

AI-Powered Trademark Prior Art Search Tools: An Empirical Analysis

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Outline

- Introducing IPSAM Research Project
- AI-Powered Prior Art Search Tools
- Exploratory Research
- Systematic and Automated Analysis
- Key Findings
- Conclusion

Introducing IPSAM Research Project


- ARC (Actions Recherches Concertées) 2020-2023 (ULB)
 - <https://droit-prive.ulb.be/ipsam-adressing-intellectual-property-relevant-similarities-in-images-through-algorithmic-decision-systems/>
- Interdisciplinary
 - Law: JurisLab (Center for Private Law - FabLab ULB)
 - Engineering: LISA (Laboratory of Image Synthesis and Analysis) (Prof. Olivier Debeir)
- Focus:
 - 2D images (IP Common)
 - IP Offices tools (publicly available)
 - TM (quantitative/qualitative data)
- BOIP Support

AI-Powered Trademark Prior Art Search Tools

- Tools developed by IP offices and Private Companies,
 - **BOIP**: Image search, powered by Darts-ip (Clarivate Analytics)
 - **EUIPO**: eSearch plus, powered by TradeMark Vision (Clarivate Analytics) (*update: nowadays in-house solution*)
 - **WIPO**: Global Brand Database, in-house developed
 - ...

BOIP Trademarks register

[Advanced search](#)



Drag an image or upload from your computer. Maximum 1.4 MB.
Accepted file types: jpg, gif and png.

?

eSearch plus

The EUIPO's database access

Search trade marks, designs, owners, representatives, Bulletins and Office decisions in one single application. [Learn how](#)

[Advanced search](#)



Drag 1 image to search for trade marks and up to 7 for designs
JPG, PNG, GIF and TIF are allowed

FILTER BY

Source	Image	Type	Status	Origin	App. Year *	Expiration *								
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>1 Pick an image</p> <p><input type="button" value="browse (fa)"/></p> <p>or</p> <div style="border: 1px dashed #ccc; padding: 5px; text-align: center;">drag an image here</div> </div> <div style="width: 30%;"> <p>2 Pick a strategy</p> <p>Concept <input type="text"/></p> <p>Shape <input type="text"/></p> <p>Color <input type="text"/></p> <p>Composite <input type="text"/></p> </div> <div style="width: 30%;"> <p>3 Pick an image type</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td>Verbal</td> <td style="text-align: right;">1,655,372</td> </tr> <tr> <td>Nonverbal</td> <td style="text-align: right;">2,439,889</td> </tr> <tr> <td>Combined</td> <td style="text-align: right;">17,300,675</td> </tr> <tr> <td>Unknown</td> <td style="text-align: right;">55,808</td> </tr> </table> </div> </div>							Verbal	1,655,372	Nonverbal	2,439,889	Combined	17,300,675	Unknown	55,808
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Nonverbal	2,439,889													
Combined	17,300,675													
Unknown	55,808													
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AI-Powered Trademark Prior Art Search Tools

• SOTA

- Tursun *e.a.*
 - 'METU' TM Dataset (Tursun *e.a.* 2017)
 - Text removal (Tursun *e.a.* 2019)
- Bernabeu *e.a.* 2022
 - EU TM Dataset
 - Text inpainting
- Trappey *e.a.* 2020
 - Logos Dataset
 - 300 US infringement case law for evaluation purpose

Component-based Attention for Large-scale Trademark Retrieval

Osman Tursun ^{*1}, Simon Denman¹, Sabesan Sivapalan¹, Sridha Sridharan¹, Clinton Fookes¹, and Sandra Mau²

¹Image and Video Research Laboratory, SAIVT, Queensland University of Technology
²TrademarkVision

Multi-Label Logo Recognition and Retrieval based on Weighted Fusion of Neural Features

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Contents lists available at [ScienceDirect](#)
Advanced Engineering Informatics
journal homepage: www.elsevier.com/locate/aei



Intelligent trademark similarity analysis of image, spelling, and phonetic features using machine learning methodologies

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^bDepartment of Industrial Engineering and Engineering Management, National Tsing Hua University, Hsinchu, Taiwan

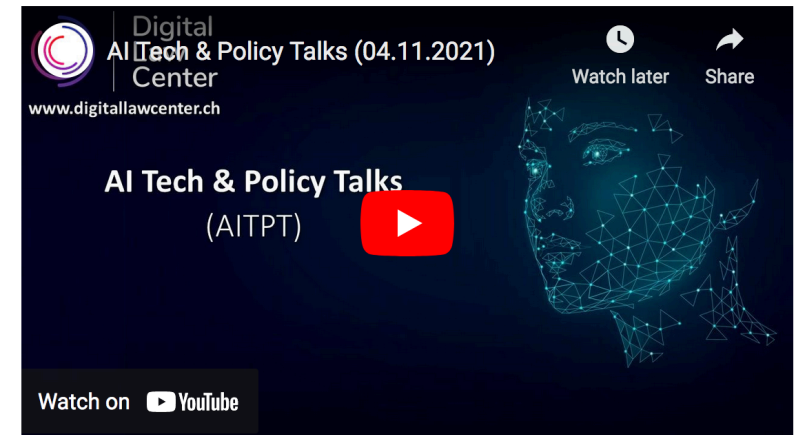


AI-Powered Trademark Prior Art Search Tools

- Performance?
 - Their claims: efficient (?), beyond SOTA (how good is SOTA?)
 - Our claim: **performances should be addressed in light of the capacity to identifying prior sign likely to raise LoC concerns according to relevant case law**
- IPSAM
 - Exploratory Research (past)
 - Systematic Analysis (present) (benchmarking purpose)
 - Comparison with IPSAM (future)

Exploratory Research

- “Assessing IP Similarities Through Technology: A Trademark Exploration of Challenges and Avenues”, *AI Tech & Policy Talks*, University of Geneva, 4 November 2021
- Testing IP Offices tools
 - // Moerland & Freitas 2021
- Publicly available image search tools (BOIP, EUIPO, WIPO)



<https://www.digitallawcenter.ch/evenement/2021/AITPT10>

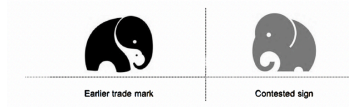
Exploratory Research

- Uploading

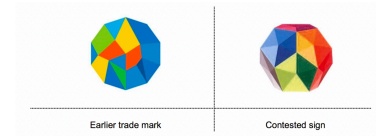
Opposition
No B 3 126
137



Opposition
No B 3 110
202



Opposition
No B 3 055
564



- Matching

BOIP

24

EUIPO

25

WIPO (concept filter)

26

Exploratory Research

- General assessment:
 - Very different outcomes
 - Noise (false positive)
 - Far from LoC (false negative)
- Surprising results!
 - Ex. Apple correct matches in WIPO's tool: 238 (Spain), 264 (Corea), 472 (North Macedonia) !
 - Comp. Moerland & Freitas 2021 : *'This test [conceptual similarity] used the Apple, Inc. logo to identify similar signs for food products and computers. In fact, all tools performed well in Test 2'*

Opposition
No B 3 059
743

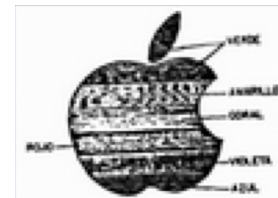


Earlier trade mark



Contested sign

238



264



472



Systematic and Automated Analysis

- Methodology

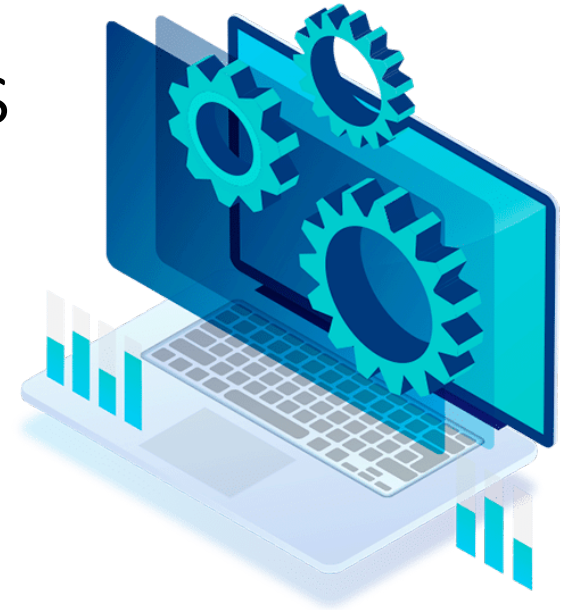
- Query set

- LoC according to EUIPO (art. 8(1)(b) EUTMR)
 - Figurative EUTM
 - Opposition Division
 - 8.196 decisions from 23/3/2016* to 31/5/2022

- *: Entry into force Regulation (EU) 2015/2424 (codification in Regulation (EU) 2017/1001)

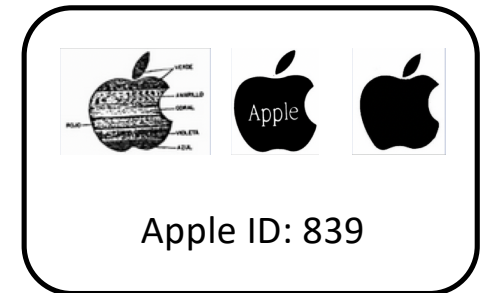
- Automated Data Mining Process

- Testing BOIP Image Search & EUIPO esearch plus
 - High resolution images
 - Various errors (1.513 decisions) and results with **6.683 decisions**
 - 3.491 LoC+ (52,24%) ; 1.731 LoC- (25,90%) ; 1.461 LoC+- (21,86%)



Systematic and Automated Analysis

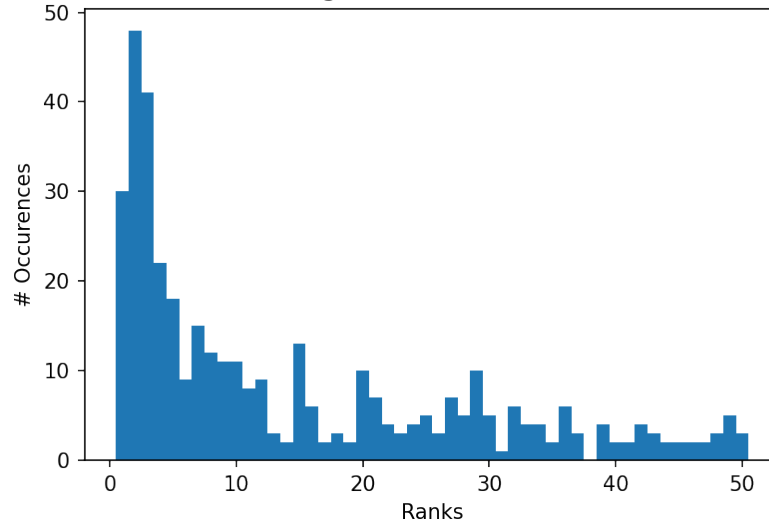
- Evaluation process: uploading contested sign, matching opponent sign
 - By « Holder ID » : Logical since multiple trademarks could've resulted in LOC
 - By « Trademark ID » : Sure to match LoC assessment of administrative decision
- Both yield results with negligible differences. Rest of analysis based on match by Holder ID



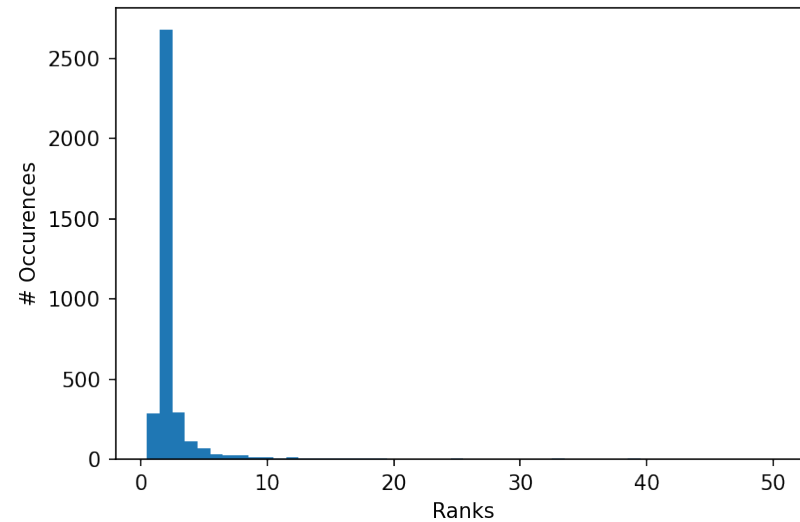
Key Findings

- Overall performances
 - Matches percentage
 - BOIP: matches only for 7,8 %
 - EUIPO : matches for 57,8 %
 - Histogram of ranks
 - BOIP: more distributed (range from 1 to 50)
 - EUIPO: concentrated (73,4 % of matches at rank 2)

BOIP - Histogram of ranks (Match Holder)



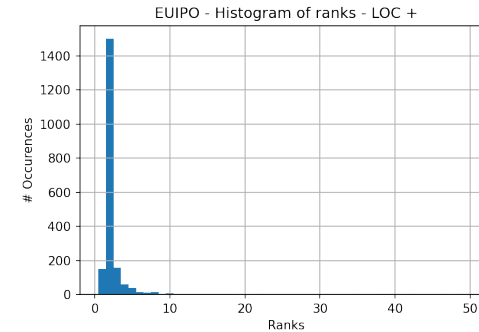
EUIPO - Histogram of ranks (Match Holder)



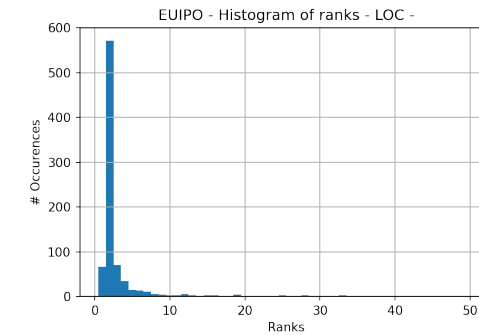
Key Findings

- Performances by LoC
 - BOIP: non conclusive (too few examples)
 - EUIPO: no significant differences related to LoC conclusion (Kolmogorov-Smirnov $p > 0,19$)

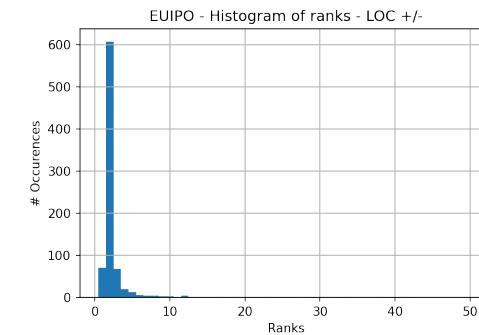
LoC+



LoC-



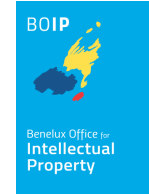
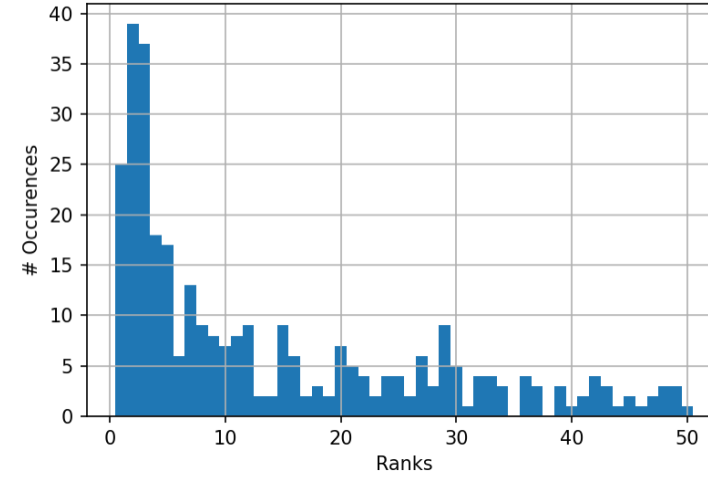
LoC+-



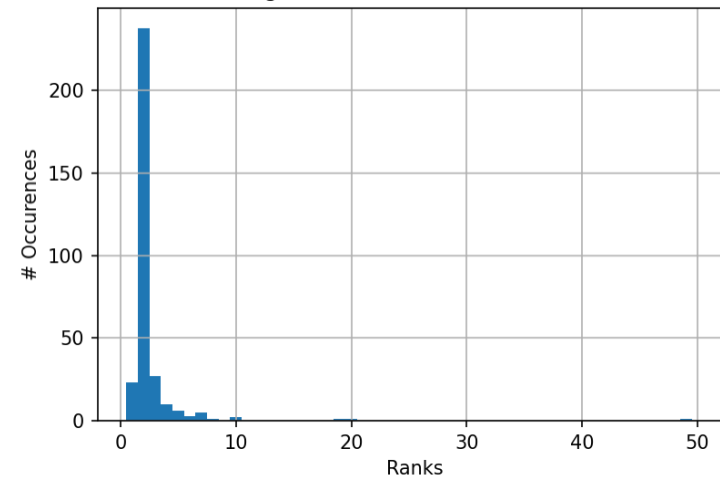
Key Findings

- Common matches performances
 - Common LoC : 318 samples
 - Histogram of ranks
 - Similar to overall

BOIP - Histogram of ranks - Intersection of datasets



EUIPO - Histogram of ranks - Intersection of datasets

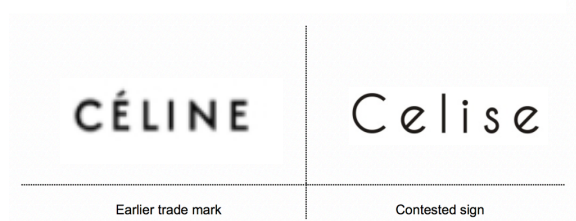
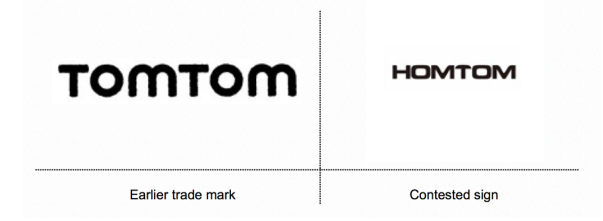
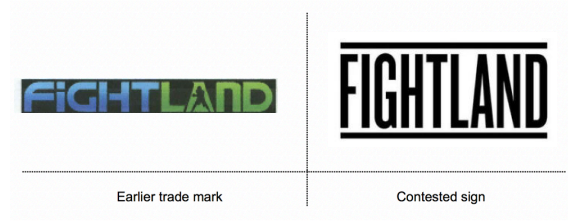
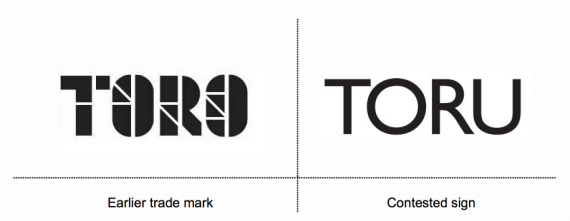


Key Findings

- EUIPO > BOIP
 - Both in match rate and ranking
 - Interval (73,4 % of matches at rank 2 !)
 - Too good to be true?
 - Metadata? No difference
 - Time? No difference
 - Inappropriate methodology? Could be (query set = training set)?
 - Future research: nat'l case law on LoC
 - Hidden feature? Needs further statistical and legal analysis

Key Findings

- BOIP > EUIPO?
 - 13 cases
 - Common feature (except one): text
 - Hypothesis: text removal techniques (cf. SOTA)



Conclusion

- Big Data analytics for technology regulation critical assessment
- Many limitations (data access, time consuming, tied to user interfaces)
- Indispensable interdisciplinary approach





To be continued...

Many thanks for your attention, comments and questions !

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