Project CAIAC

Controverses et collaborations Académiques autour de l'Intelligence Artificielle et Computationnelle

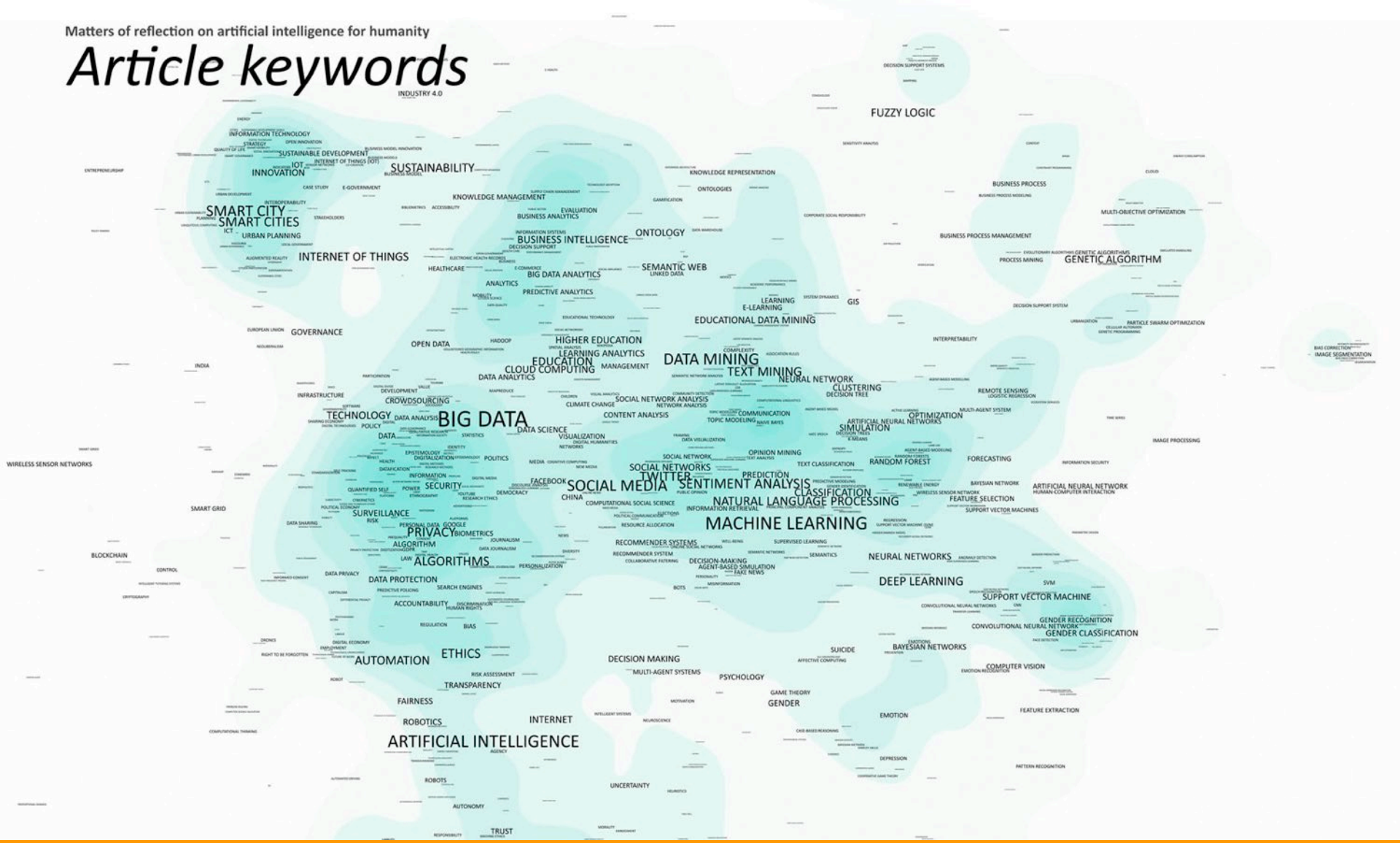
Tommaso Venturini (Centre Internet et Société)

Floriana Gargiulo (GEMASS)

Paolo Frasca (GIPSA-lab)

Global Forum on Artificial Intelligence for Humanity
(Paris, October 2019)

Atlas of Artificial Intelligence's Matters of Reflection
(GFAIH, Paris, October 2019)



Atlas of Artificial Intelligence's Matters of Reflection
(GFAIH, Paris, October 2019)

Drafting an atlas of artificial intelligence's *matters of reflection*

MAPS INTERPRETATION PROTOCOL QUERY

To facilitate the exploration of the issues and expertises mobilised by the Global Forum on Artificial Intelligence for Humanity, we have created an atlas of the recent scientific literature on AI for humanity. Starting from a query targeting both the societal implications of AI technologies and the use of AI in human and social sciences (cf. query), we collected a corpus of more than 23 thousand bibliographic records corresponding to journal articles and conference proceedings published on these topics in the last five years. Using co-citation techniques and force-directed network layout, we created a base map of the relevant scientific literature and use it to locate the keywords, subject areas and institutions appearing in our bibliographic corpus (cf. protocol).

www.tommasoventurini.it/ai/

“L’objectif de CAIAC est d’explorer de manière exhaustive, et dans tout le spectre de la recherche académique, l’évolution des controverses et de la collaboration interdisciplinaire autour de l’IA”

“La disponibilité de données bibliometriques en si grande quantité et qualité nous permettra d’identifier les grandes tendances de la recherche sur les méthodes computationnelles, mais aussi d’explorer les lignes des fractures secondaires et les collaborations intra-disciplinaires et non seulement inter-disciplinaires”

from the original CAIAC proposal

introducing

BIBLIOGRAPH

a compact tool for scientometrics landscapes

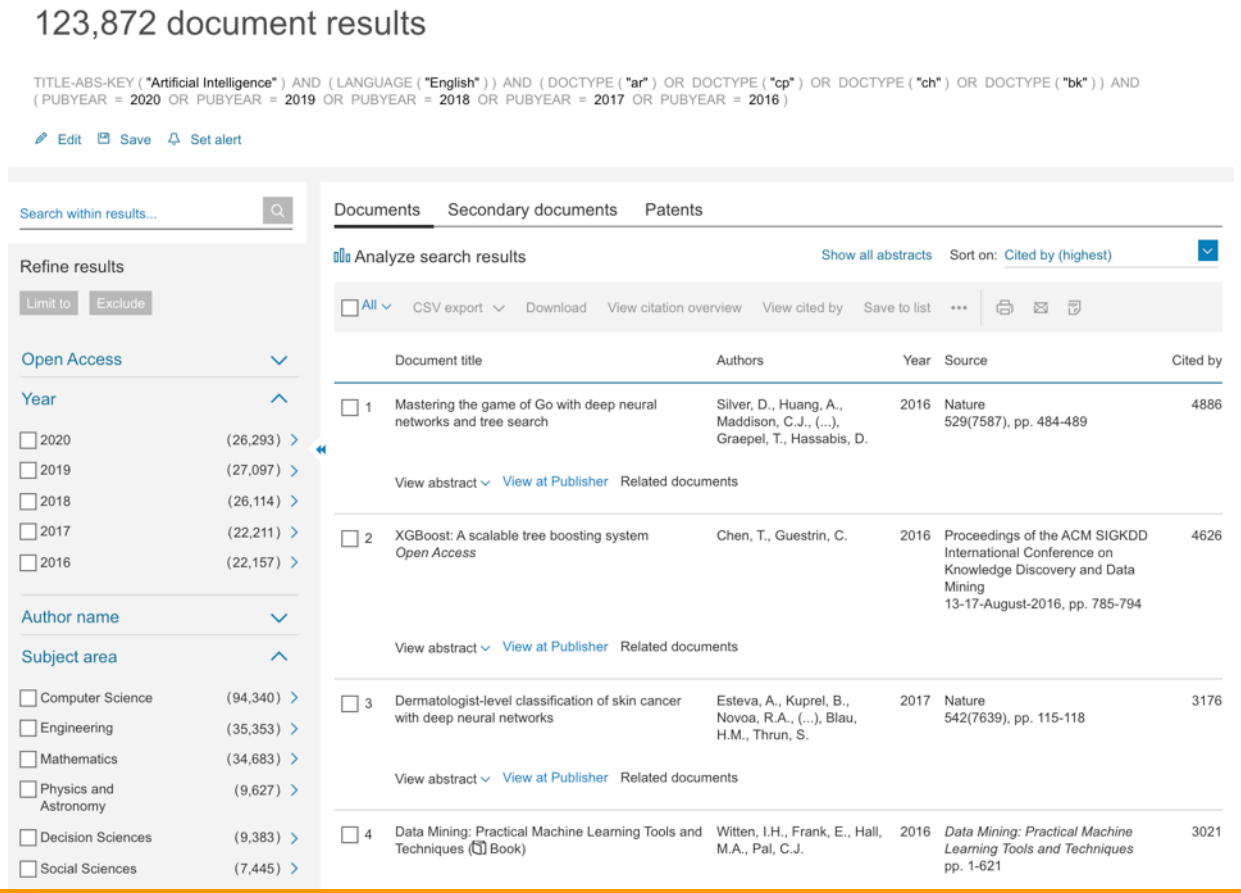
tommv.github.io/bibliograph/

TITLE-ABS-KEY("Artificial Intelligence")

AND (LANGUAGE ("English"))

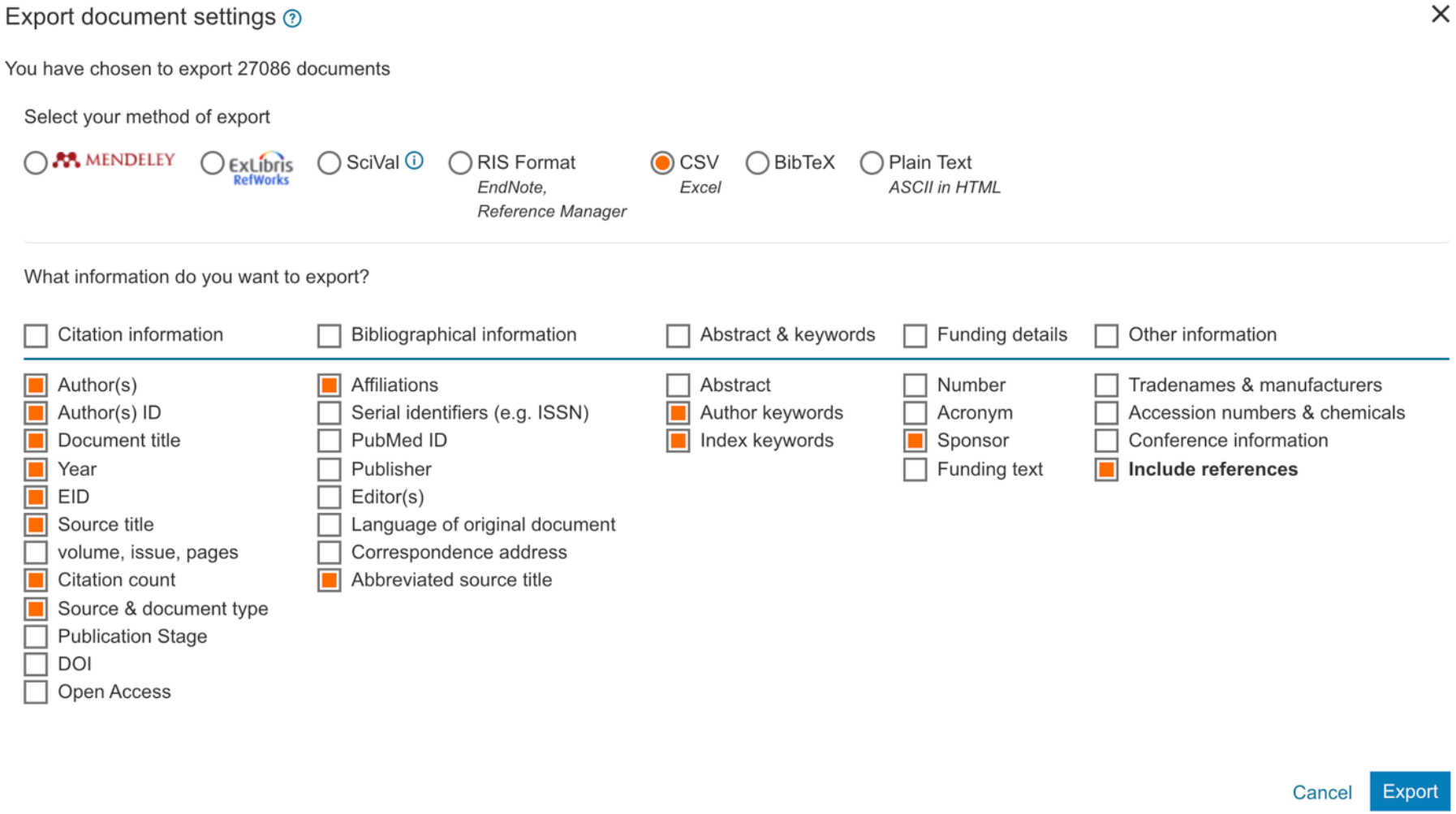
AND (DOCTYPE("ar") OR DOCTYPE("cp") OR DOCTYPE ("ch") OR DOCTYPE ("bk"))

AND (PUBYEAR IS 2020 OR PUBYEAR IS 2019 OR PUBYEAR IS 2018 OR PUBYEAR IS 2017 OR PUBYEAR IS 2016)



Choose a query

and run it in Scopus (or ISI WoS)



Export as CSV from Scopus

(or ISI Web of Science)

Bibliograph

Bibliograph allows you turn a corpus of scientometrics records from ISI Web of Science or Scopus into a landscape of bibliographic coupling. Such a landscape consists in:

1. A base map network of references co-occurring in the records of the corpus - weighted by the frequency of their co-occurrence;
2. A layer of metadata extracted from the records (e.g. authors, subject areas, keywords) and positioned in the graph according to their co-occurrence with the references of the base map.

Upload your corpus, choose the period you want to investigate, select the filtering thresholds and explore your bibliographic landscape.

Drag and drop here your CSV files or their folder

currently 5 selected files

AI_LowLevel_2016.csv AI_LowLevel_2017.csv AI_LowLevel_2018.csv AI_LowLevel_2019.csv AI_LowLevel_2020.csv

Only parse papers published between 1900 and 2100

These CSVs come from Scopus

PARSE AND INDEX 5 CSV FILES

Upload your corpus

(also select time period and source)

Filters

Use the sliders to chose how many nodes of each type should be included in your network based on the number of records in which they appears. It is strongly recommended NOT to include the references occurring in one record only.

Your data-set contained 9919 articles published between 1900 and 2100.
1 articles were duplicates (0.0%).

References

Keep the 4761 References occurring in at least 3 records

0 461995

Sources

Keep the 97 Sources occurring in at least 18 records

0 2416

Author keywords

Keep the 101 Author keywords occurring in at least 22 records

0 21792

Index keywords

Keep the 101 Index keywords occurring in at least 156 records

0 44102

Authors

Keep the 0 Authors occurring in at least 25 records

0 38567

Affiliation institutions

Keep the 0 Affiliation institutions occurring in at least 74 records

0 13421

Affiliation countries

Keep the 50 Affiliation countries occurring in at least 41 records

0 159

Funders

Keep the 56 Funders occurring in at least 7 records

0 2743

FILTER AND VISUALISE

Select the filtering thresholds

Explore your landscape
Export your results

CORPUS

We have analysed 9956 bibliographic records extracted from Scopus and published from 2016 and 2020.

Specifically, or corpus contained:
- 1995 records published in 2016
- 1995 records published in 2017
- 1987 records published in 2018
- 1970 records published in 2019
- 1970 records published in 2020

Our corpus consisted of:
- 7078 entries flagged as "Article"
- 2763 entries flagged as "Conference Paper"
- 57 entries flagged as "Book Chapter"
- 20 entries flagged as "Book"

BASE MAP

We extracted the 461995 references present in this corpus and kept the 4761 references cited by at least 3 records.

We built the co-citation network of these references weighted by the frequency of their co-occurrence (aka bibliographic coupling).

We remove the nodes with no connection at all.

We spatialized the network with the ForceAtlas2 layout and fixed the position of the reference-nodes at equilibrium.

METADATA LAYER

From the same corpus we extracted and added to the network:

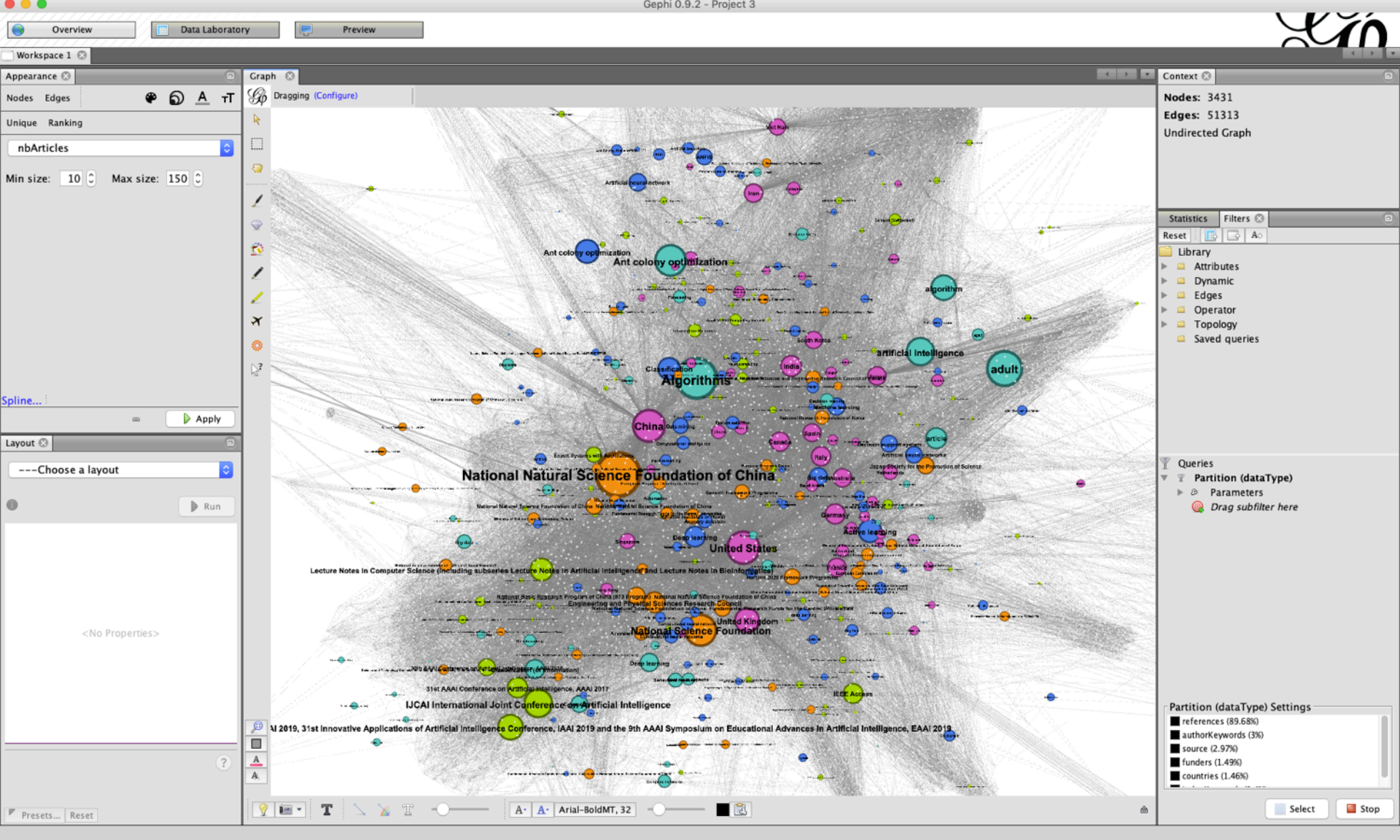
- 97 "Sources" occurring in at least 18 records
- 50 "Affiliation countries" occurring in at least 41 records
- 101 "Author keywords" occurring in at least 22 records
- 101 "Index keywords" occurring in at least 156 records
- 56 "Funders" occurring in at least 7 records

We connected these new nodes to the references co-appearing with them in the bibliographic records.

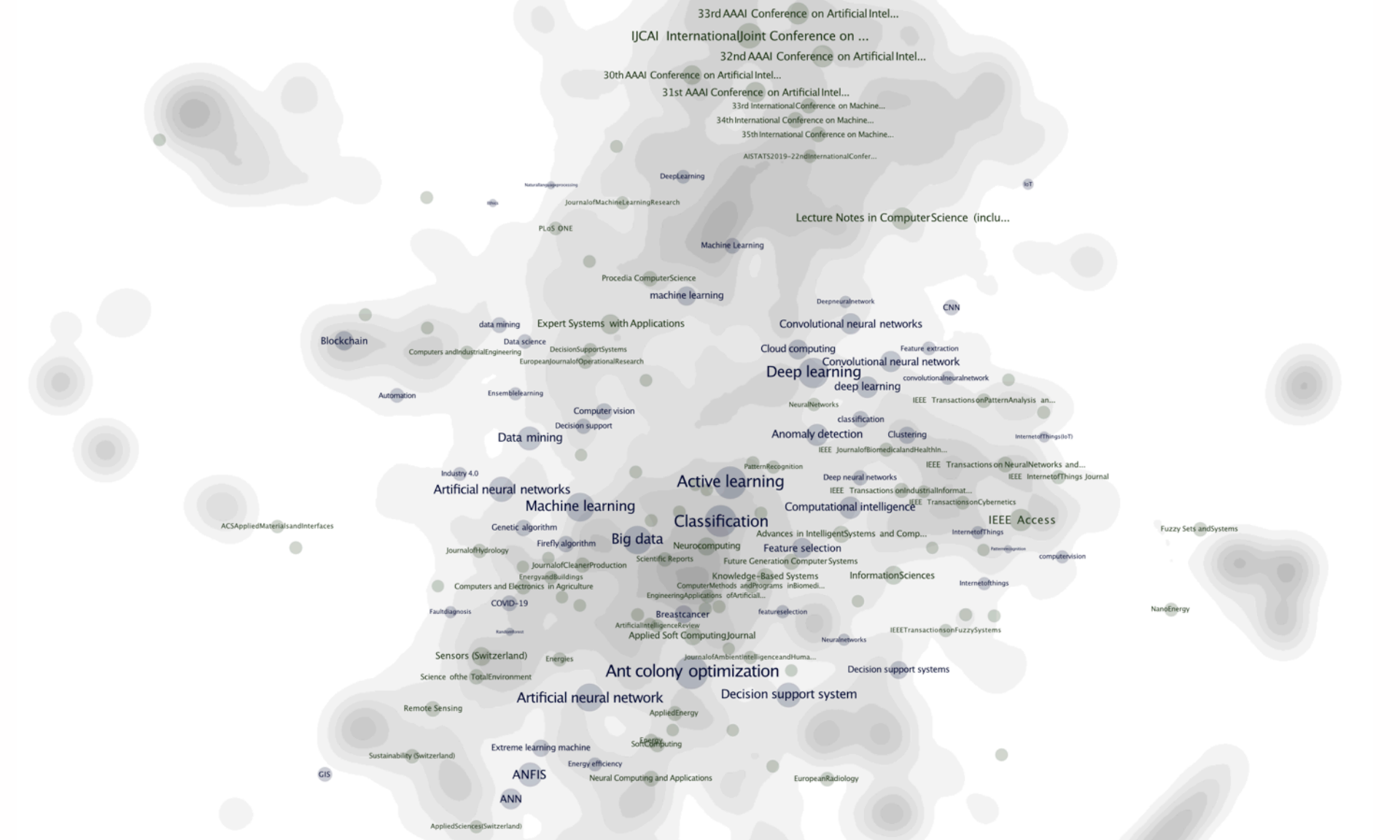
We only kept the largest connected component from the graph.

We positioned new nodes using with the same layout algorithm while keeping fixed the position of the reference-nodes.

We sized the nodes the nodes according to the number of records in which they occurred and coloured them according to their type.


Gephi 0.9.2 - Project 3
Overview
Data Laboratory
Preview
Workspace 1
Appearance
Nodes
Edges
Unique
Ranking
nbArticles
Min size:
10
Max size:
150
Spline...
Apply
Layout
---Choose a layout
Run
<No Properties>
Presets...
Reset
Graph
Dragging (Configure)
Ant colony optimization
Ant colony optimization
algorithm
artificial intelligence
adult
Classification
Algorithms
China
National Natural Science Foundation of China
United States
Deep learning
Active learning
Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)
United Kingdom
National Science Foundation
IJCAI International Joint Conference on Artificial Intelligence
Arial-BoldMT, 32
Context
Nodes: 3431
Edges: 51313
Undirected Graph
Statistics
Filters
Reset
Library
Attributes
Dynamic
Edges
Operator
Topology
Saved queries
Queries
Partition (dataType)
Parameters
Drag subfilter here
Partition (dataType) Settings
references (89.68%)
authorKeywords (3%)
source (2.97%)
funders (1.49%)
countries (1.46%)
Select
Stop

The graph


33rd AAAI Conference on Artificial Intel...
IJCAI InternationalJoint Conference on ...
32nd AAAI Conference on Artificial Intel...
30th AAAI Conference on Artificial Intel...
31st AAAI Conference on Artificial Intel...
33rd International Conference on Machine...
34th International Conference on Machine...
35th International Conference on Machine...
AISTATS2019-22ndInternationalConfer...
DeepLearning
IoT
JournalofMachineLearningResearch
Lecture Notes in ComputerScience (inclu...
PLoS ONE
Machine Learning
Procedia ComputerScience
machine learning
DeepneuralNetwork
CNN
data mining
Expert Systems with Applications
Convolutional neural networks
Blockchain
Data science
Computers andIndustrialEngineering
DecisionSupportSystems
EuropeanJournalofOperationalResearch
Cloud computing
Feature extraction
Convolutional neural network
Deep learning
convolutionalneuralnetwork
deep learning
Automation
Ensemblelearning
NeuralNetworks
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Computer vision
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Data mining
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PatternRecognition
IEEE Transactions on NeuralNetworks and...
Industry 4.0
Active learning
Deep neural networks
IEEE InternetofThings Journal
Artificial neural networks
IEEE Transactions onIndustrialInformat...
Machine learning
IEEE TransactionsonCybernetics
Computational intelligence
ACSAppliedMaterialsandInterfaces
Genetic algorithm
Classification
IEEE Access
Advances in IntelligentSystems and Comp...
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Fuzzy Sets andSystems
Firefly algorithm
Big data
Neurocomputing
Feature selection
JournalofHydrology
Scientific Reports
computervision
JournalofCleanerProduction
Future Generation Computer Systems
EnergyandBuildings
Knowledge-Based Systems
InformationSciences
Computers and Electronics in Agriculture
ComputerMethods andPrograms inBiomedi...
Internetofthings
EngineeringApplications ofArtificiall...
COVID-19
Faultdiagnosis
featureselection
NanoEnergy
Breastcancer
ArtificialIntelligenceReview
IEEETransactionsonFuzzySystems
Applied Soft ComputingJournal
Neuralnetworks
Sensors (Switzerland)
Energies
JournalofAmbientIntelligenceandHuma...
Ant colony optimization
Decision support systems
Science ofthe TotalEnvironment
Artificial neural network
Decision support system
Remote Sensing
AppliedEnergy
Extreme learning machine
Energy
SoftComputing
Sustainability (Switzerland)
Energy efficiency
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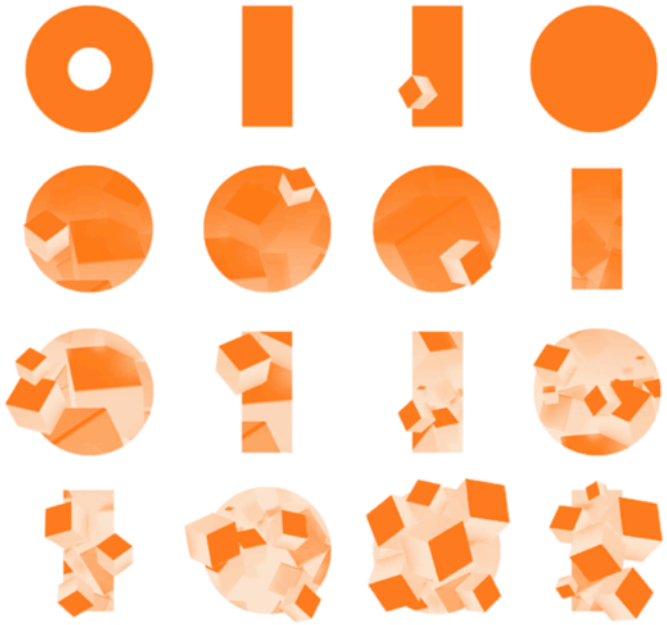
ANFIS
Neural Computing and Applications
EuropeanRadiology
ANN
AppliedSciences(Switzerland)

The heatmap

Artificial Intelligence mini-research example

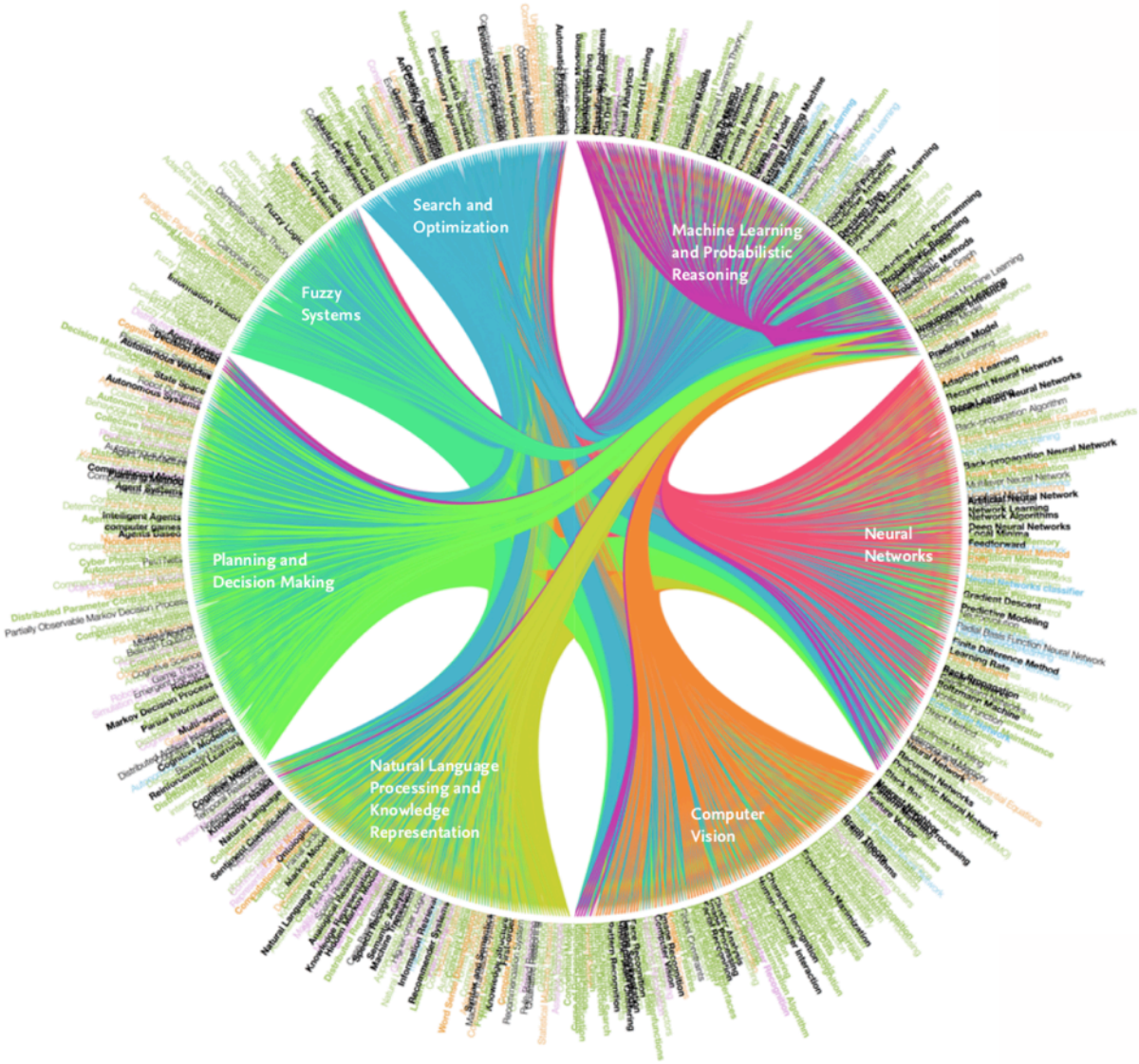
comparing the consequences of different query strategies



Artificial Intelligence: How knowledge is created, transferred, and used

Trends in China, Europe, and the United States

ELSEVIER



Testing Elsevier Query

HI-LEVEL QUERY - 8,470 document results – (i.e. those that "talk about" AI)

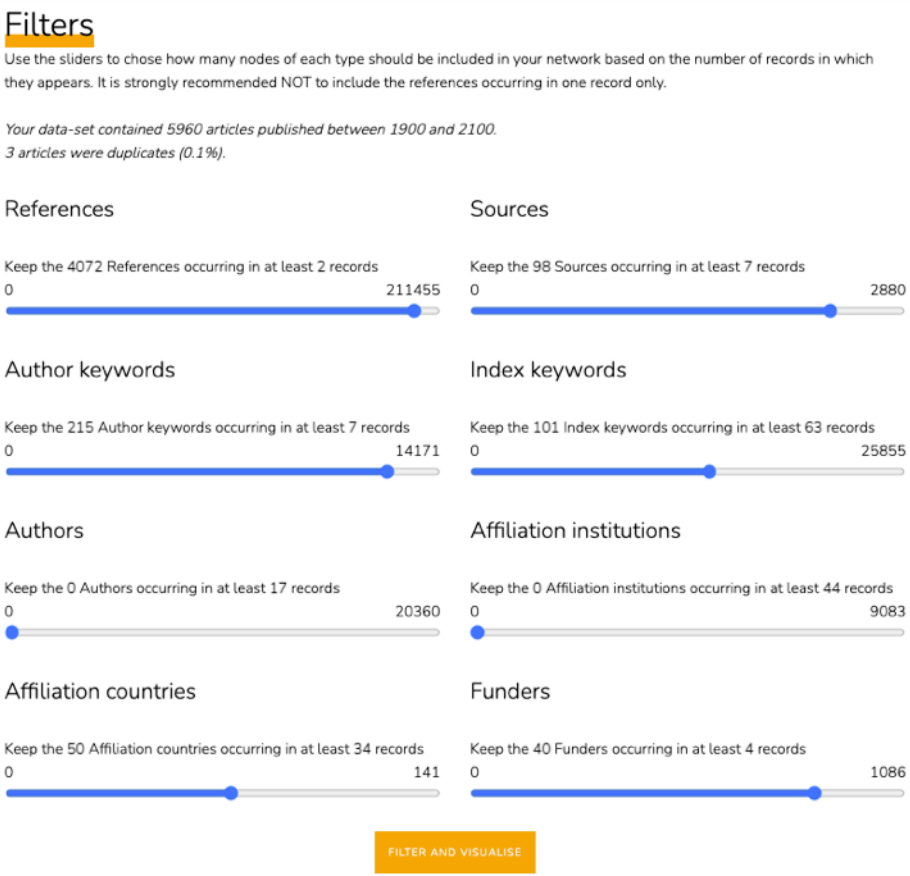
TITLE("Artificial Intelligence")
AND (LANGUAGE ("English"))
AND (DOCTYPE("ar") OR DOCTYPE("cp") OR DOCTYPE ("ch") OR DOCTYPE ("bk"))
AND (PUBYEAR IS 2020 OR PUBYEAR IS 2019 OR PUBYEAR IS 2018 OR PUBYEAR IS 2017 OR PUBYEAR IS 2016)

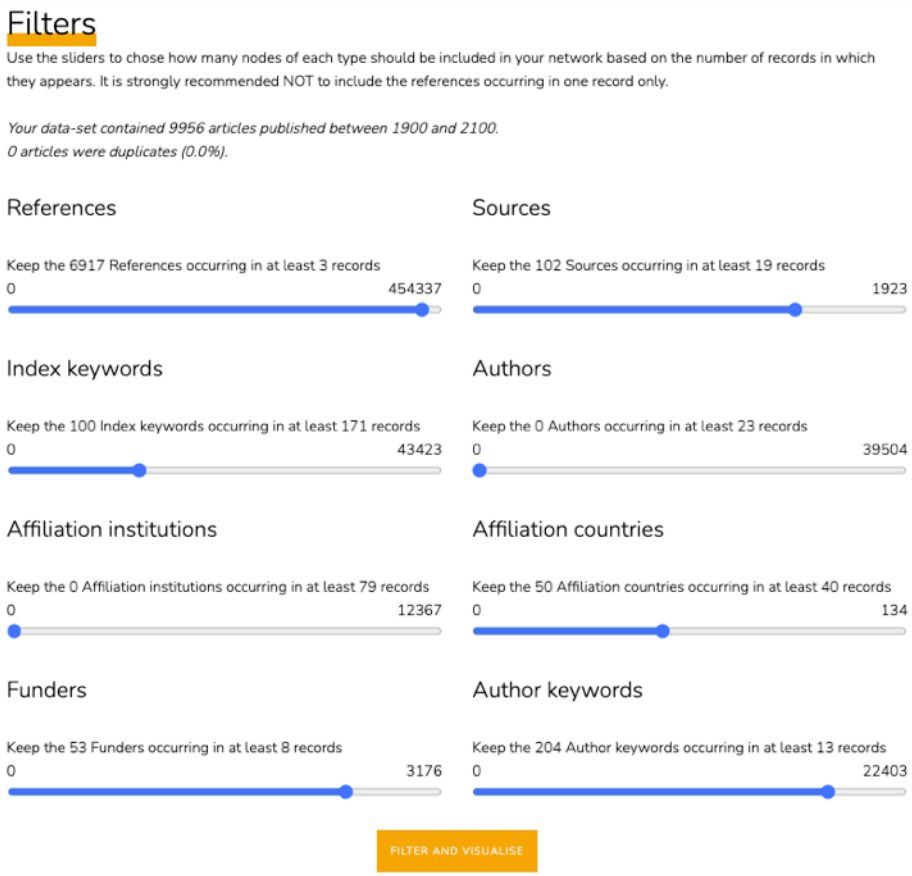
LOW LEVEL QUERY - 322,361 document results – (i.e. those that "do" AI)

TITLE("classification scheme" OR "image representation" OR "color image processing" OR "classification algorithm" OR "classification problem" OR "feature selection" OR "facial recognition" OR "feature vector" OR "classification system" OR "high dimensional data" OR "automatic speech recognition" OR "pattern classification" OR "data classification" OR "handwriting recognition" OR "supervised machine learning" OR "nearest neighbor" OR "speech synthesis" OR "image retrieval" OR "convolutional neural network" OR "belief network" OR "deep neural network" OR "dimensionality reduction" OR "boltzmann machine" OR "image recognition" OR "facial expression recognition" OR "image annotation" OR "nearest neighbor search" OR "k nearest neighbor" OR "face recognition" OR "learning model" OR "human robot interaction" OR "humanoid robot" OR "heuristic programming" OR "heuristic algorithm" OR "heuristic search" OR "branch and bound" OR "search strategy" OR "heuristic function" OR "swarm intelligence" OR "heuristic optimization" OR "ant colony optimization" OR "combinatorial optimization" OR "local search" OR "cryptography" OR "block cipher" OR "quantum computer" OR "finite element model" OR "distributed control" OR "error probability" OR "eigenproblem" OR "eigenvalues and eigenvectors" OR "finite element modeling" OR "boltzmann equation" OR "probabilistic method" OR "reinforcement learning" OR "boltzmann distribution" OR "multiple input multiple output" OR "kalman filtering" OR "boolean algebra" OR "state space model" OR "distributed parameter control system" OR "markov decision process" OR "gradient algorithm" OR "petri nets" OR "laplacian matrix" OR "finite element analysis" OR "autonomous navigation" OR "finite element method" OR "bound state" OR "estimation algorithm" OR "quadratic programming" OR "state space" OR "information fusion" OR "analytic solution" OR "eigenfunction" OR "direct method" OR "partial differential equation" OR "finite difference method" OR "analytical modeling" OR "eigenvalues and eigenfunctions" OR "fault detection" OR "second order" OR "analytical model" OR "error bound" OR "computer modeling" OR "error detection" OR "complex structure" OR "error estimate" OR "analytical solution" OR "eigenvector" OR "eigenvalue" OR "conjugate gradient method" OR "dynamic simulation" OR "parallel algorithm" OR "dynamic modeling" OR "computational simulation" OR "condition monitoring" OR "fuzzy clustering" OR "hopfield net" OR "hopfield neural network" OR "hopfield network" OR "ontological" OR "conceptual model" OR "domain ontology" OR "description logic" OR "neural networks learning" OR "activation function" OR "feedforward neural network" OR "feedforward network" OR "feedforward" OR "extreme learning machine" OR "recurrent network" OR "learning machine" OR "game theory" OR "fuzzy evaluation" OR "fuzzy inference system" OR "defuzzification" OR "evaluation model" OR "fuzzy rule" OR "fuzzy inference" OR "fuzzy set theory" OR "fuzzy logic controller" OR "fuzzy rule base" OR "fuzzy number" OR "fuzzy cognitive map" OR "fuzzy logic system" OR "forecasting model" OR "semantic analysis" OR "word sense disambiguation" OR "translation system" OR "natural language generation" OR "statistical machine translation" OR "machine translation" OR "bayesian inference" OR "nucleotide sequence" OR "genetic model" OR "back propagation neural network" OR "graph matching" OR "image registration" OR "pattern matching" OR "matching problem" OR "feature matching" OR "prediction model" OR "closed loop control system" OR "closed loop control" OR "multiple input multiple output" OR "model predictive control" OR "kalman filter" OR "clustering method" OR "autonomous system" OR "agent based" OR "fault tree" OR "condition based maintenance" OR "finite element" OR "fault isolation" OR "signature analysis" OR "recommender system" OR "collaborative filtering" OR "recommendation system" OR "nonlinear dynamic" OR "nonlinear model" OR "closed loop" OR "adaptive algorithm" OR "common feature" OR "biochip" OR "biosensing" OR "biosensing technique" OR "logical agent" OR "path planning" OR "autonomous vehicle" OR "planning method" OR "autonomous agent" OR "learning rate" OR "adaptive learning" OR "computer game" OR "detection probability" OR "predictive model" OR "bp neural network" OR "image matching" OR "network algorithm" OR "deep learning" OR "character recognition" OR "hidden markov model" OR "natural language processing" OR "bayes theorem" OR "hierarchical model" OR "bayesian estimation" OR "bayesian model" OR "bayesian analysis" OR "bayesian learning" OR "ontologies" OR "knowledge representation" OR "fuzzy controller" OR "fuzzy logic control" OR "closed loop system" OR "time series forecasting" OR "characteristic curve" OR "formal concept analysis" OR "concept lattice" OR "distributed system" OR "chaotic system" OR "boolean function" OR "binary tree" OR "binary search" OR "spatial learning" OR "learning and memory" OR "cognitive dysfunction" OR "associative learning" OR "computational geometry" OR "fault diagnosis" OR "monte carlo simulation" OR "hierarchical clustering" OR "cognitive radio" OR "associative storage" OR "associative memory" OR "image classification" OR "supervised learning" OR "multilayer neural network" OR "back propagation" OR "finite automata" OR "state machine" OR "evolutionary computation" OR "genetic programming" OR "fuzzy neural network" OR "computer aided diagnosis" OR "recurrent neural network" OR "fuzzy control" OR "neural network model" OR "matrix factorization" OR "inference method" OR "automated pattern recognition" OR "markov model")
AND (LANGUAGE ("English"))
AND (DOCTYPE("ar") OR DOCTYPE("cp") OR DOCTYPE ("ch") OR DOCTYPE ("bk"))
AND (PUBYEAR IS 2020 OR PUBYEAR IS 2019 OR PUBYEAR IS 2018 OR PUBYEAR IS 2017 OR PUBYEAR IS 2016)

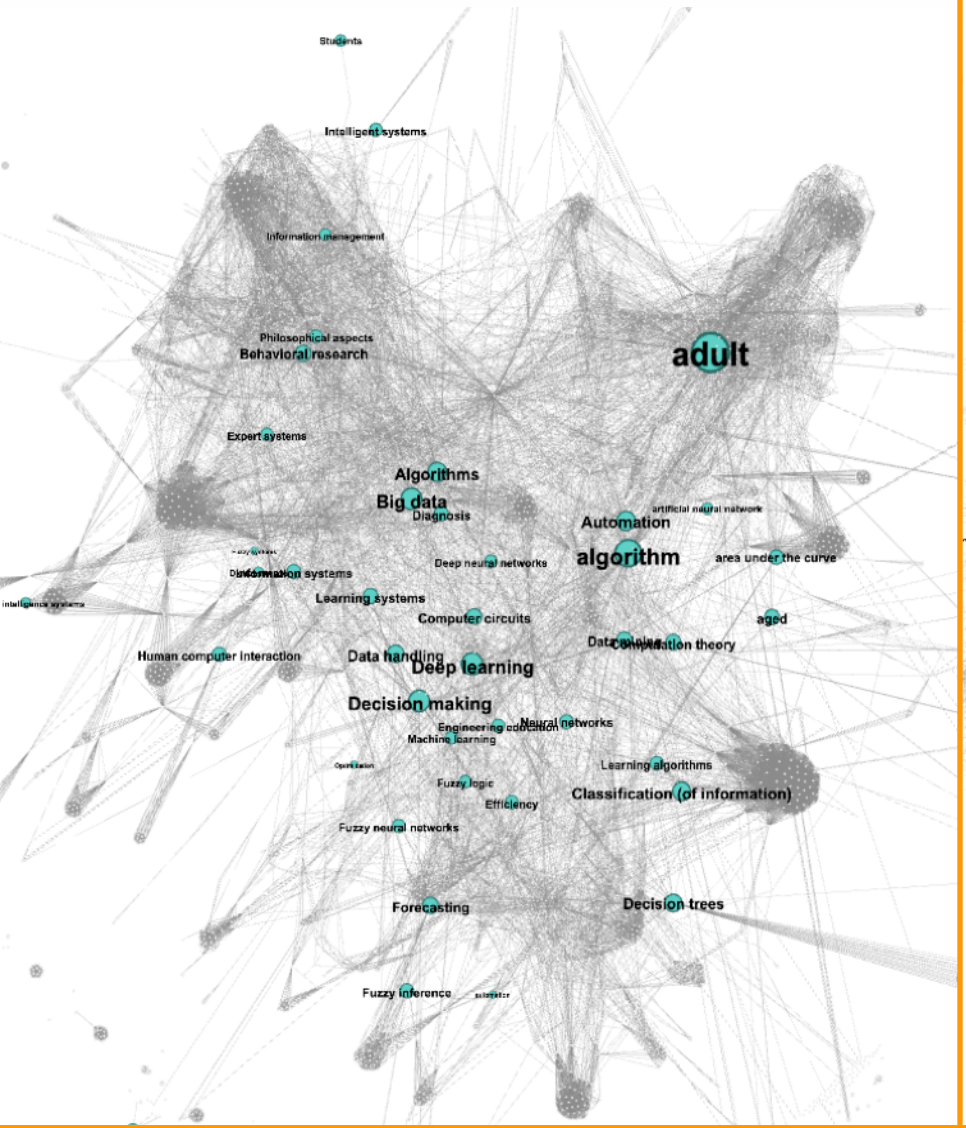
An AI mini-research example

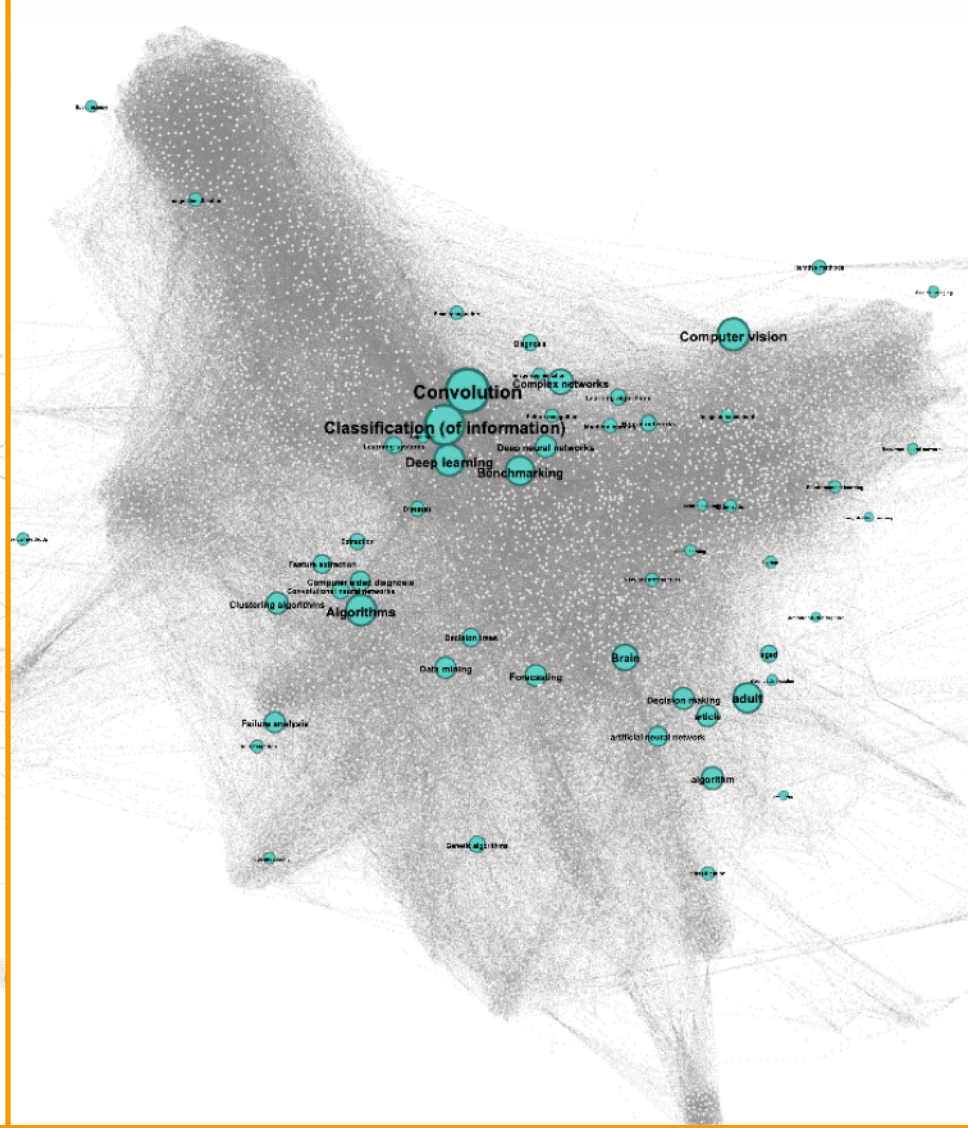
(comparing the consequences of different queries)



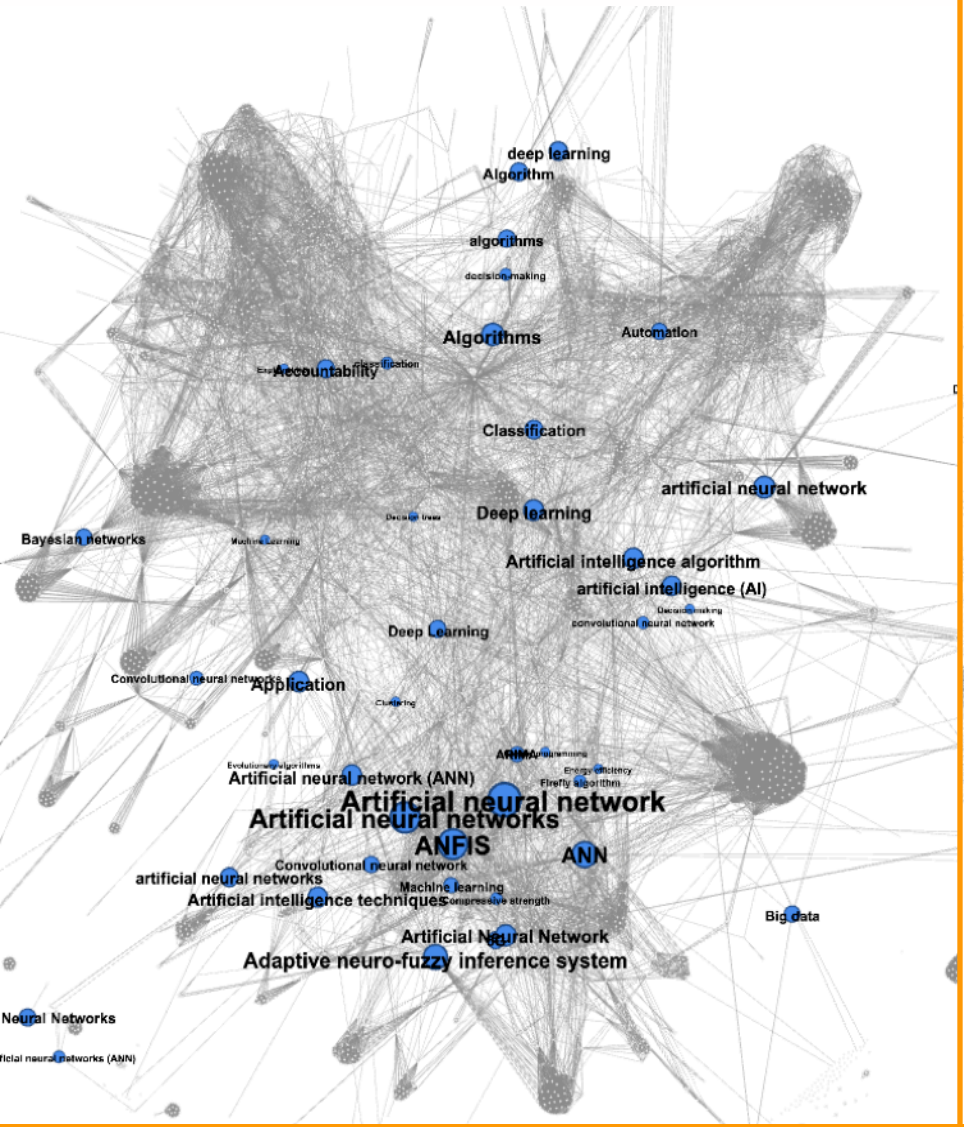


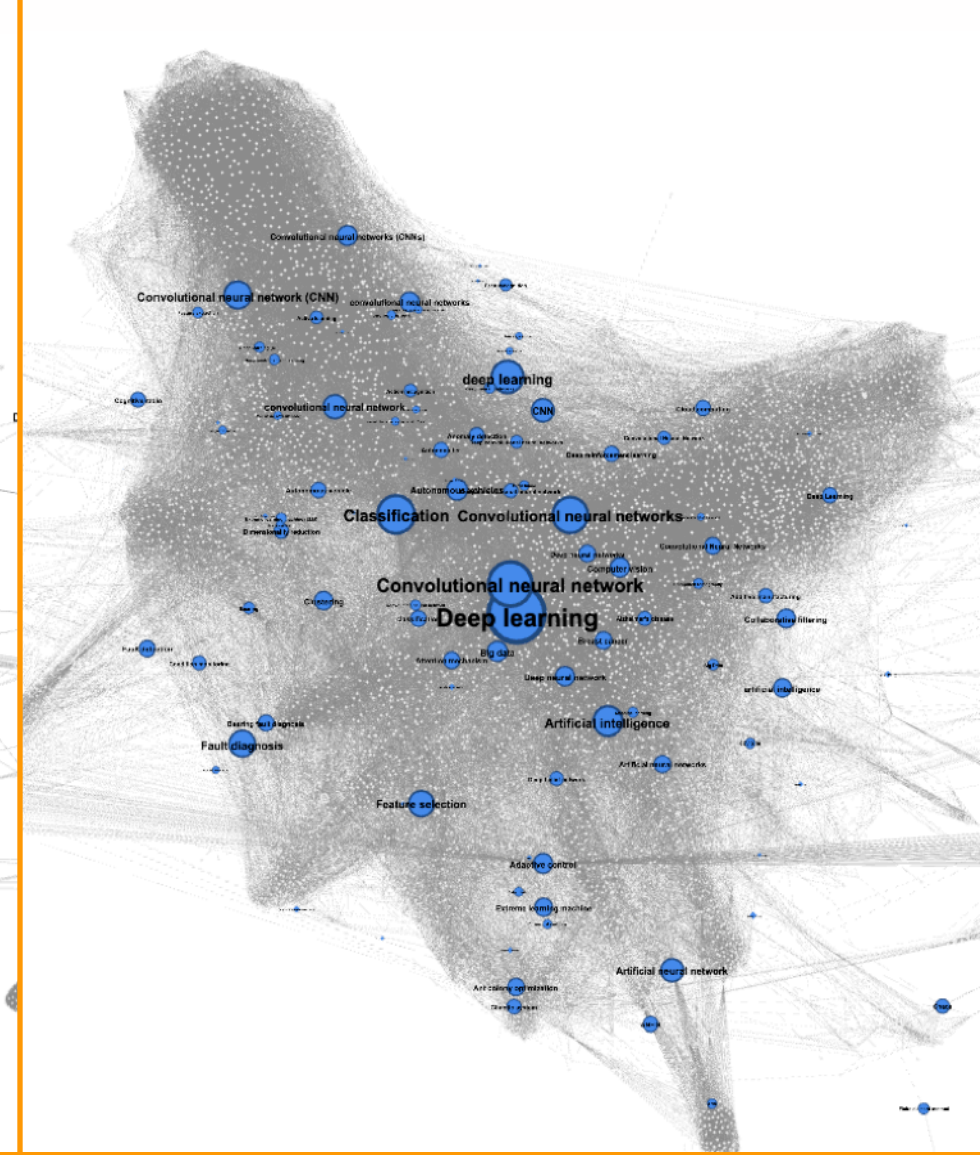
Applying the similar filtering thresholds



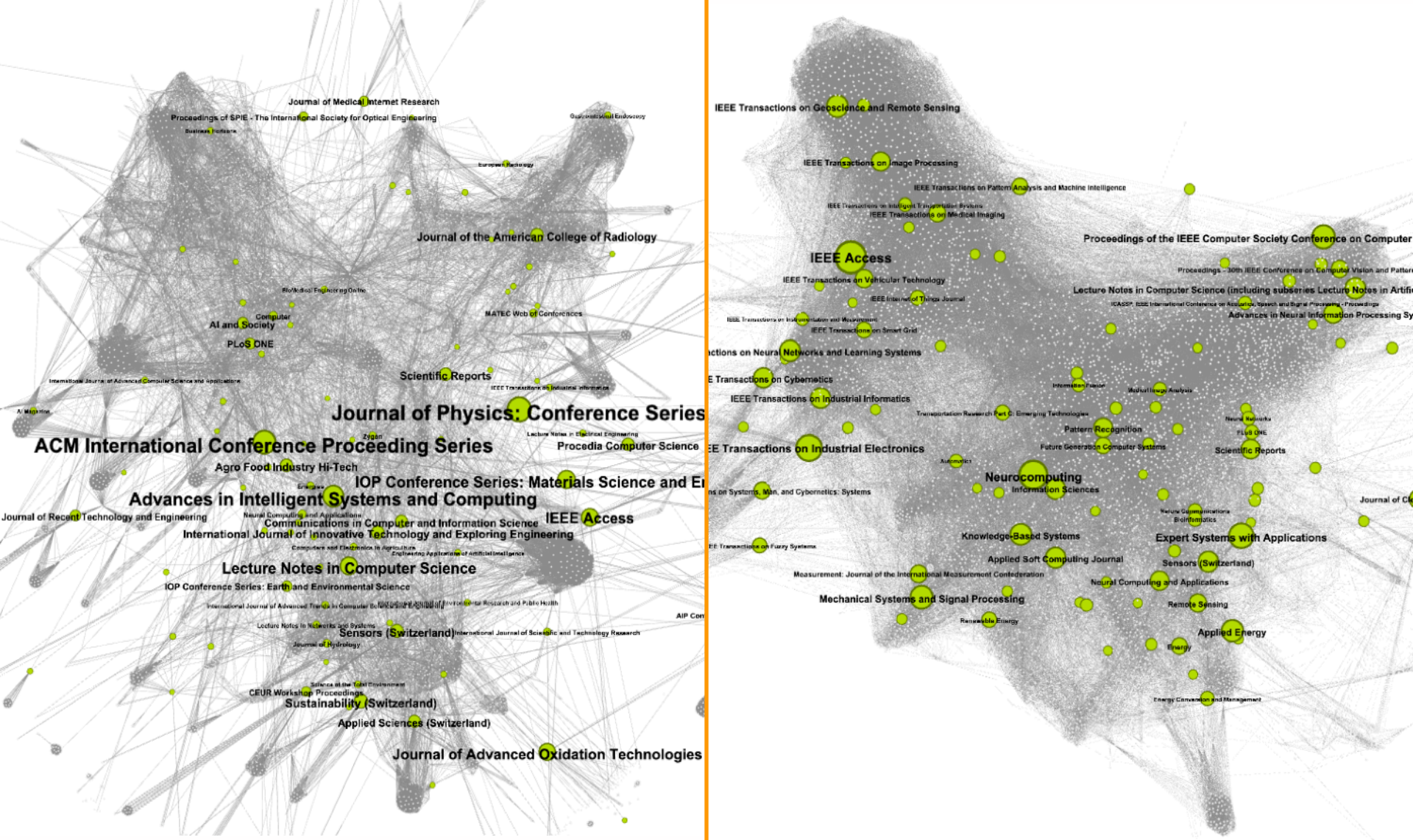


Index Keywords





Author Keywords


Journal of Medical Internet Research
Proceedings of SPIE - The International Society for Optical Engineering
Journal of the American College of Radiology
BioMedical Engineering OnLine
Computer
AI and Society
MATEC Web of Conferences
PLoS ONE
Scientific Reports
Journal of Physics: Conference Series
ACM International Conference Proceeding Series
Procedia Computer Science
Agro Food Industry Hi-Tech
IOP Conference Series: Materials Science and E
Advances in Intelligent Systems and Computing
Journal of Recent Technology and Engineering
Communications in Computer and Information Science
IEEE Access
International Journal of Innovative Technology and Exploring Engineering
Lecture Notes in Computer Science
IOP Conference Series: Earth and Environmental Science
Sensors (Switzerland)
Journal of Hydrology
CEUR Workshop Proceedings
Sustainability (Switzerland)
Applied Sciences (Switzerland)
Journal of Advanced Oxidation Technologies
IEEE Transactions on Geoscience and Remote Sensing
IEEE Transactions on Image Processing
IEEE Transactions on Pattern Analysis and Machine Intelligence
IEEE Transactions on Medical Imaging
IEEE Access
IEEE Transactions on Vehicular Technology
IEEE Internet of Things Journal
IEEE Transactions on Smart Grid
IEEE Transactions on Cybernetics
IEEE Transactions on Industrial Informatics
Pattern Recognition
E Transactions on Industrial Electronics
Neurocomputing
Information Sciences
Knowledge-Based Systems
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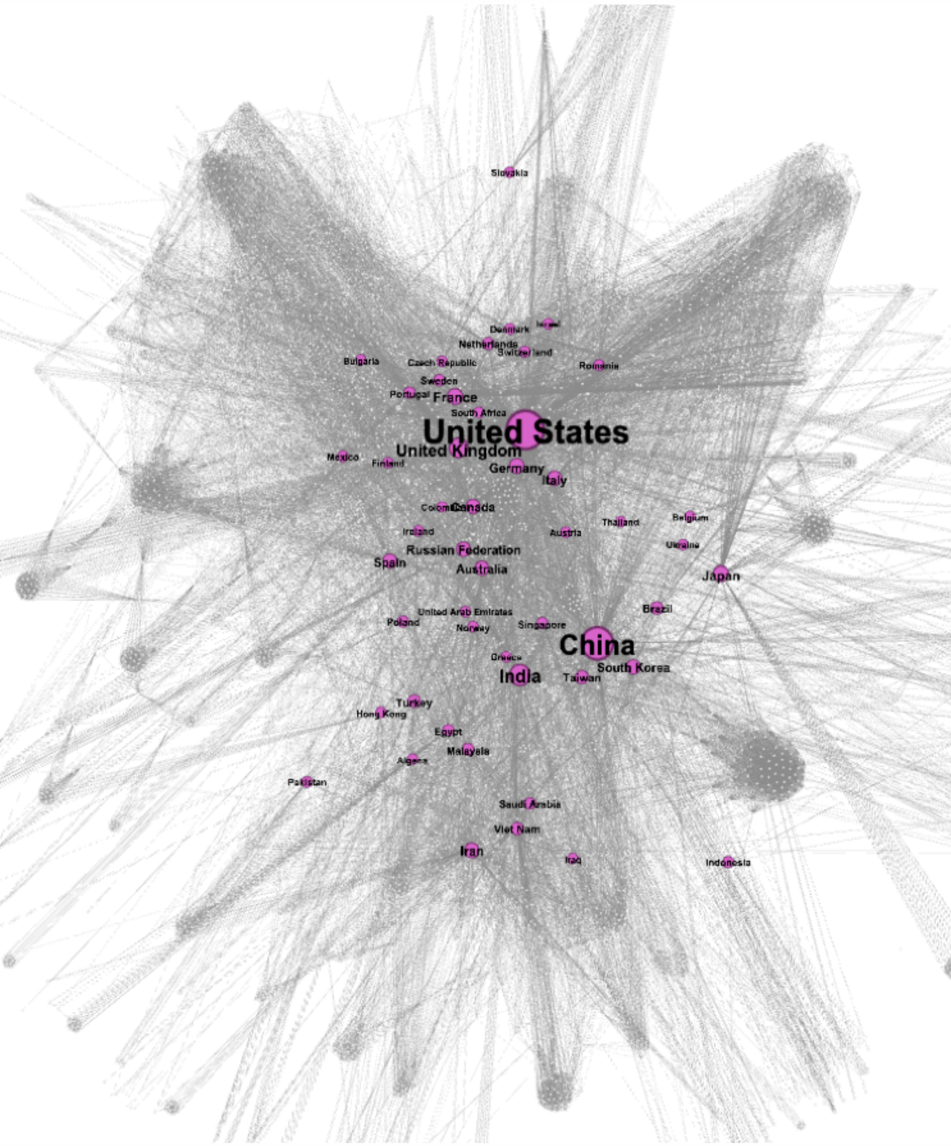
Neural Computing and Applications
Mechanical Systems and Signal Processing
Remote Sensing
Applied Energy
Energy
Energy Conversion and Management

Sources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South Africa
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Singapore
Greece
China
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Saudi Arabia
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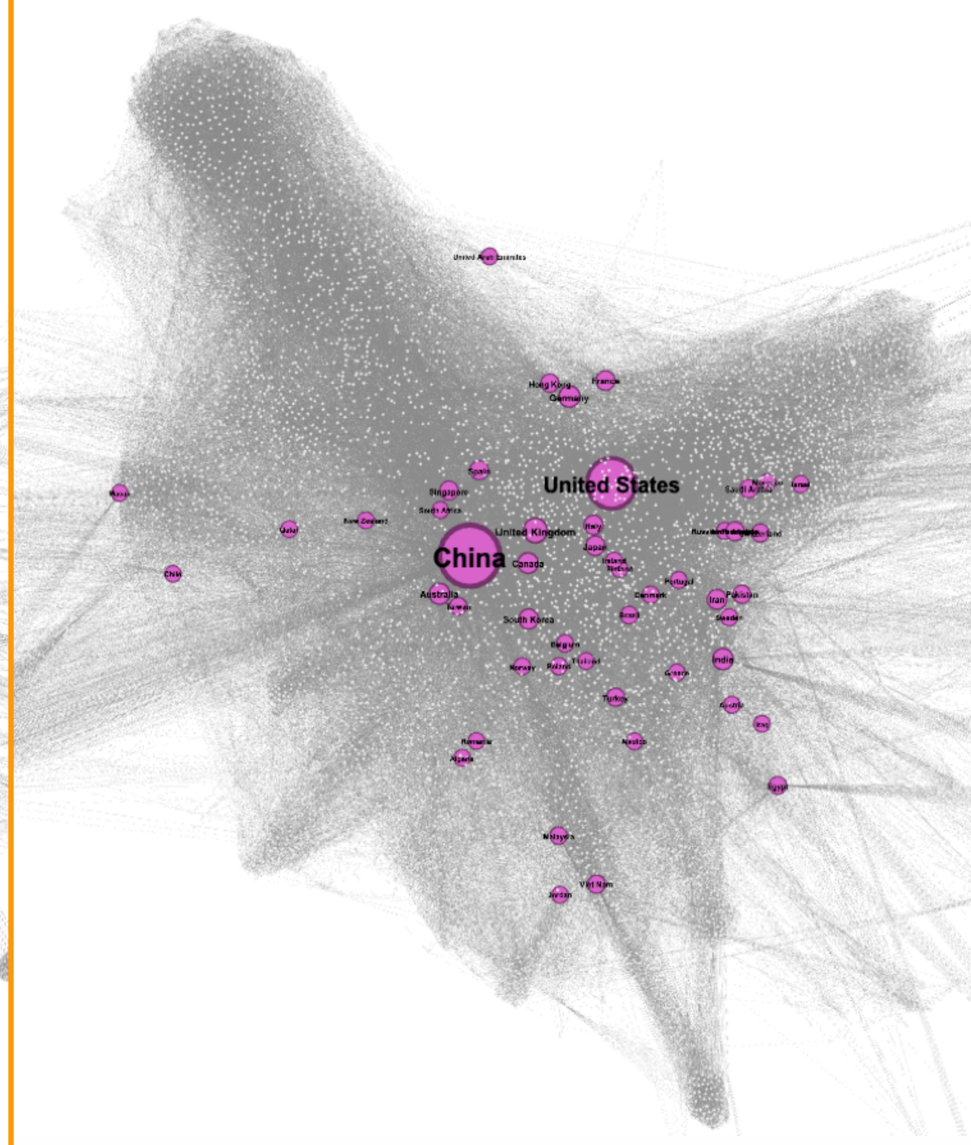
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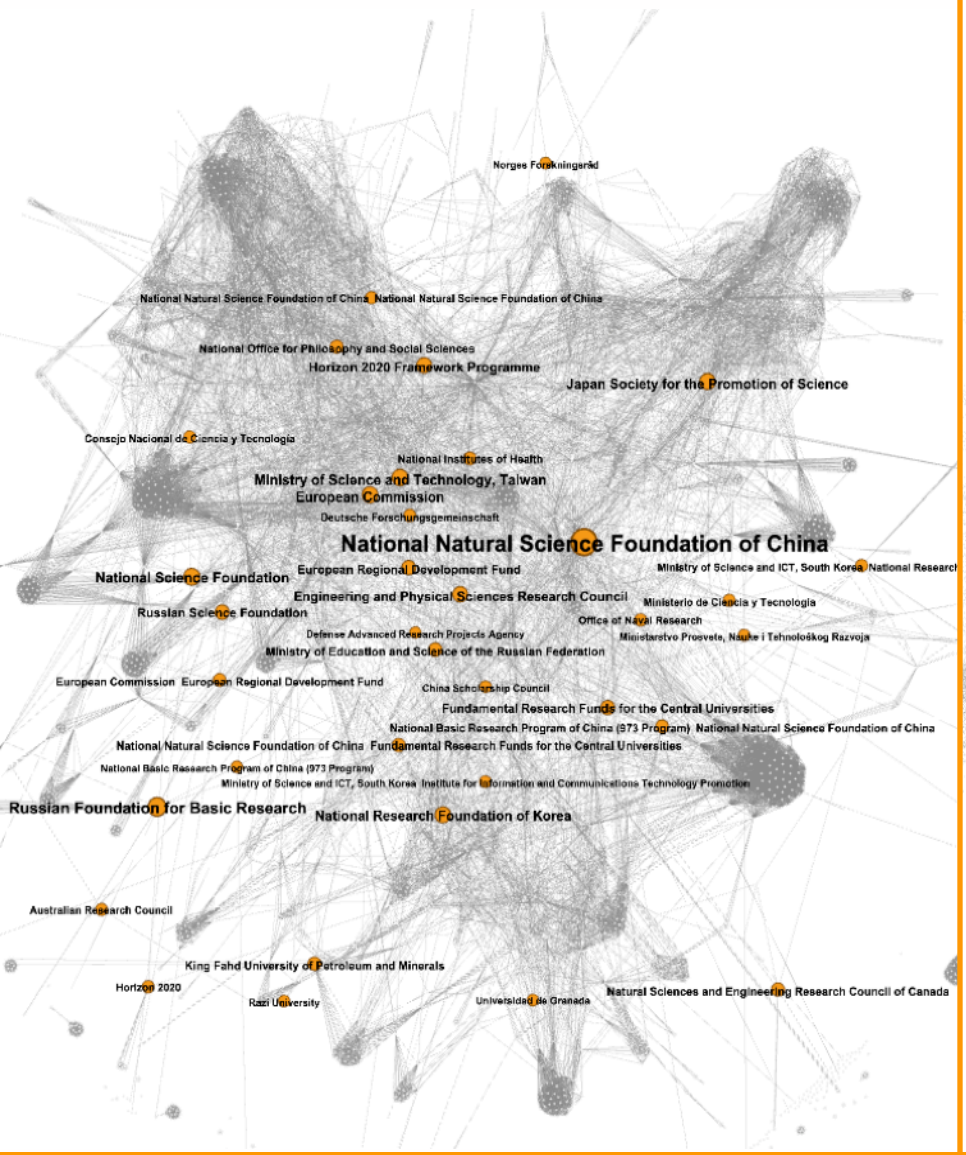
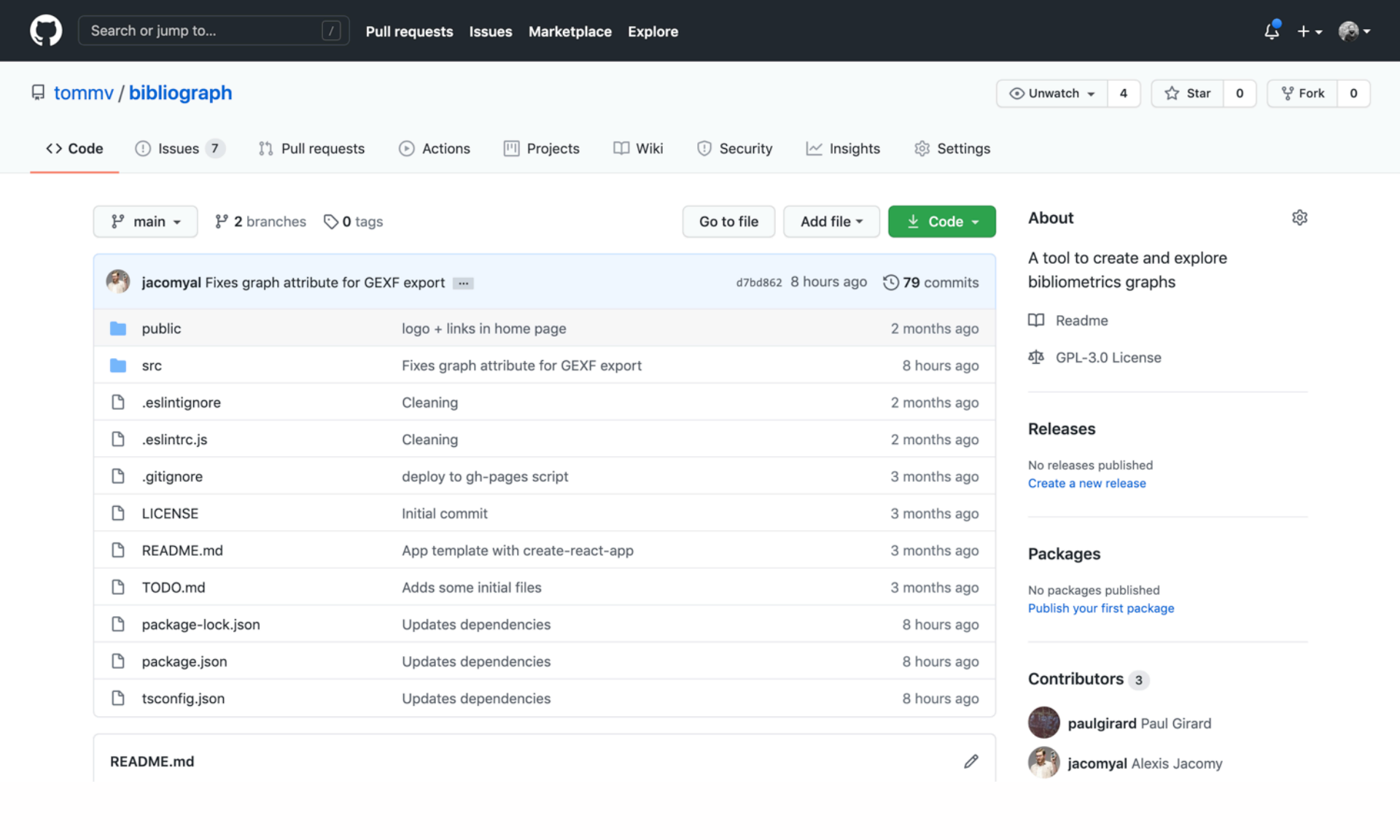
Viet Nam

Countries


Norges Forskningsråd
National Natural Science Foundation of China National Natural Science Foundation of China
National Office for Philosophy and Social Sciences
Horizon 2020 Framework Programme
Japan Society for the Promotion of Science
Consejo Nacional de Ciencia y Tecnología
National Institutes of Health
Ministry of Science and Technology, Taiwan
European Commission
Deutsche Forschungsgemeinschaft
National Natural Science Foundation of China
National Science Foundation
European Regional Development Fund
Ministry of Science and ICT, South Korea National Research
Engineering and Physical Sciences Research Council
Ministerio de Ciencia y Tecnología
Russian Science Foundation
Office of Naval Research
Defense Advanced Research Projects Agency
Ministarstvo Prosvete, Nauke i Tehnološkog Razvoja
Ministry of Education and Science of the Russian Federation
European Commission European Regional Development Fund
China Scholarship Council
Fundamental Research Funds for the Central Universities
National Basic Research Program of China (973 Program) National Natural Science Foundation of China
National Natural Science Foundation of China Fundamental Research Funds for the Central Universities
National Basic Research Program of China (973 Program)
Ministry of Science and ICT, South Korea Institute for Information and Communications Technology Promotion
Russian Foundation for Basic Research
National Research Foundation of Korea
Australian Research Council
King Fahd University of Petroleum and Minerals
Horizon 2020
Razi University
Universidad de Granada
Natural Sciences and Engineering Research Council of Canada

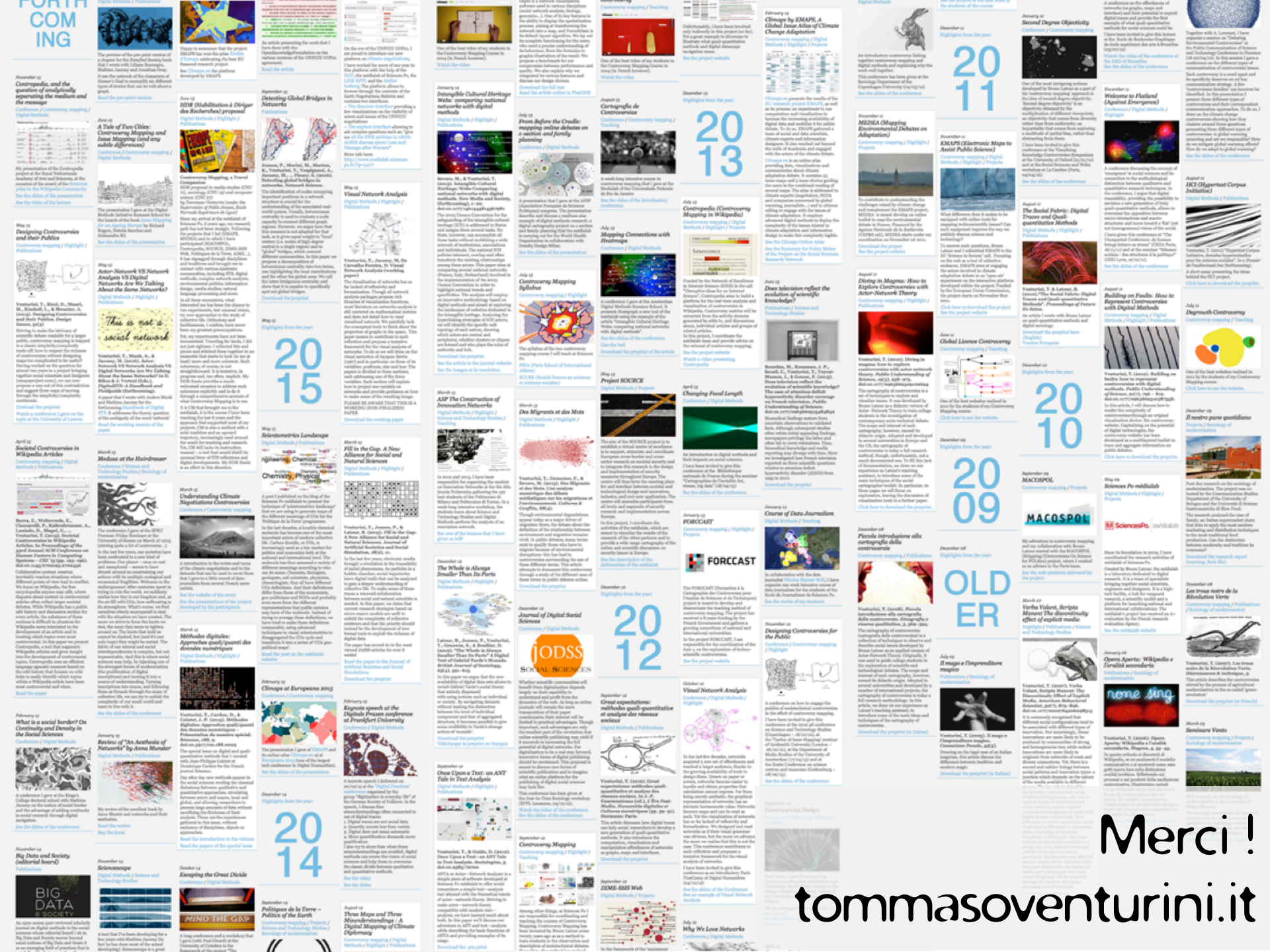

China Postdoctoral Science Foundation
National Basic Research Program of China (973 Program)
Japan Society for the Promotion of Science
Australian Research Council
China Scholarship Council
Engineering and Physical Sciences Research Council
National Science Foundation
Horizon 2020 Framework Programme
National Natural Science Foundation of China
Chinese Academy of Sciences
National Natural Science Foundation of China
European Research Council
European Commission
National Natural Science Foundation of China Fundamental Research Funds for the Central Universities
National Basic Research Program of China (973 Program) National Natural Science Foundation of China
National Natural Science Foundation of China
National Institutes of Health
Natural Sciences and Engineering Research Council of Canada
China Scholarship Council National Natural Science Foundation of China
Ministry of Science and Technology, Taiwan
Ministry of Science, ICT and Future Planning National Research Foundation of Korea
Fundamental Research Funds for the Central Universities
China Postdoctoral Science Foundation National Natural Science Foundation of China

Founders



Open-Source Release

https://github.com/tommv/bibliograph/


Merci !
tommasoventurini.it