Crime Data Analytics using AI and Complex Networks
University de São Paulo

Job Title	Crime Data Analytics using AI and Complex Networks
Department	Institute of Mathematics and Computer Science (ICMC)
	https://www.icmc.usp.br/
Institution	University de São Paulo
	São Carlos, , Brazil
Date Posted	Mar. 12, 2025
Application Deadline	Apr. 3, 2025
Position Start Date	May 1, 2025
Job Categories	Post-Doc
Academic Field(s)	Computer/Information Sciences
Apply By Email	

Job Description

The Brazilian Research Center of Applied Artificial Intelligence for Smart and Sustainable City, IARA, has one opening call for a post-doctoral researcher in machine learning, data mining, network analysis, and Natural Language Processing (NLP). IARA is recruiting a post-doctoral researcher in these areas to investigate crime data in Brazil using police inquiries. This project, funded by FAPESP, aims to explore various methodologies to establish connections between crimes occurring in different regions, applying concepts and advanced techniques of complex networks and NLP. Through the use of complex network techniques, we aim to address aspects related to security in smart cities, focusing on the following objectives: identifying crime patterns, automating case categorization, predicting future crimes, and detecting crime networks over time. Additionally, we intend to apply NLP methods to crime textual descriptions to identify similarities between cases, contributing to the construction of interconnected crime networks.

The position is located at the Institute of Mathematics and Computer Science (ICMC), University of São Paulo (USP), in the city of São Carlos, SP, Brazil. USP has been ranked as one of the 100 best universities in the world. São Carlos, with around 220,000 inhabitants, is situated in the central region

of São Paulo, Brazil. The city is 240 km from the state capital, the city of São Paulo, and 850 meters above sea level. Due to its mild climate, the city is known as the "Brazilian Capital of the Climate". With its growing number of high-technology startups and companies, São Carlos is also known as the "Brazilian Capital of Technology". São Carlos is the Latin American city with the highest ratio of PhDs per capita, 1 per 100 inhabitants. São Carlos has an intense research and education reputation, being the only city in Brazil of its size, with two of the best Brazilian universities, the University of São Paulo and Federal University of São Carlos (UFSCar), and two Embrapa Research Centers.

Besides a substantial background and a recent PhD in computer science, computer engineering, data science or statistics, the candidate should also have:

- Strong publication record in Natural Language Processing (NLP) and Network Science.
- Data Analysis: Knowledge of techniques such as data cleaning, preparation, exploration, and visualization. Experience with tools like pandas (Python) for data manipulation and the ability to interpret data through visualizations using Matplotlib, Seaborn, or Plotly. Proficiency in tools like Power BI or Tableau for creating interactive reports is also required.
- Natural Language Processing (NLP): Experience with sentiment analysis, text summarization, and text classification applications. Proficient in libraries such as SpaCy, NLTK, Hugging Face Transformers, or Gensim, with knowledge of techniques like word embeddings, BERT, and LDA for text topic identification.
- Machine Learning: Knowledge of classification, regression, and clustering techniques. Experience with models like Random Forest, XGBoost, and neural networks using frameworks such as PyTorch or TensorFlow.
- Complex Networks and Graph Analysis: Ability to build and analyze graphs with meaningful nodes and edges. Proficient in tools like Igraph, NetworkX, or Gephi for centrality analysis, community detection, and interactive network visualization.
- Key Tools and Technologies: Proficiency in programming languages such as Python, R, and SQL. Skilled in data visualization tools like Power BI, Tableau, Matplotlib, and Seaborn. Experience with machine learning using Scikit-learn and PyTorch. Expertise in NLP libraries such as SpaCy, NLTK, Hugging Face, and Gensim. Knowledge of graph analysis tools like Igraph, NetworkX, and Gephi. Familiarity with databases like PostgreSQL, MySQL, and CosmosDB.
- Strong teamwork capacity

Annual salary: approx. BRL 144,000.00 (tax free) + (research grant) + airplane tickets + (installation support).

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If you are interested in this position and believe that you qualify, please send a cover letter, a résumé with a list of publications, and the names, e-mail addresses, and phone numbers of at least three references to Prof. Alneu de Andrade Lopes: alneu@icmc.usp.br

Contact Information

Please reference Academickeys in your cover letter when applying for or inquiring about this job announcement.

Contact	Alneu De Andrade Lopes
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