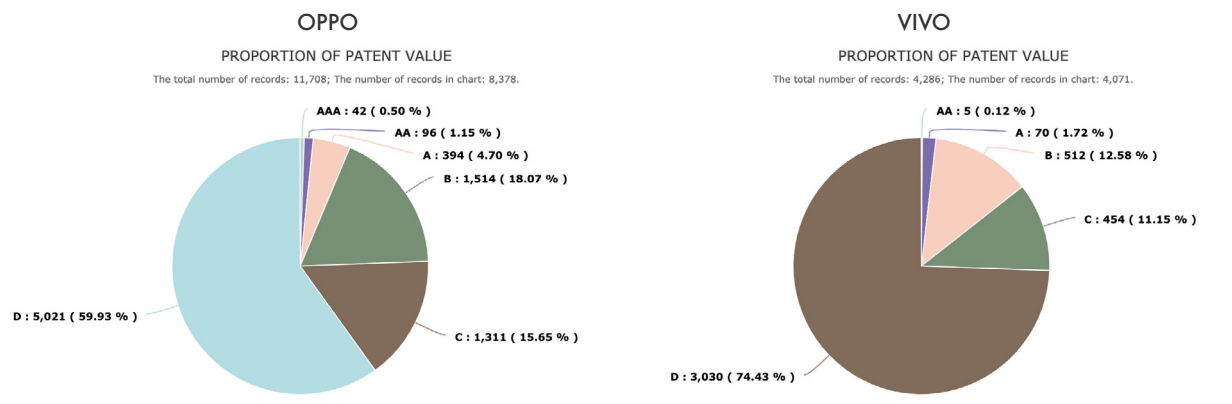
It appears that **OPPO**'s declared SEPs have higher patent quality and value proportion. Consequently, OPPO may be a better investment target in 5G SEPs.

Figure 23. The patent quality proportion of OPPO and VIVO



Source: *Patentcloud's Patent Vault*, data updated on July 9th, 2021

Figure 24. The patent value proportion of OPPO and VIVO



Source: *Patentcloud's Patent Vault*, data updated on July 9th, 2021

Conclusion

With the rapid growth of patent data, patent evaluation has become a significant issue.

To propose an effective solution to this problem, we first introduced a framework of patent quality, value, and price to describe the different aspects of a patent.

Starting from these theoretical assumptions, we have tried to overcome the challenges commonly found in the traditional approaches and deliver a meaningful and useful method for evaluating patent quality and value.

The result — supported by machine learning technologies, the comprehensive patent data in *Patentcloud*, and continuous validation — is *Patentcloud's* exclusive and industry-leading *Patent Quality and Value Rankings*.

This white paper has presented the origin and the validation of the *Patent Quality and Value Rankings*. Perhaps most importantly, it has revealed how they can help by complementing quantity-based intelligence, separating the signal from the noise, and gaining actionable insights in the several stages of *Patent Lifecycle Management (PLCM)*.

We sincerely hope that every patent professional can benefit from our *Patent Quality and Value Rankings* — to deliver more accurate insights and make well-informed decisions.

About InQuartik

InQuartik is an IP intelligence company dedicated to converting patent data into actionable insights and delivering AI-driven solutions. From first-tier companies and law firms to SMEs, InQuartik supports IP professionals throughout the entire patent lifecycle so that they can work smarter, live better, and gain more success.

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