



11° SUMMER SCHOOL NETVAL
10-13 settembre 2018, Loano

**«Data value e data sharing:
il ruolo del trasferimento
tecnologico nei Big Data»**



Patent trends in Big Data

**Comparing
NETVAL associates' and
Big data companies**

Audrey Dayon

Big Data



▶ Main trends and players in big data

Focus on Netval's big data portfolio

Netval portfolio vs Big data companies

Insights in terms of licensing out opportunities

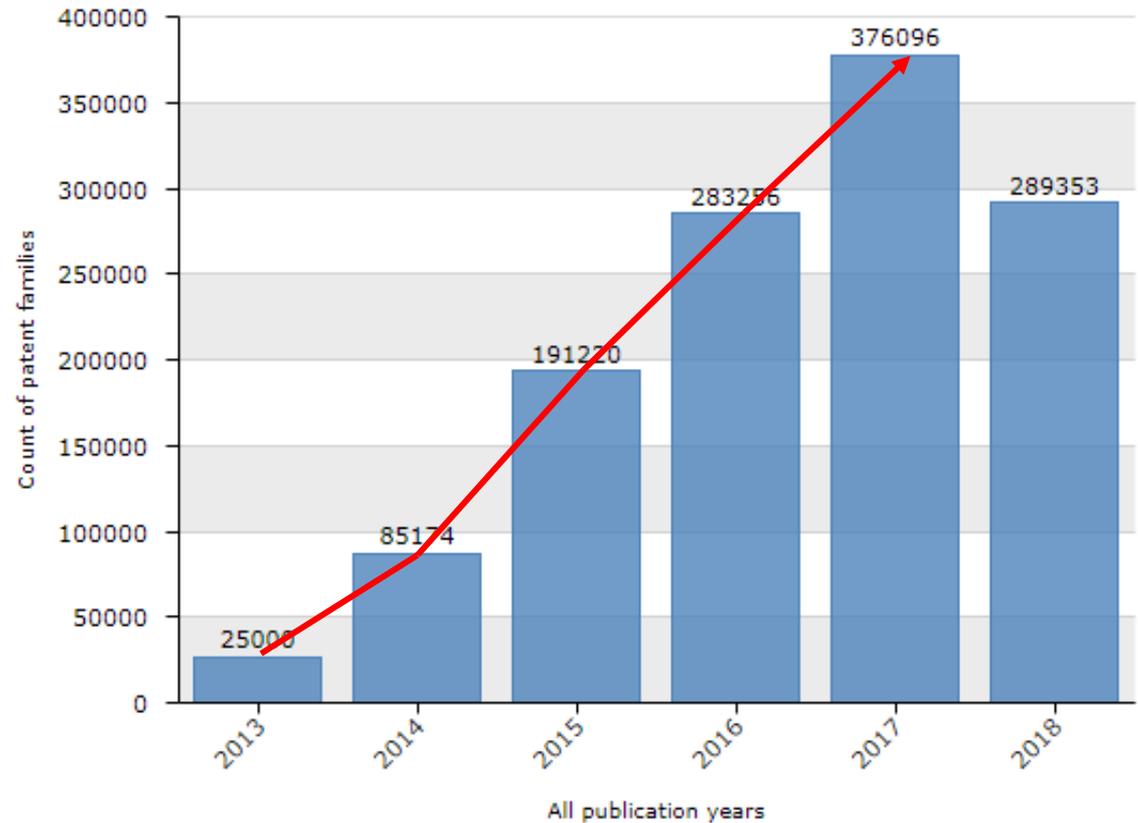
Main trends in big data

(G06F OR G06Q OR G06N OR G06T OR G06G OR G06K)/IPC/CPC and PRD>2013

➔ 872 651 patent families

Observe general filing trends in this domain in the last 5 years

Publication Trend



- This sector in the last five years keeps growing.
- The growth rate decreased in 2016 which could signify that the sector now has many players and is starting to be well developed.
- We can expect this domain to continue to grow in the coming years as data analysis becomes more and more important.

Big Data

Main subclasses definition (Espacenet)

Technological Classification for Big Data

CPC Codes	Description
G06F	Electric Digital Data Processing (computer systems based on specific computational models G06N)
G06Q	Data processing systems or methods, specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes; systems or methods specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes, not otherwise provided for
G06N	Computer systems based on specific computational models
G06T	Image data processing or generation, in general
G06G	Analogue Computers (analogue optical computing devices G06E3/00)
G06K	Recognition of data; presentation of data; record carriers; handling record carriers

[Link to Espacenet for CPC Group G06](#)

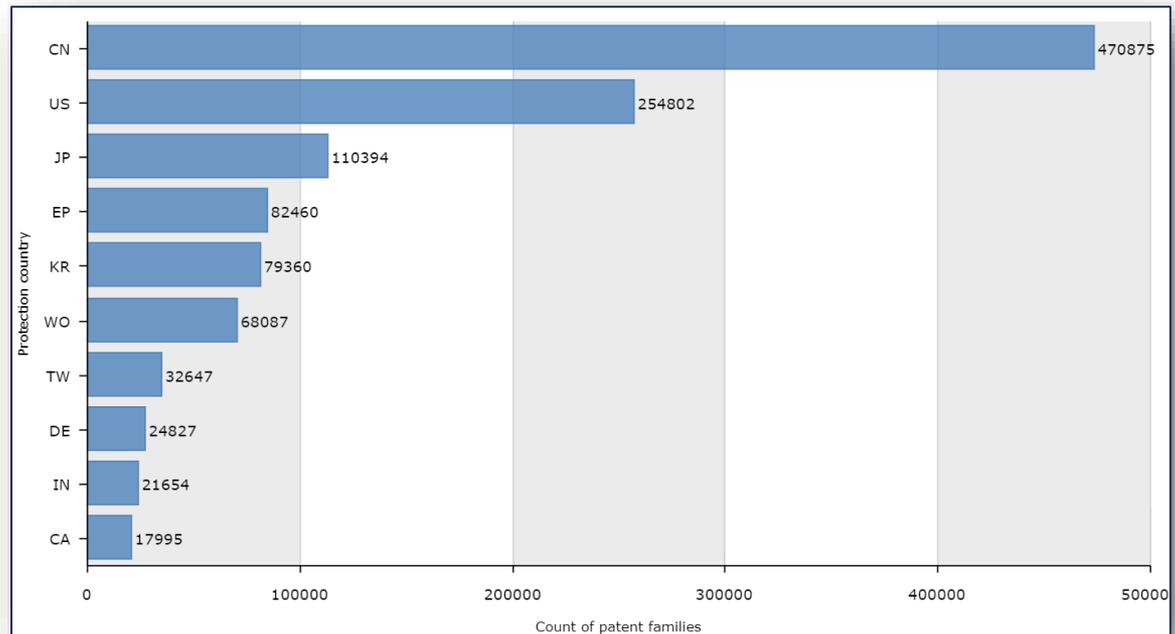
Main trends in Big Data

- The geographical filling indicates where innovation in Big Data is originating.
- The top R&D locations are **China** and **USA** as well as **Japan, Korea, Taiwan, Germany, India**
- Same countries for top Market & Competitors locations as R&D. These are all high GDP countries with the biggest tech companies coming from these countries.

Research & Development location



Markets & competitors location



Big Data

Application Trends for Top Players

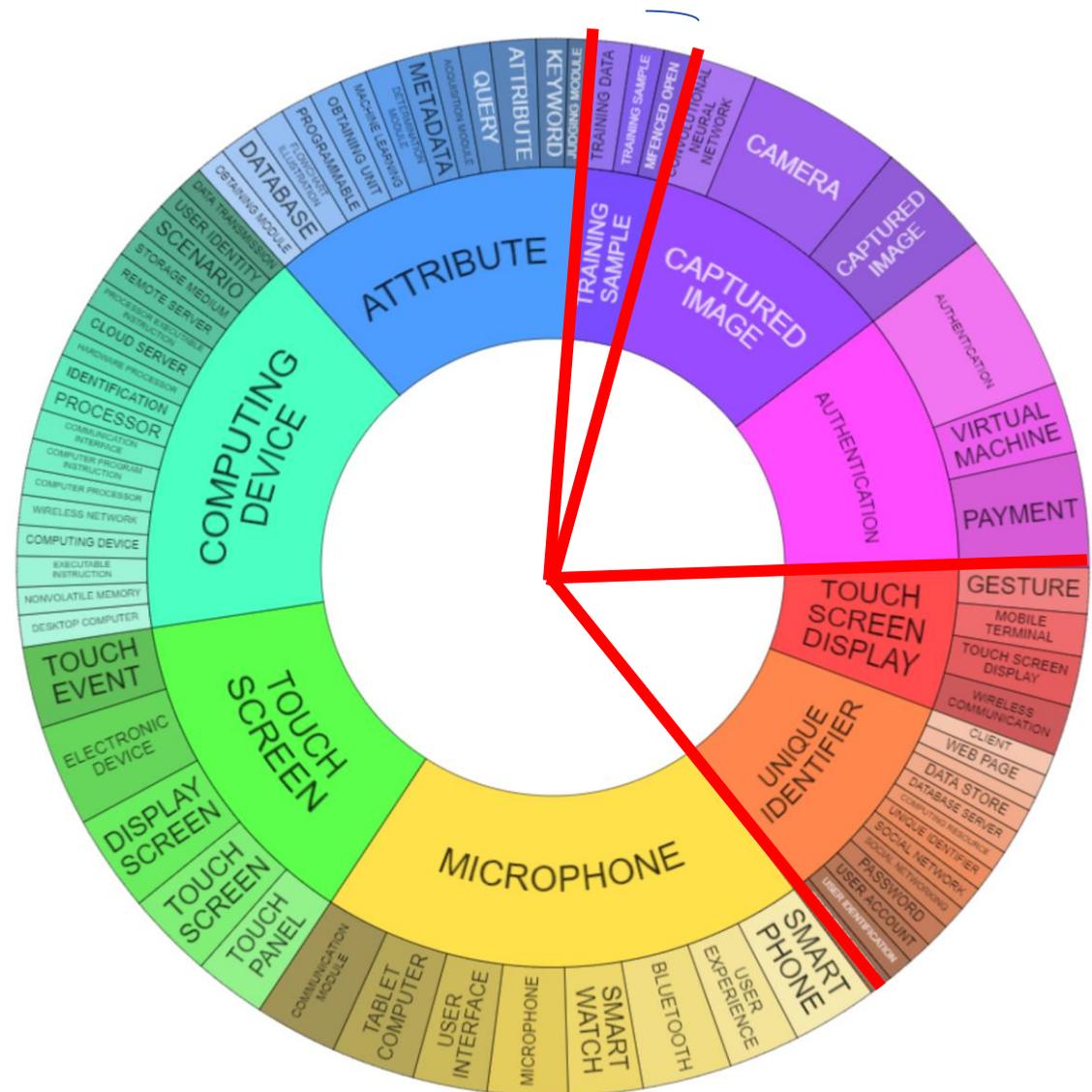
▶ Main trends in big data

Assignee	Application year										
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
IBM	265	239	391	490	1108	1903	4744	6488	6597	3164	509
SAMSUNG ELECTRONICS	116	171	253	311	416	753	3889	5446	4807	2964	539
STATE GRID CORPORATION OF CHINA (SGCC)						11	2164	2466	2499	2376	204
MICROSOFT TECHNOLOGY LICENSING	268	272	507	753	733	1272	2991	3531	4035	2586	307
CANON	66	101	138	141	221	328	2730	3413	3103	1511	230
INTEL	112	154	191	400	666	780	2044	2673	3126	1645	140
GUANGDONG OPPO MOBILE TELECOMMUNICATIONS							386	1426	1669	2508	343
LENOVO	2	4	5	11	22	30	2100	1797	1099	917	152
FUJITSU	7	10	26	26	41	53	1678	2466	2565	1214	120
GOOGLE	124	151	203	400	740	1041	2134	1804	2011	1381	350
ZHENGZHOU YUNHAI INFORMATION TECHNOLOGY							3		663	3614	281
QIHOO 360 TECHNOLOGY			2	5	8	48	1034	1520	948	670	40
NUBIA TECHNOLOGY						1	92	707	1285	1620	114
APPLE	210	209	271	362	491	525	1370	1357	1385	918	207
TENCENT TECHNOLOGY (SHENZHEN)							877	693	1138	720	174

The development of this sector is rising and we can see the application trend of the top players.

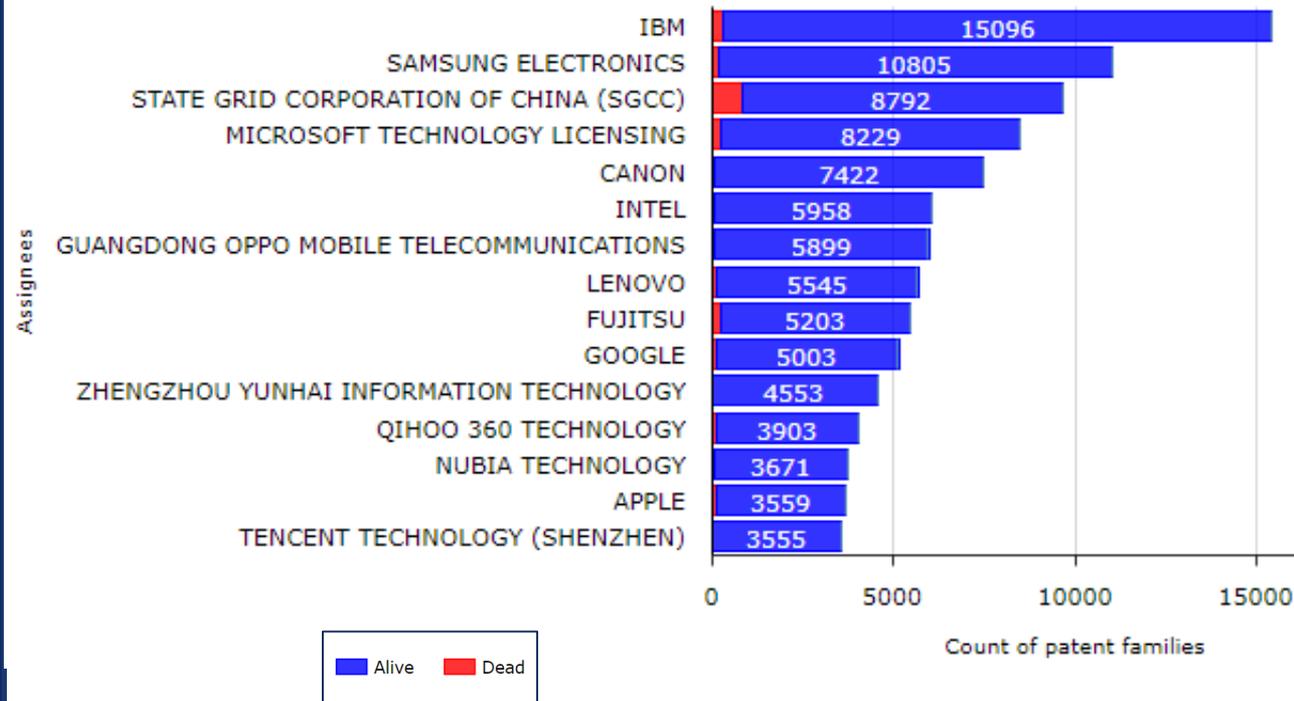
Main trends in Big Data

- This graph shows most common concepts in Big data.
- Ideas for new developments could be:
 - Touch screen display
 - Unique identification
 - Training data



Main trends in Big Data

Top 15 Players



These are the top 15 companies with the highest volume of patents in Big Data over the last 5 years coloured based on legal state (Alive or Dead patents).

Main trends in Big Data

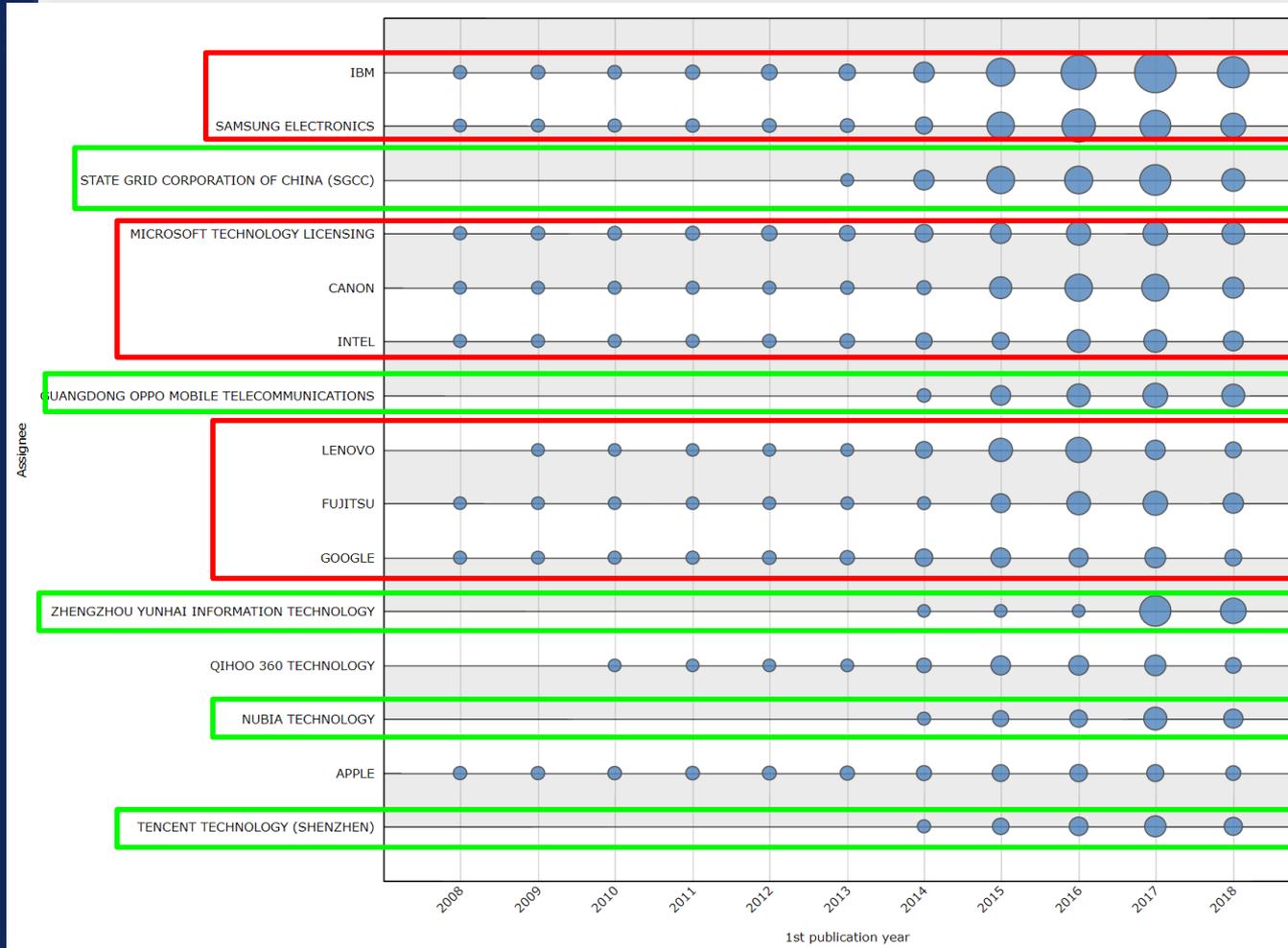
Player Activity Across Applications

Assignee	Applications in Big Data												
	Health care	Information retrieval	Data warehouse	E-commerce	Marketing	Product management	Social media	Transactions	Scoring	Advertisement	Telecommunications	Fraud detection	Tourism
IBM	249	1113	394	161	548	1267	1785	4748	730	1483	1240	128	22
SAMSUNG ELECTRONICS	1839	426	24	71	87	112	914	830	174	842	2790	33	14
STATE GRID CORPORATION OF CHINA (SGCC)	15	275	275	19	837	192	21	780	306	106	194	9	3
MICROSOFT TECHNOLOGY LICENSING	55	1131	277	109	375	245	1818	965	401	1023	901	71	17
CANON	18	276	14	11	44	169	35	332	49	207	286	10	1
INTEL	30	148	32	47	92	85	335	1204	67	373	774	35	2
GUANGDONG OPPO MOBILE TELECOMMUNICATIONS	4	65	4	8	10	19	27	172	36	310	206	15	3
LENOVO	8	75	4	22	32	54	97	345	16	104	212	17	3
FUJITSU	85	322	25	32	52	160	86	429	60	177	161	42	5
GOOGLE	38	705	80	67	203	128	1845	823	430	1422	518	69	25
ZHENGZHOU YUNHAI INFORMATION TECHNOLOGY	3	43	36	12	18	96	10	151	10	15	27	3	
QIHOO 360 TECHNOLOGY	3	185	30	61	129	73	45	316	52	544	76	79	3
NUBIA TECHNOLOGY	1	56	12	22	20	25	22	187	17	116	1941	21	2
APPLE	15	170	13	63	58	61	254	518	66	463	330	56	6
TENCENT TECHNOLOGY (SHENZHEN)	4	151	35	33	70	36	224	345	112	351	63	48	2

- IBM is a strong player whose research is focused on various applications of Big data.
- Top players specialised in one area for example Nubia Technology focuses a lot on Big Data in Telecoms.

Main trends in Big Data

Top players investment trend



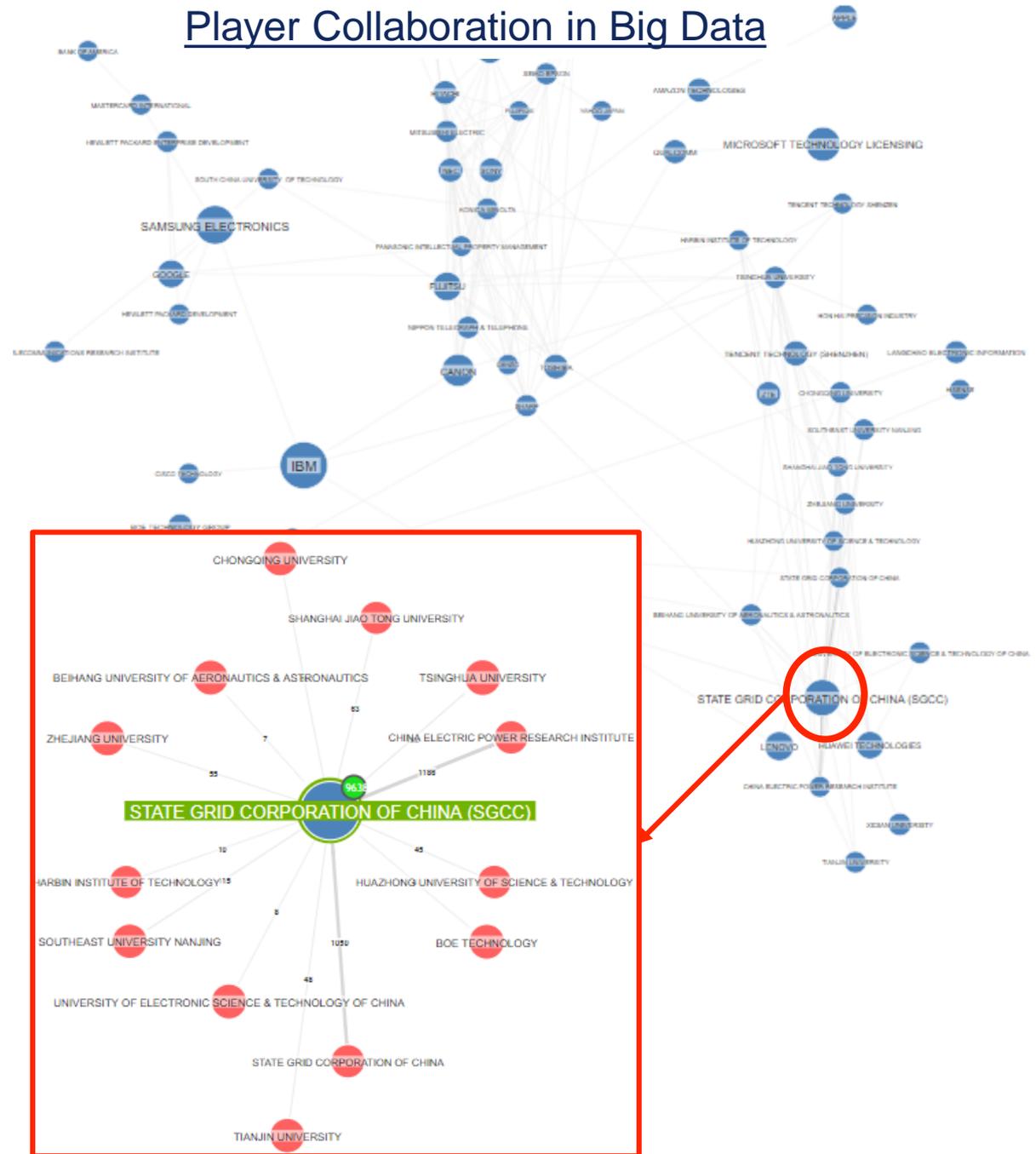
This shows the assignee innovation time line for the top 15 companies in Big data.

Earliest Innovators and **New Players**

Main trends in Big Data

Player Collaboration in Big Data

- A lot of collaboration of companies in Big data.
- The trend seems to be big companies partnering with universities



Big Data

Main trends and players in big data

▶ **Focus on Netval's big data portfolio**

Netval portfolio vs Big data companies

Insights in terms of licensing out opportunities

Netval's Big Data portfolio

List of NETVAL members : <https://netval.it/netval-network/soci-netval/>

((((UNIVERSIT+ S (AQUILA OR INSUBRIA OR BARI OR BERGAMO OR (BIO_MEDICO S ROMA) OR BOLOGNA OR BRESCIA OR CAGLIARI OR CALABRIA OR CAMERINO OR CATANIA OR FERRARA OR FIRENZE OR FOGGIA OR GENOVA OR MACERATA OR MESSINA OR MILANO OR (MILANO S BICOCCA) OR PADOVA OR PALERMO OR PARMA OR PAVIA OR PERUGIA OR PISA OR SANNIO OR SALENTO OR SALERNO OR SASSARI OR TORINO OR TRENTO OR TRIESTE OR UDINE OR VERONA OR (MODENA S REGGIO) OR (NAPOLI FEDERICO) OR (CAMPANIA LUIGI VANVITELLI) OR (FOSCARI S VENEZIA) OR (IUAV S VENEZIA) OR (CATTOLICA S SACRO S CUORE) OR (REGGIO CALABRIA) OR CASSINO OR (LAZIO MERIDIONALE) OR (PIEMONTE ORIENTALE) OR (CAMPUS S ROMA) OR (ROMA S VERGATA) OR URBINO OR SIENA OR BOLZANO OR (CARLO CATTANEO) OR (ANNUNZIO S CHIETI S PESCARA))) OR (POLITEC+ S (BARI OR MARCHE OR MILANO OR TORINO)) OR (AREA SCIENCE PARK) OR (ARTI S PUGLIA) OR (CENTRO S ITALIANO S RICERCHE S AEROSPAZIALI) OR (CONSIGLIO S NAZ+ S RICERCHE) OR (CONSIGLIO S RICERCA S AGRI+) OR (CRA S RICERCA) OR (CENT+ S RIFERIMENTO S ONCOLOGICO) OR (ENEA AND (NUOVE S TECNOLOGIE S ENERGIA)) OR (I?STITUT# ORTOPEDIC# RIZZOLI) OR (FONDAZIONE S GRANDA) OR ((I?STITUT? 1D NA?IONAL?) 3D TUMOR?)) OR (ADVANCED S STUDIES S LUCCA) OR ((I?STITUT# 1D NA+) S (FISICA 2D NUCLEA+)) OR INFN OR (FONDAZIONE S CITTA S SCIENZA) OR ((ITALI+ 1D I?STITUT+) S TEC?NOLOG+) OR (ISTITUTO 1D RICERCA 1D DIAGNOSTICA 1D NUCLEARE) OR (INAIL OR (ISTITUTO NAZ+ 2D ASSICURAZIONE 4D INFORTUNI 2D LAVORO)) OR (MATERNO 2D INFANTILE 2D BURLO 2D GAROFOLO) OR (SCUOLA S (PISA OR (SANT ANNA) OR TRIESTE)) OR ITALIACAMP)/PA/OPA/PAH/OWR/REAS

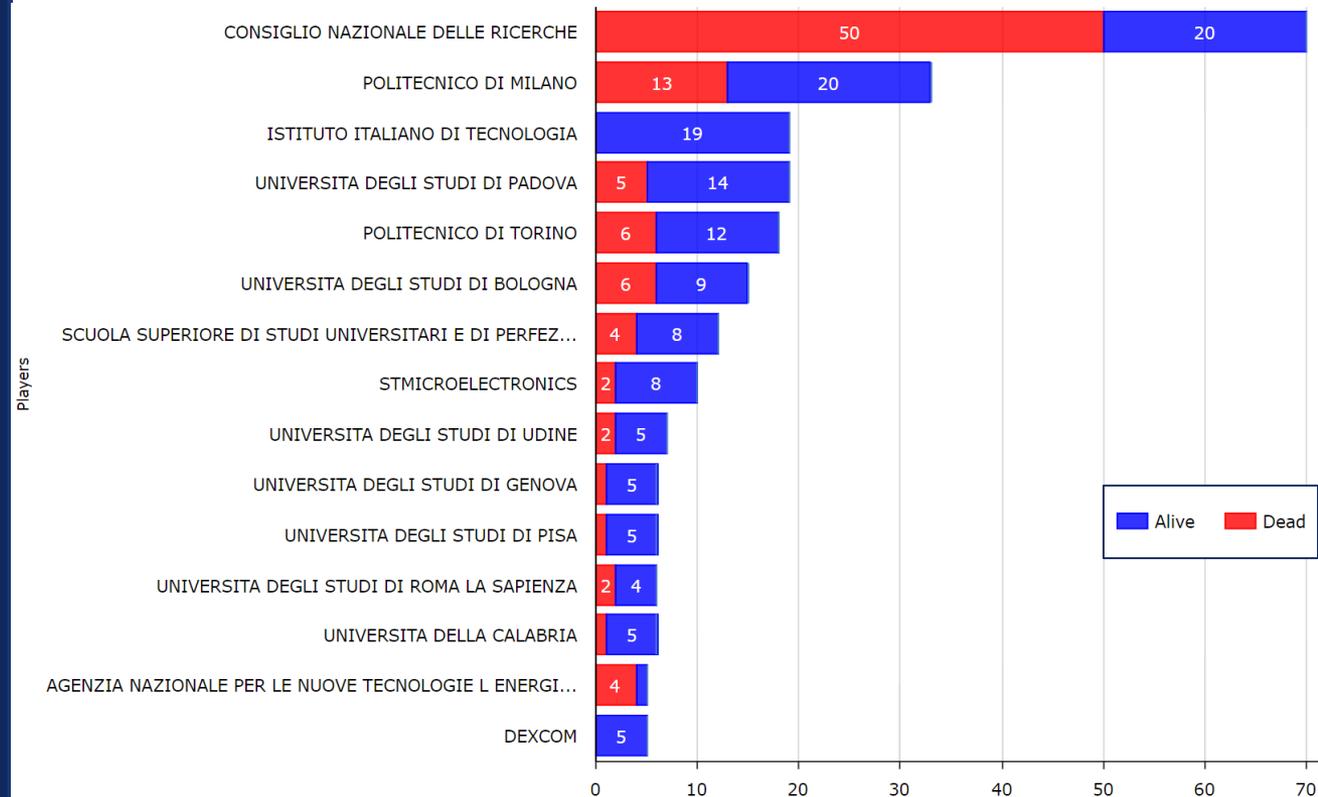
7038 PATENT FAMILIES

AND (G06F OR G06Q OR G06N OR G06T OR G06G OR G06K)/IPC/CPC

333 PATENT FAMILIES

Netval's Big Data portfolio

Top Netval Members' Dead & Alive Patents

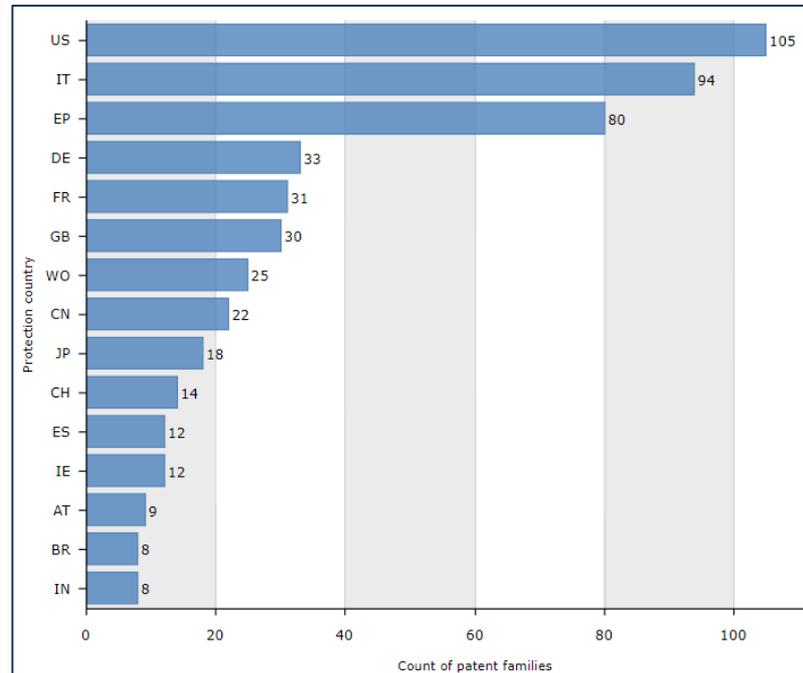


- Identify associates who have already withdrawn from the Big data (abandonment, lapse and/or expiration of their patents) and those who are still active (applications and patents granted still in force).
- CNR has highest count of applications.
- **CNR, POLIMI, IIT** have the highest count of active patents.

Netval's Big Data portfolio

- The protection countries indicate where the members' patent is currently alive.
- In the tabular chart, for EP/WO patents you'll see both the EP/WO authority itself and also all of the countries which are currently covered by these particular EP/WO patents.

Markets & competitors location

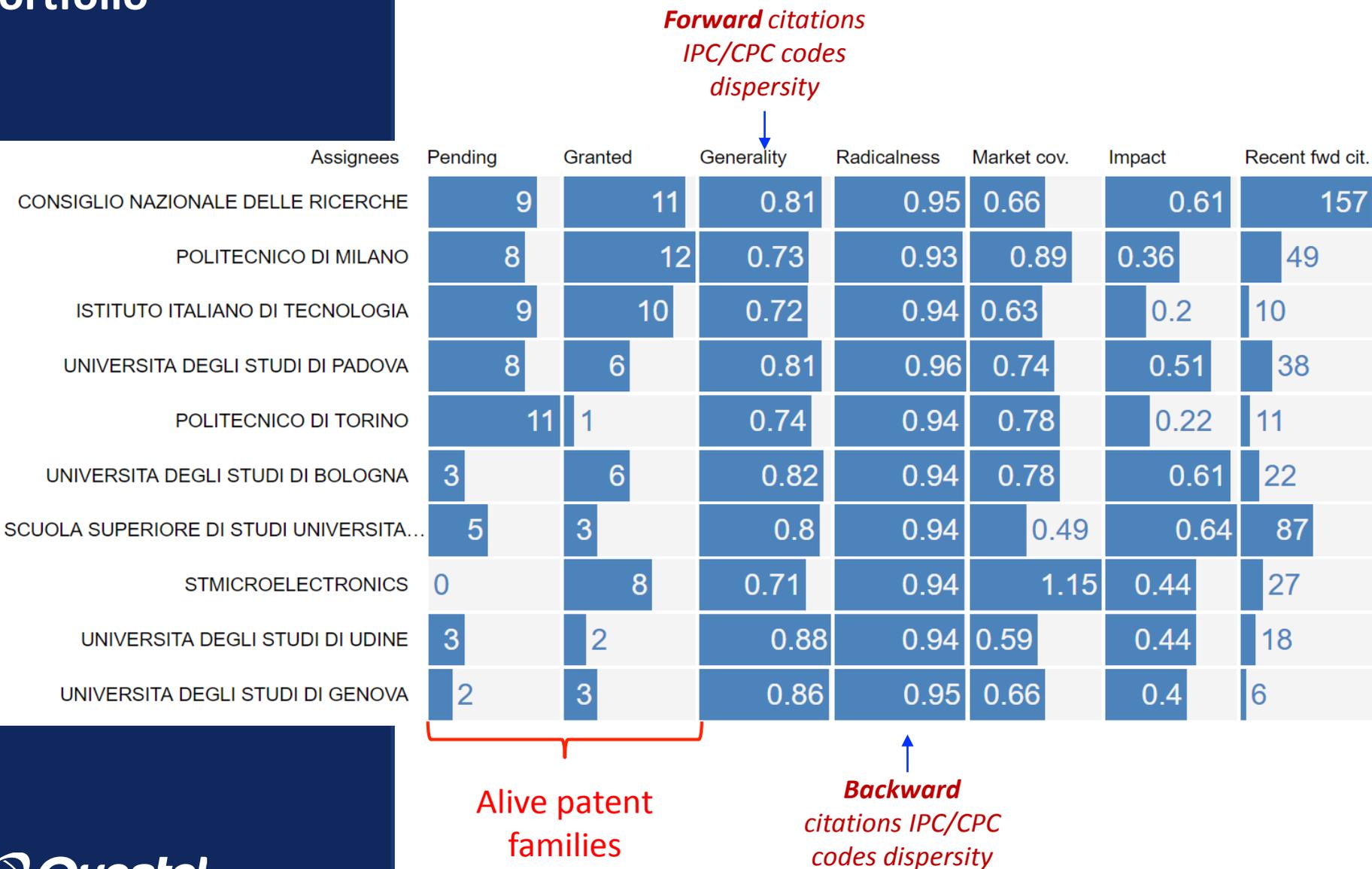


These are the top 15 countries where Netval protects their patents in Big data.

> Big data protection strategy include US, China, Japan, Korea and India

Netval's Big Data portfolio

Top 10 publishing Netval members



Netval's Big Data portfolio

Top 15 Key Inventions of Netval members

Technical Impact

Single assignee often citing this family

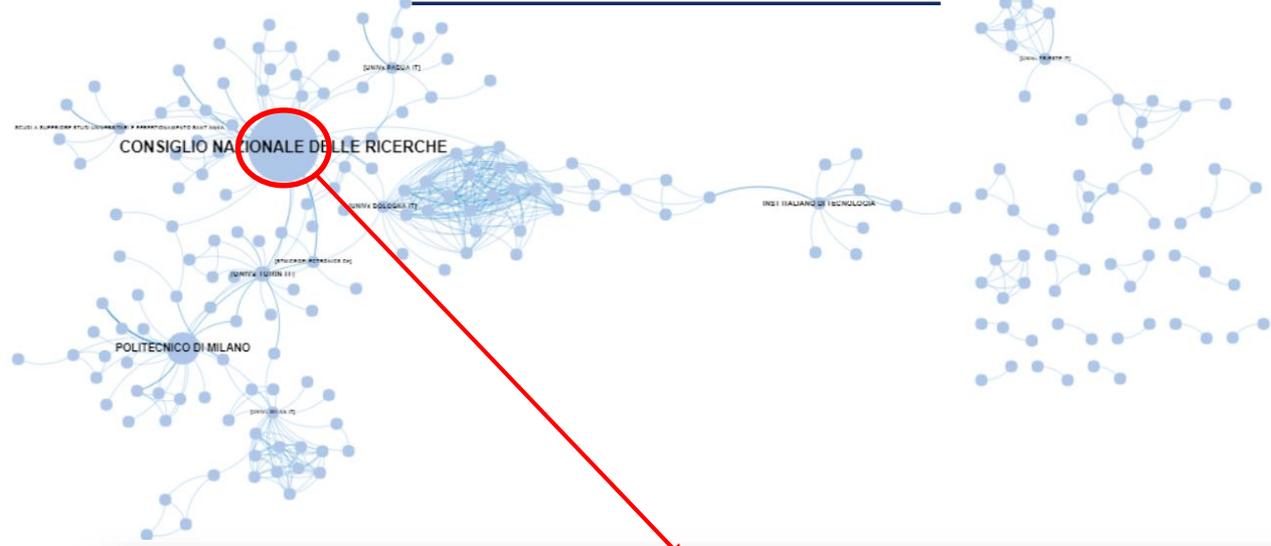
Title	Applicant/Assignee	Publication number	1st Publ. date	Impact	All fwd cit.	Generality	Originality	Litigated	Opposed	Shark present	Predator present
Novel multi-state memory	SANDISK* UNIVERSITA DEGLI STUDI DI MILANO	WO9908284	1999-02-18	3.65	815	0.65	0.67	NO	YES	NO	NO
A device for monitoring the configuration of a distal physiological unit for use, in particular, as an advanced interface for machines and computers	SCUOLA SUPERIORE DI STUDI UNIVERSITARI	ITTO920941	1992-11-20	3.08	252	0.9	0.85	NO	NO	YES	NO
Systems and methods for providing sensitive and specific alarms	DEXCOM*	US20140118138	2014-05-01	2.13	22	0.86	0.9	NO	NO	NO	NO
Communications system	ELDAMA SYSTEMS IP*	GB0109808	2001-06-13	2.07	70	0.8	0.83	NO	NO	NO	NO
Humanized anti-NGF antibodies	ABBVIE RESEARCH*	ITRM20030601	2005-06-25	2.05	46	0.87	0.88	NO	NO	NO	YES
Error correcting apparatus	CONSIGLIO NAZIONALE DELLE RICERCHE	US4357702	1982-11-02	2	32	0.84	0.78	NO	NO	NO	NO
Method and system for the detection and the classification of events during motion actions	CNR - CONSIGLIO NAZIONALE DELLE RICERCHE FEDERAZIONE ITALIANA GIUOCO CALCIO	ITRM20050192	2006-10-21	1.99	41	0.86	0.79	NO	NO	NO	NO
Method and device for image processing and learning with neuronal cultures	SCUOLA INTERNAZIONALE SUPERIORE DI STUDI UNIVERSITARI	ITRM20020604	2004-05-30	1.94	47	0.9	0	NO	NO	YES	NO
A process for managing virtual machines in a physical processing machine, corresponding processor system and computer program product therefor	CONSIGLIO NAZIONALE DELLE RICERCHE STMICROELECTRONICS*	US20060123416	2006-06-08	1.92	51	0.51	0.14	NO	NO	NO	YES
Method of identifying a consensus sequence for intracellular antibodies	SCUOLA INTERNAZIONALE SUPERIORE DI STUDI UNIVERSITARI UNITED KINGDOM RESEARCH & INNOVATION	WO03014960	2003-02-20	1.87	43	0.86	0.89	NO	NO	YES	YES
Method, system and software program for shooting and editing a film comprising at least one image of a 3D computer-generated animation	CNRS - CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE INSTITUT NATIONAL DE LA RECHERCHE SCIENTIFIQUE THINKING LENS* UNIVERSITA DEGLI STUDI DI UDINE UNIVERSITE DE NANTES*	US20130135315	2013-05-30	1.84	18	0.87	0.76	NO	NO	NO	YES
Procedure and apparatus for the survey of the impression made on a specimen in measuring the hardness at penetration	CONSIGLIO NAZIONALE DELLE RICERCHE	IT8467181	1984-02-24	1.82	25	0.88	0.66	NO	NO	NO	YES
Method for extracting, merging and ranking search engine results	SEARCH ENGINE SOLUTIONS*	US20110040749	2011-02-17	1.82	33	0.67	0.74	NO	NO	YES	YES
Apparatus particularly for evaluating the functionality of man locomotive faculties	CNR - CONSIGLIO NAZIONALE DELLE RICERCHE FONDAZIONE PRO JUVENTUTE DC	US4136682	1979-01-30	1.79	28	0.88	0.51	NO	NO	YES	NO
Method to control the vibrations in an articulated arm for pumping concrete, and relative device	CIFA*	US20090229457	2009-09-17	1.67	18	0.87	0.92	NO	NO	NO	YES

Netval's Big Data portfolio

This shows the network of collaborations/co-patents between the associates.

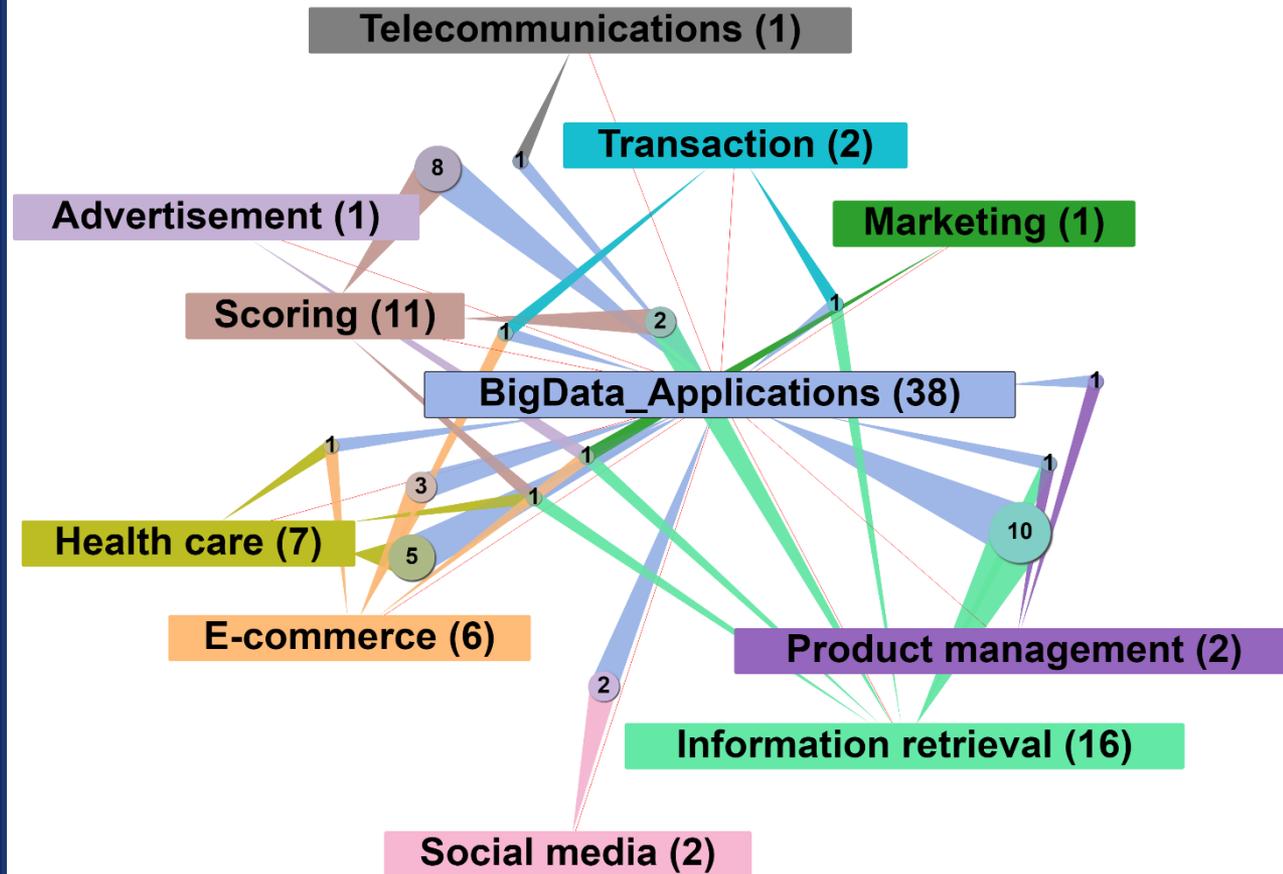
The associates are very collaborative and the most active player is CNR also happens to have the most collaboration links.

Members' Collaboration



Netval's Big Data portfolio

Application of Big data by Netval Members



Netval members are most active in inventions concerning **Information retrieval & Scoring**. They are least active in Big data for Telecoms, Marketing & Advertisement.

Big Data

Main trends and players in big data

Focus on Netval's big data portfolio

▶ **Netval portfolio vs Big data companies**

Insights in terms of licensing out opportunities

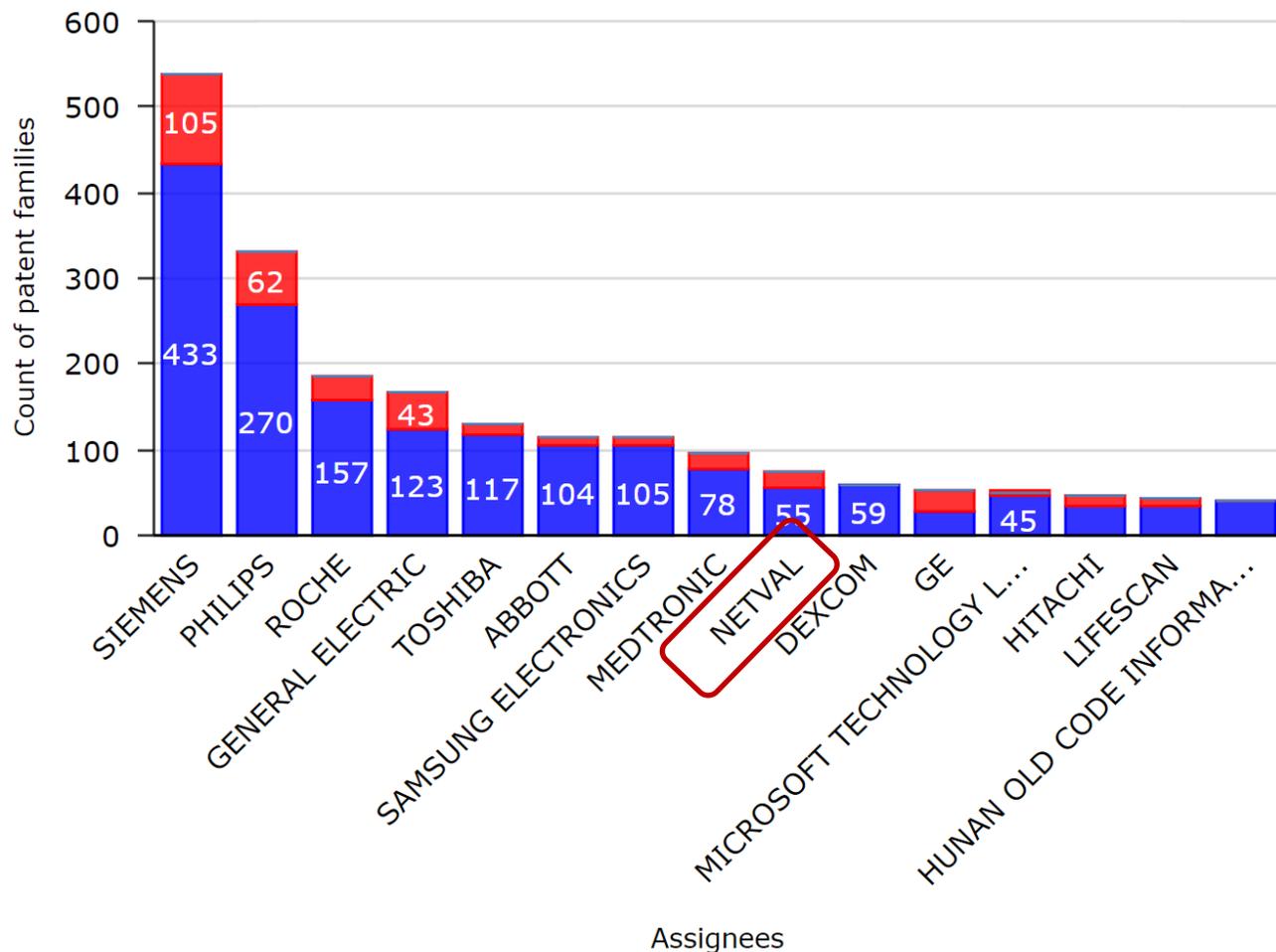
Netval portfolio vs Big Data companies

Comparable environment created from similar patents of Netval members and restricted to classification codes: G06F OR G06Q OR G06N OR G06T OR G06G OR G06K

> Similarity search is based on patent classification codes, citations and concepts.

→ 6 651 patent families

Netval vs Top Players by Applications filled



- The top player in this domain is the Siemens group.
- Netval Associates is the biggest non-corporate player here.

Netval portfolio vs Big Data companies

Main uses of Big Data for the top 15 players

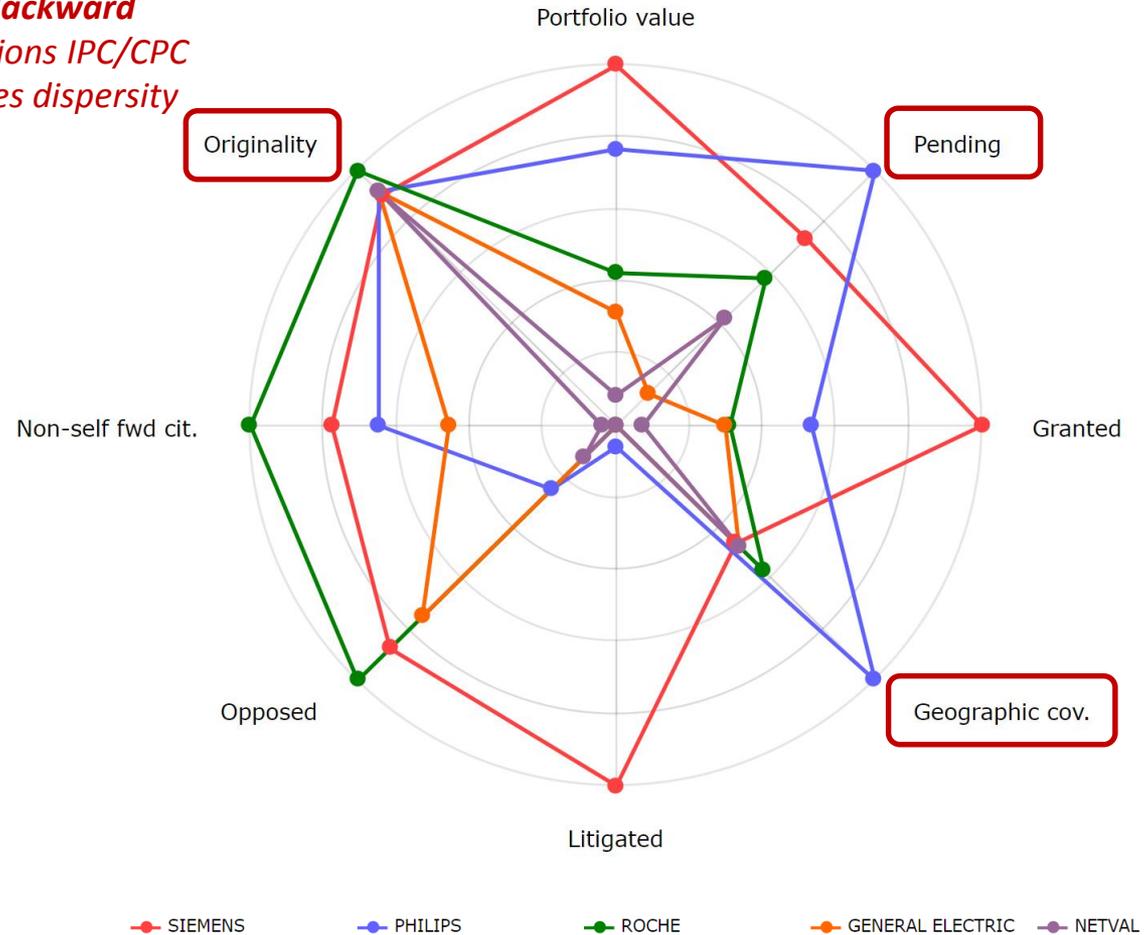


- We can notice a focus on the general areas like **Telecoms, Transactions**.
- This shows that there is still a lot of possible development for other applications of Big Data.

Netval portfolio vs Big Data companies

Netval benchmarked against the Top 4 Players

Backward
citations IPC/CPC
codes dispersity

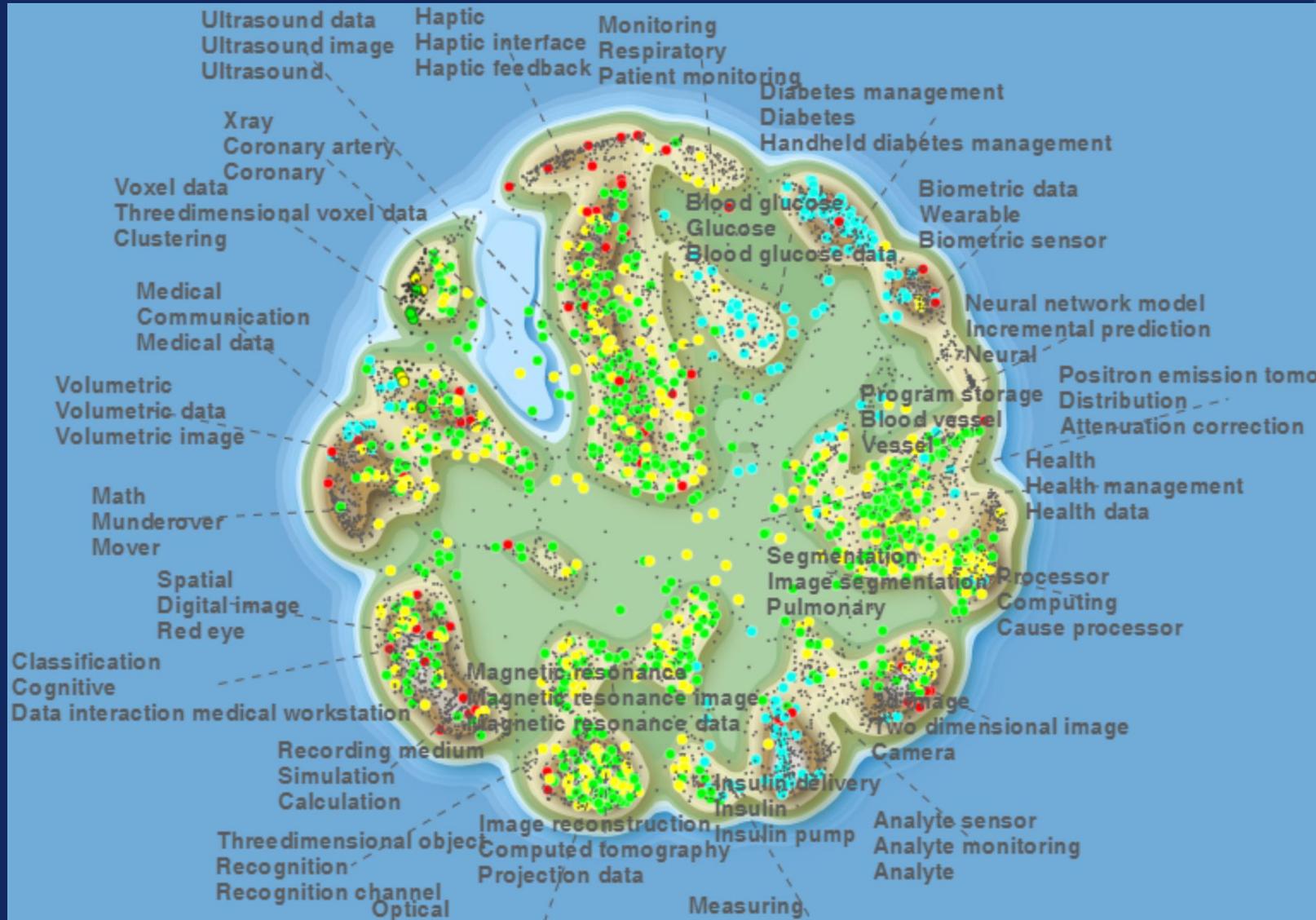


Netval has a less stronger portfolio in comparison to the big companies but they are however the Academics with the more stronger portfolio.

Netval portfolio vs Big Data companies

Concept map

NETVAL	Red
SIEMENS	Green
PHILIPS	Yellow
ROCHE	Cyan



Big Data

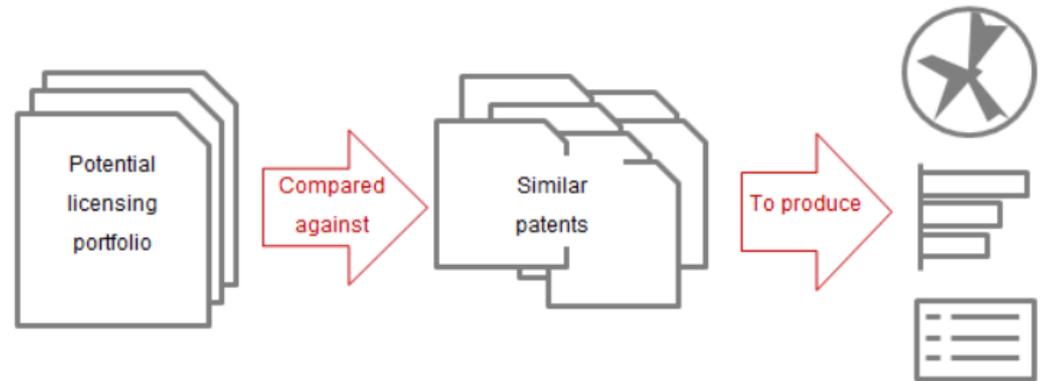
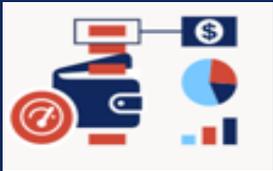
Main trends and players in big data

Focus on Netval's big data portfolio

Netval portfolio vs Big data companies

▶ **Insights in terms of licensing out opportunities**

Licensing out



This process compares a selected portfolio against comparable art following this process:

1. Select your patents for potential licensing (Case uses 6 top Netval patents)
2. Compare your portfolio to the industry (Done with automatic similarity search)
3. Visualizations of 45+ patent portfolio strength indicators (organised into **Legal**, **Technical** and **Geographical**)
4. Identify potential licensees for the chosen portfolio

Selecting Patents for Licensing Out

Evaluate each patent in selected part of your portfolio

Title	Applicant/Assignee	Publication number	1st Publ. date	Family size	Fwd cites	Cites/yr	Predator	Generality	Originality	Validated	Rank
Humanized anti-NGF antibodies	ABBVIE RESEARCH*	ITRM20030601	2005-06-25	86	46	3.48	PREDATOR	0.87	0.88	NO	21.54
Method of identifying a consensus sequence for intracellular antibodies	SCUOLA INTERNAZIONALE SUP UNITED KINGDOM RESEARCH &	WO03014960	2003-02-20	1	43	2.77	SHARK	0.86	0.89	NO	17.88
Communications system	ELDAMA SYSTEMS IP*	GB0109808	2001-06-13	5	70	4.06	NONE	0.8	0.83	NO	16.44
Method for extracting, merging and ranking search engine results	SEARCH ENGINE SOLUTIONS*	US20110040749	2011-02-17	1	33	4.37	SHARK	0.67	0.74	NO	15.47
Method, system and software program for shooting and editing a film comprising :	CNRS - CENTRE NATIONAL DE L INSTITUT NATIONAL DE LA REC THINKING LENS* UNIVERSITA DEGLI STUDI DI UD UNIVERSITE DE NANTES*	US20130135315	2013-05-30	2	18	3.41	PREDATOR	0.87	0.76	NO	14.05
A process for managing virtual machines in a physical processing machine, corre	CONSIGLIO NAZIONALE DELLE STMICROELECTRONICS*	US20060123416	2006-06-08	3	51	4.16	PREDATOR	0.51	0.14	NO	11.57

- Rank your patents depending on various metrics such as Age, Radicalness, Generality, Forward Citations, Presence of Shark & Technical impact.
- Selected 6 patents for use in the licensing example to identify potential partners. These were chosen based on the patents with high impact, high citations, presence of predators and still active.

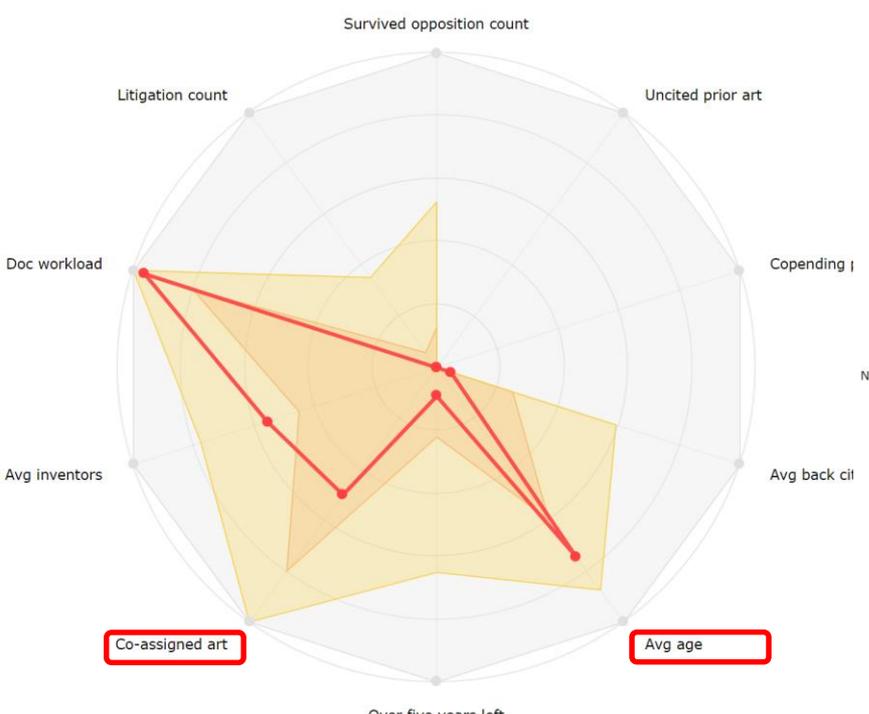


Licensing out

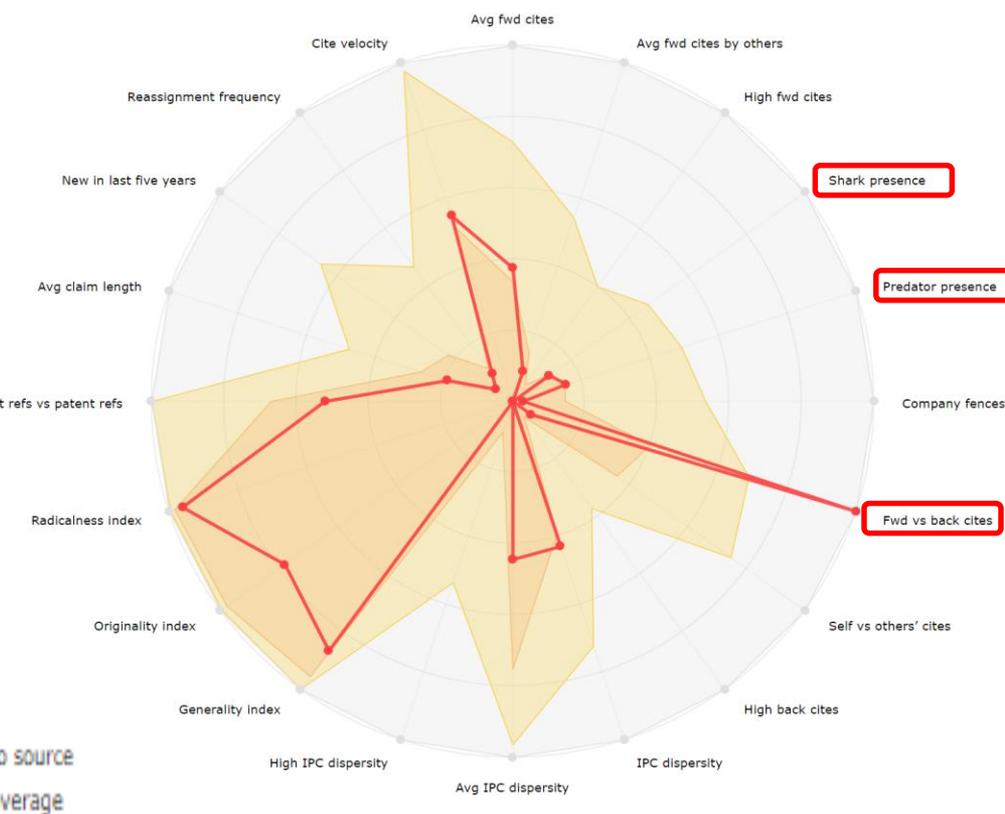
Metric	Correlation & Indication	Calculation
Age	Longer life means art has had more time to become referenced, opposed or litigated.	Average age in years since first publication per patent family.
Radicalness	High scores indicate more breakthrough technologies, low scores indicate more incremental improvement. Range between 0 & 1	Patents with backward citations to a wider spread of technology groups will generate a higher score. IPCs that are listed in both the current patent family and cited patents are not counted. Fully defined by Shane, 2001.
Generality	High scores indicate a wider application across different technology groups, low scores indicate more specific application. Wider application is preferred. Range between 0 & 1.	Inventions with forward citations to a wider spread of technology groups will generate a higher score. Fully Defined by Hall, Jaffe, and Trajtenberg (2001).
Forward Citations	High citation activity indicates that others think the art has value.	Average number of forward citations per patent family.
Presence of Shark	Presence of IP Sharks indicates another entity felt the technology was of commercial value.	Number of patent families in an assignee's portfolio where a minimum of 3 <u>and</u> at least 30 percent of the forward citations are from a single entity (not being the assignee itself).
Technical impact	Patents with higher impact are the ones that are most likely to have more influence in their domain and are the most breakthrough inventions.	Forward citations normalized by age / technology field / self/non-self status

3. Visualising Metrics

Validity and ownership value of assets



Technical and use value of assets



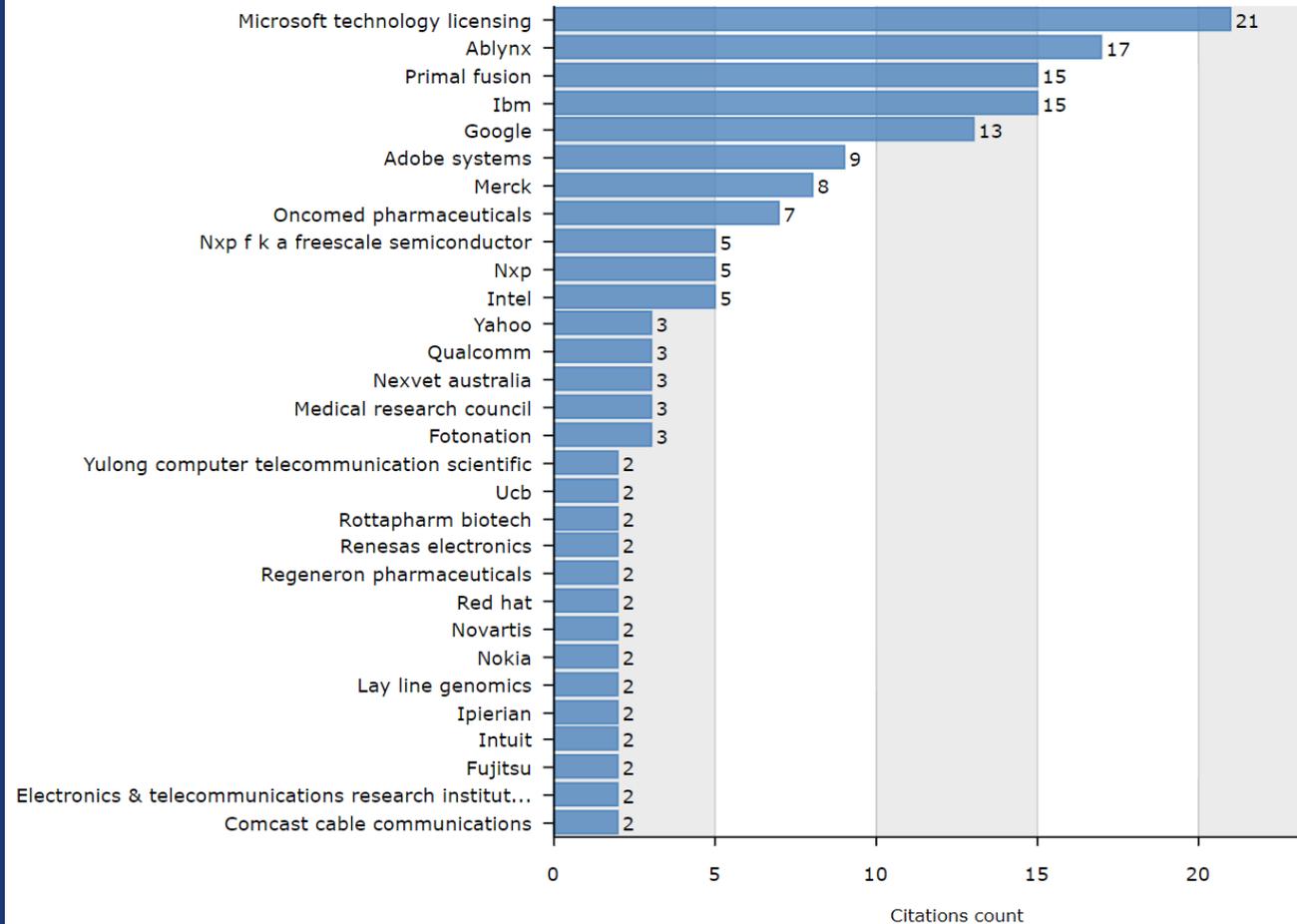
- Portfolio source
- Below average
- Above average

- ✓ No major enforcement problems from co-ownership. Co-ownership amongst associate members is not really a challenge.
- ✓ Average presence of IP Sharks/ Predators indicates another entity felt the technology was of commercial value
- ✓ Radical & original – breakthrough technology
- ✓ High Average family size shows wider geographic protection and greater investment
- X No litigations or oppositions



Insights in terms of licensing out opportunities

Potential licensing entities



- Identify first list of potential licensing partners for the 6 patents.
- These players can then be benchmarked and evaluated closely using Orbit Metrics

CONCLUSION

- Big Data is a domain that has **grown rapidly** in the last 5 years and continues to grow
- Most big players on the market are corporates however, there are also a lot of universities working on this and **Netval Associates are very well positioned in relation to other academics.**
- There is **a lot of collaboration amongst Netval members** and authors. This can be a big advantage in knowledge transfer internally to strengthen the portfolio.
- There is a lot of collaboration in general in Big Data and **Netval has potential to find Licensing opportunities** with other corporates.

Orbit IPBI solutions foster
IP stakeholders in all their
IP activities

**Thank you for
your interest!**



More references for Big Data Analysis

<https://www.datamation.com/big-data/big-data-trends.html>

<https://marketinginsidergroup.com/strategy/big-data-trends-you-should-know-about-in-2018-infographic/>

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