

Evolving ECAI Topics and Contributors: A Predictive Framework

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Abstract. This work analyzes how ECAI research topics and contributors have evolved from 1994 to 2024. Using data from DBLP and SemOpenAlex, we examine topic trends and authors’ geographical distribution, and propose a predictive framework based on a stacked LSTM model to forecast 2025 topics.

Keywords: Trend Analysis · Series Forecasting · Artificial Intelligence Research · Bibliometric Analysis · Research Topic Dynamics · Marginisation Identification

1 Background and Research Focus

The European Conference on Artificial Intelligence (ECAI), held biennially until 2022 and annually since 2023 [3], is a major venue for AI research in Europe. This study analyzes the evolution of research topics and contributors’ countries of origin from 1994 to 2024, and uses trend analysis to forecast emerging themes for the 2025 edition.

2 Methods

2.1 Data Extraction

Two public SPARQL endpoints—DBLP [1] and SemOpenAlex [2]—are queried to extract the relevant information. All available DOIs of ECAI papers in the years listed in Appendix 5.1 are collected from DBLP. The year refers to the *publication year* rather than the ECAI edition itself, which explains the presence of some DOIs in years when the conference was not held.

Topics Each DOI is then used to retrieve associated topics from SemOpenAlex. Topic frequencies are analyzed yearly to identify temporal trends, which are discussed in Section 3.1.

Contributors For each DOI, the country of each author’s affiliation is extracted to analyze the geographical distribution of ECAI contributors.

2.2 Predictive Framework

We propose a time-series forecasting framework for predicting ECAI 2025 topic frequencies using a stacked LSTM with a dense output. The model forecasts the next year’s topic counts from the previous three years.

3 Results

3.1 Trend Topics Analysis

In order to visualize the evolution of topics over the ECAI editions we opted for a Gantt chart Gantt chart. It is apparent from the

3.2 Contributor Nationality Analysis

In the available ECAI proceedings, the United States and United Kingdom led representation with 184 authors each, followed by Germany (171), France (125), The Netherlands (113), Italy (95), and China (89)—the China figure suggesting Chinese institutions favor publishing elsewhere. Meanwhile, 24 countries had only one author, including Egypt, Croatia, Iraq, South Africa, Palestine, and Jordan, highlighting a need to promote collaboration with marginalised countries and less-wealthy institutions.

3.3 Future Topics Prediction

The input data contained many zeros, limiting predictions to small frequencies. As a result, the most frequently predicted topics for ECAI 2025 are Genetic, Bioinformatics and Biomedical Research, and Cloud Computing and Resource Management (each predicted up to three times). The model’s tendency to predict small values also led to the incorrect expectation that “Information and Cyber Security” would not appear in ECAI 2025.

4 Future Work

The predictive model could be improved by moving away from a simple LSTM based model. In future work we could explore a model based on Kolmogorov-Arnold Networks (KANs) to better learn the underlying representation of ECAI proceedings and obtain more accurate predictions for future proceedings.

The Python scripts, data and visualizations are available at https://github.com/kevinfee98/ECAI_DC_EDI_Submission_1

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References

1. <https://sparql.dblp.org/>
2. <https://semopenalex.org/sparql>
3. <https://www.eurai.org/ecai/history>

5 Appendix

5.1 Appendix 1

Included publication years: 1994, 1995, 1997, 2001, 2007, 2008, 2009, 2010, 2011, 2012, 2014, 2016, 2017, 2020, 2022, 2023, and 2024.