

# Sergio A. Barbosa

MSC ARTIFICIAL INTELLIGENCE

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## Profile

I am deeply passionate about the world of intelligent systems. My research interest lies in the intersection of Artificial Intelligence (AI) and human understanding, aiming to create conversational agents capable of interacting with people in a human-like way. Throughout my professional and academic journey, I have dedicated myself to the fields of Deep Learning (DL), Machine Learning (ML), Natural Language Processing (NLP), and computer vision. With a professional background in computer science, I have advanced the development of conversational systems by harnessing the capabilities of AI and specialised language models.

## Education

### Pontificia Universidad Javeriana

Bogotá, Colombia

MENG IN COMPUTER SCIENCE AND SYSTEMS ENGINEERING

Feb. 2024 - Present

- Development thesis on the design and implementation of a modular software architecture for RAG systems in LLM-based virtual assistants with focus on exploring conversational memory factors.

### Pontificia Universidad Javeriana

Bogotá, Colombia

MSC IN ARTIFICIAL INTELLIGENCE

Jul. 2021 - Dec. 2022

- Degree with honours, Cum Laude. Recognition of Academic Excellence (GPA 4.6/5.0).

### The Naval School 'Almirante Padilla'

Cartagena, Colombia

B.S. IN ELECTRONIC ENGINEER

Jan. 2014 - Dec. 2018

- Scholarship for excellent academic results (GPA 9.11/10). Degree with honours.

## Work Experience

### Digital GHENOVA

Bogotá, Colombia

ENGINEER OF NLP

Jul. 2022 - Present

- Expertly developed innovative technological solutions based on language models for the creation of conversational agents for digital transformation, applied in areas such as healthcare and business. My skills include AI generative techniques, NLP, fine-tuning Large Language Models (LLMs), designing conversational agents, applying DL and ML techniques, quantisation models, dialog management, and speaker diarisation.

### (JEP) Special Jurisdiction for Peace Organisation

Bogotá, Colombia

ENGINEER OF NLP

Sep. 2023 - Dec. 2023

- Successfully adapted and deployed a Named Entity Recognition (NER) model pre-trained in the social context of victims and the armed conflict in Colombia, improving the accuracy and understanding of narratives surrounding this complex socio-political landscape. Skills include working with pre-trained NER models, Transformer Language Models (TLMs), integrated DL models, implementing ML models, and data science.

### (COTECMAR) Science and Technology Corporation

Cartagena, Colombia

ENGINEER & NAVAL OFFICER

Jan. 2016 - Dec. 2021

- Member of the Colombian Navy, contributing to the production team for the construction of Colombia's first Marine Scientific Research Vessel and other maritime patrol vessels. Naval Officer in service since 2011. Skills include leadership, problem-solving, resource optimisation, management, and process improvement.

## Publications

### Detection of Hate Speech, Racism and Misogyny in Digital Social Networks: Colombian Case Study

MDPI Journal

ACADEMIC PUBLICATION (IN REVIEW)

May. 2024 - PRESENT

- The main contribution of this work is the fine-tuning of a model using a proprietary dataset extracted from social networks, georeferenced in Colombia, and manually labelled with typical and dialect-specific features. Indeed, the experiment compares the performance of TLM models adjusted to the Colombian slang domain against a GPT, having a significant impact on achieving more accurate predictions in this task.

### Identifying depressive language on Twitter with Word Embeddings and LDA

MDPI Journal

ACADEMIC PUBLICATION (IN REVIEW)

Jun. 2024 - PRESENT

- This study explores how mood manifests in text publications on Twitter, aiming to identify patterns indicative of depressive, anxious, and potentially suicidal language. This work involves training models using Word Embeddings methodology and applying Latent Dirichlet Allocation (LDA) to group topics, comparing their performance with LLMs.

## Honours & Awards

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2023	<b>Cum Laude</b> , Degree with honours in Master's degree. <b>Meritorious thesis</b> , in computer vision achieved by implementing an AI model utilising Reinforcement Learning (RL) and Convolutional Neural Network (CNN) to label students' emotions during virtual classes, based on their facial features, gaze, and gestures.	Bogotá, Colombia
2022	<b>Academic Distinctions</b> , Recognitions of Academic Excellence (3x). <b>Medal "Francisco José de Caldas" category "to consecration"</b> , Awarded for having obtained the best grade-point average in the academic program of Electronic Engineering.	Bogotá, Colombia
2016	<b>Order of Naval Merit "Almirante Padilla" category "Officer"</b> , For military virtues, dedication to work, distinguished professional services, exemplary discipline.	Cartagena, Colombia
2018		Cartagena, Colombia

## Research Experience

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### 2024 CFP Tech Ethics Lab, University of Notre Dam

Bogotá, Colombia

TEAM MEMBER OF PROJECT

Jun 2024 — Present

- The goal of this project is to create a Question-Answering System for the Colombian Truth Commission, the first-ever digital archive of the peace process. I am part of the research team at Pontificia Universidad Javeriana (PUJ) and participate in the development of the project.

### Session class in Data Analytics Program at Pontificia Universidad Javeriana

Bogotá, Colombia

LECTURER

Oct. 2023

- Predictive analytical methods of Machine Learning: decision trees, regression, ensemble models.

### Center of Excellence in Big Data & Data Analytics

Bogotá, Colombia

DEVELOP TEAM OF PROJECT

Jul 2022 — Dec 2022

- Successfully development of research project about text classification in the social context. Course advanced topics of AI.

## Courses & Certificates

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2024	<b>Software Design and Architecture Specialisation</b> , University of Alberta.	Online
2024	<b>Introduction to Quantum Computing</b> , University College London (UCL).	Online
2023	<b>6.86x: Machine Learning with Python-From Linear Models to Deep Learning</b> , Massachusetts Institute of Technology (MIT).	Online
2022	<b>SQL for Data Science</b> , University of California, Davis.	Online
2022	<b>Microsoft Azure Databricks for Data Engineering</b> , Microsoft.	Online
2022	<b>Diploma certificate in Artificial Intelligence</b> , Sergio Arboleda University.	Online