# Andrés Enrique **Rosso-Mateus**

PhD · Computer Science (NLP / LLMs / Deep Learning)

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*"I am an internationally recognized Computer Scientist with a PhD and over 15 years of experience driving innovations in Machine Learning (ML), Natural Language Processing (NLP), and Deep Learning. As Chief Technology Officer (CTO) at KEO, I have pioneered Large Language Model (LLM) solutions and patented fintech technologies, facilitating transactions exceeding $289 million and shaping both academic research and commercial applications. Recognized for top placements in global biomedical AI competitions like BioASQ, I also serve on the Board of Directors at the Institute for Certification of Computing Professionals (ICCP), overseeing new LLM certification standards. My unique blend of academic rigor and executive leadership allows me to orchestrate advanced AI deployments that optimize business outcomes, all while contributing to the broader AI community through cutting-edge publications and industry partnerships. "*

## Executive Summary


Dr. Andrés E. Rosso-Mateus is an internationally acclaimed Computer Scientist with 15+ years of experience in Biomedical NLP, Large Language Models (LLMs), and Deep Learning. He has consistently achieved top placements (**1st and 2nd**) in global competitions such as *BioASQ*, underscoring his advanced expertise in biomedical information retrieval.

As the Chief Technology Officer (CTO) at **KEO**—the fintech sponsor of his O-1 application—Dr. Rosso-Mateus has pioneered patented credit risk assessment and settlement card systems, driving over **$289 million** in transactions in 2024 alone. In parallel, he serves on the Board of Directors at the *ICCP*, a globally recognized standards body for data professionals, shaping the future of AI certification and competency frameworks.

Widely published and recognized at premier conferences and journals, he continues to influence the global AI landscape through cutting-edge research, real-world deployments, and strategic leadership. His contributions, adopted by leading fintech organizations, exemplify a distinctive blend of academic rigor and commercial impact.


## Education

**Universidad Nacional de Colombia** — *Bogotá, Colombia*

PhD in Computer Science (Cum Laude) — *Jan. 2016 – Apr. 2021*

- **Advisor:** Fabio A. González O., PhD
- **Dissertation:** *A Deep Learning Question Answering Method Over Mixed Closed-Domain Information Sources*

**Universidad Javeriana** — *Bogotá, Colombia*

Master in Computer Science — *2013*

**Universidad Sergio Arboleda** — *Bogotá, Colombia*

Specialization in Applied Mathematics — *2015*

**Universidad Distrital Francisco José de Caldas** — *Bogotá, Colombia*

B.S. in Computer Science and Engineering — *2007*

## Key Achievements

### Major Awards & Honors

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|---|---|---|
| 2023 | **1st & 2nd Place, Document & Passage Retrieval**, BioASQ 11b (2023), a premier international biomedical NLP challenge (100+ participants) | *Thessaloniki, Greece* |
| 2019 | **1st & 2nd Place, Document & Passage Retrieval**, BioASQ 7b (2019), an international competition featuring top AI research labs | *Würzburg, Germany* |
| 2018 | **2nd Place, Snippet Retrieval**, BioASQ 6b (2018), recognized worldwide for biomedical QA benchmarking | *Brussels, Belgium* |
| 2023 – Present | **Board Director**, ICCP (Institute for Certification of Computing Professionals), global standards body | *United States* |
| 2021 | **Cum Laude Thesis Honor**, Universidad Nacional de Colombia | *Bogotá, Colombia* |
| 2024 | **Mención Especial (Outstanding Final Project)**, HL7 Colombia FHIR Camp (24-hour advanced training in HL7 FHIR standards) | *Bogotá, Colombia* |
| 2016 | **Excellence Scholarship (PhD)**, Colciencias, awarded to top research candidates | *Colombia* |

### Patents

**Settlement Card Having Locked-In Card Specific Merchant and Rule-Based Authorization for Each Transaction** — *US 18/508,280 (US Patent Publication No. 2024/0169355 A1, filed Nov 14, 2023)*

Co-Inventor

- Developed a locked-in settlement card system for KEO, increasing transaction security and enabling real-time merchant restrictions.
- Transforming fintech processes, cited as a major contribution to next-generation payment technologies.

**System and Method for Issuing a Loan to a Consumer Determined to be Creditworthy onto a Transaction Card** — *US 16/183,782 (2018)*

Co-Inventor

- Introduced a novel ML-driven risk assessment mechanism enabling real-time credit analysis.
- Adopted by MO Technologies and integrated into their flagship lending platform, improving financial inclusion.

## Leadership and Board Roles

**KEO** — *Miami, US (Remote from Colombia)*

Chief Technology Officer (CTO) — *Apr. 2021 – Present*

- Developed and patented the *Settlement Card* system (US 18/508,280), driving $289M in transaction volume in 2024 and reducing fraud via real-time merchant restrictions.
- Led AI integration into financial models, pushing default rates below 1% and establishing KEO as a fintech innovator in the US and LATAM markets.
- Managed cross-border teams, reflecting recognized leadership and technical expertise on an international scale.
- Implemented a PageRank-based graph model for lead discovery, boosting lead identification from 4% to 30% and accelerating pipeline growth.
- Spearheaded AI-driven lending processes, significantly enhancing efficiency and accuracy while fostering a high-performance culture.
- Developed a chatbot leveraging knowledge graphs for automated, personalized customer assistance, improving service accuracy.
- Oversaw forecasting models and big-data pipelines for financial risk indicators, enabling data-driven strategic decisions.

**ICCP (Institute for Certification of Computing Professionals)** — *Illinois, US (Remote from Colombia)*

Director of New Projects, ICCP Board of Directors (*Volunteer*) — *Mar. 2024 – Present*

- Designing a novel LLM (Large Language Model) certification, shaping global AI competency standards through the ICCP.
- Appointed to the board of a globally recognized standards body for data professionals, underscoring subject-matter expertise.
- Spearheading the New Projects Committee, aligning educational and exam standards to enhance the value of professional certifications.
- Guiding AI certification policies and best practices, leveraging deep industry and academic experience.
- Active in quarterly board/executive meetings, steering strategic decisions that influence the ICCP's worldwide impact.
- Leading the expansion of an AI certification roadmap, ensuring robust offerings that reflect cutting-edge trends in data science.
- Coaching and mentoring candidates, raising professional standards in the AI field.

### MO Technologies

*Delaware, US (Remote from Colombia)*

Chief Analytics Officer (CAO) *Aug. 2017 – Jun. 2020*

- Invented and patented an ML-based creditworthiness system (US 16/183,782), enabling real-time loan issuance without traditional identifiers.
- Reduced bad debt from 7% to 0.2% via advanced ML pipelines, demonstrating extraordinary technical acumen and leadership.
- Co-led a visionary AI-driven strategy with the CTO/CEO, establishing a roadmap that solidified MO's reputation as a leader in machine learning.
- Developed advanced credit scoring systems for the fintech sector, leveraging cutting-edge deep learning architectures.
- Formulated and implemented a data-driven, AI-centric product portfolio, driving sustainable growth and market expansion.
- Established strategic academic partnerships, amplifying the company's R&D capabilities and innovation ecosystem.

### Experian - DataCrédito

*Bogotá, Colombia*

Development Manager *Nov. 2009 – Sep. 2014*

- Led a team to create advanced fraud detection products, boosting security and user trust in consumer finance.
- Architected and launched the microfinance credit-scoring platform *midatacredito.com*, enhancing customer accessibility.
- Developed Experian's identity management system with automated user provisioning, raising operational efficiency.
- Championed the new decision engine *"Decisor+"*, expediting real-time decision-making processes.
- Integrated AI/ML into existing products, yielding a 15% improvement in predictive accuracy and cutting false positives in fraud detection.
- Adopted Agile methodologies, halving project delivery times and raising team productivity through rapid prototyping.

## Academic Experience

### Universidad Nacional de Colombia

*Bogotá, Colombia*

PhD Researcher, Biomedical Question Answering *Jan. 2016 – Aug. 2020*

- Conducted doctoral research on Machine Learning (ML) and Deep Learning (DL) approaches for biomedical QA, leading to top placements in the international *BioASQ* challenge.
- Integrated ontologies, terminology databases, and large textual corpora into advanced information retrieval pipelines.
- Implemented Natural Language Understanding (NLU) methods for large-scale corpus processing (millions of documents).
- Experimented with diverse semantic representations (graphs, embeddings) to improve the accuracy and efficiency of question answering tasks.
- Dissertation related to novel *Deep Learning Question Answering Methods* for specialized biomedical domains, culminating in a PhD (Cum Laude).

## Professional Experience

### YSEOP

*Bogotá, Colombia*

NLP & ML Technical Leader *Apr. 2020 – Mar. 2021*

- Developed NLP/ML methodologies for automated narrative generation within the YSEOP engine.
- Applied deep learning for NLU and NLG tasks, transforming structured data and time-series patterns into natural-language reports.
- Researched alternative knowledge representations (ontologies, knowledge graphs) to improve domain-specific text generation.

### Universidad Sergio Arboleda

*Bogotá, Colombia*

Professor, Master in AI *Jan. 2021 – Dec. 2021*

- Taught NLP and Deep Learning courses at the Master's level, covering advanced neural architectures.
- Instructed foundational linear algebra and probabilistic methods critical to modern machine learning.
- Introduced reinforcement learning techniques and practical labs for real-world application.

### United Nations

*Bogotá, Colombia*

NLP & Deep Learning Main Instructor *Oct. 2021 – Dec. 2021*

- Trained professional statisticians in applying deep learning and ML techniques to natural language processing projects.
- Developed comprehensive online materials (slides, notebooks, tests, projects) for a specialized NLP course.

### Universidad Antonio Nariño

*Bogotá, Colombia*

Part-time Professor *Aug. 2021 – Dec. 2021*

- Taught Machine Learning, Deep Learning, and Business Analytics.
- Guided students in statistical analysis and advanced ML toolkits for practical problem-solving.

**Instituto Geográfico Agustín Codazzi (IGAC)** — *Bogotá, Colombia*

External Consultant — *Jun. 2020 – Dec. 2021*

- Defined AI methodologies for analyzing large geospatial datasets in national mapping and research projects.
- Evaluated emerging technologies (big data processing, data analytics) for integration with geospatial data systems.
- Shaped lines of research and future trends in AI/data analytics for geospatial innovation.

**BD Guidance** — *Bogotá, Colombia*

Main Instructor, Introduction to Machine Learning — *May 2017 – Aug. 2017*

- Crafted and delivered the course curriculum, including presentations, notebooks, and project-based evaluations.
- Focused on core ML concepts, data preprocessing, and supervised/unsupervised methods.

**Easy Solutions** — *Bogotá, Colombia*

Product Architect — *Sep. 2015 – Apr. 2016*

- Built a bank fraud detection system leveraging circular statistics and ML, improving anomaly detection.
- Optimized the core banking fraud platform with MapReduce, cutting detection latencies.
- Led engineering teams to meet financial compliance and client demands.

**VOTUM SAS** — *Bogotá, Colombia*

Co-Founder / CEO — *Apr. 2014 – Sep. 2015*

- Designed and implemented a project management solution used by the governmental entity *Gobernación de Cundinamarca*.
- Oversaw sales, technology, and staffing in a startup environment, growing the platform's adoption.

**Netinfo PLC** — *Nicosia, Cyprus*

Technical Leader — *Jan. 2009 – Nov. 2009*

- Developed secure internet banking solutions for Banco Falabella (Cyprus, Chile, Peru).
- Focused on scalable architectures and cross-border compliance for online financial services.

**OEI (Organización de Estados Iberoamericanos) - SENA** — *Bogotá, Colombia*

Java Developer — *May 2008 – Dec. 2008*

- Created an online training software platform, benefiting national workforce development at SENA.

**Assist Consultores de Sistemas** — *Bogotá, Colombia*

Technical Leader — *Jan. 2005 – Apr. 2008*

- Architected and implemented Claro BPM to enhance telecommunications workflows.
- Led internet banking implementations for Bank Cuscatlán and Bank Agrícola (El Salvador).

## Writing

**Deep Metric Learning for Effective Passage Retrieval in the BioASQ Challenge** — *Rosso-Mateus, A., Munoz-Serna, L. A., Montes-y-Gomez, M., and Gonzalez, F. A. CLEF Working Notes: 168–177*

Author — *2023*

- **Focus:** Proposes a deep metric learning approach to gauge semantic similarity for biomedical text, aiming to improve retrieval in the BioASQ challenge.
- **Methods & Results:** Employs pairwise distance learning and advanced neural architectures, outperforming IR baselines and demonstrating high precision in BioASQ retrieval tasks.
- **Impact:** Recognized by the CLEF community (Conference and Labs of the Evaluation Forum) for pushing the frontier in biomedical QA benchmarks.

**Metodologia para obtencion y analisis de datos inmobiliarios usando fuentes alternativas (Methodology for the Collection and Analysis of Real Estate Data Using Alternative Sources)**

*A. Rosso-Mateus, Y. M. Montilla-Montilla, and S. C. Garzon-Martinez. Revista Ingenieria, vol. 27(3), e19252*

Author *2022*

- **Focus:** Outlines a methodology for scraping, cleaning, and merging real estate data from public websites in Colombian mid-sized cities.
- **Methods & Results:** Utilizes ML models (Ridge Regression, Random Forest) to predict property values, bridging gaps in official cadastral data and improving accuracy for municipal evaluations.
- **Impact:** Offers a scalable approach for emerging markets seeking reliable real estate valuation, cited by local urban development projects.

**Graph-based Similarity for Document Retrieval in the Biomedical Domain**

*Zuluaga Cajiao, A. and Rosso-Mateus, A. 7th Intl. Conf. on Machine Learning Technologies*

Author *2022*

- **Focus:** Explores a graph-based approach to model term relationships in biomedical texts.
- **Methods & Results:** Improves retrieval metrics for domain-specific queries by leveraging conceptual nodes and edges, yielding higher precision for complex biomedical terms.
- **Impact:** Validated at an international ML conference, signaling practical improvements for specialized healthcare information systems.

**A Deep Metric Learning Method for Biomedical Passage Retrieval**

*A. Rosso-Mateus, F. A. Gonzalez, and M. Montes-y-Gomez. Proceedings of COLING 2020*

Author *2020*

- **Focus:** Proposes a neural metric-learning framework to compare biomedical passages at a semantic level.
- **Methods & Results:** Demonstrates higher retrieval precision for biomedical QA datasets compared to classical IR baselines.
- **Impact:** Accepted at COLING, a premier computational linguistics conference with a highly competitive acceptance rate, enhancing visibility of the approach.

**Deep Fusion of Multiple Term-Similarity Measures for Biomedical Passage Retrieval**

*A. Rosso-Mateus, F. A. Gonzalez, and M. Montes-y-Gomez. Journal of Intelligent and Fuzzy Systems*

Author *2020*

- **Focus:** Introduces a fusion technique combining multiple text-similarity metrics to retrieve relevant biomedical passages.
- **Methods & Results:** Achieves robust retrieval performance by integrating fuzzy logic, lexical, and semantic scoring into a unified architecture.
- **Impact:** Provides a generalized blueprint for combining heterogeneous similarity measures in biomedical search, cited by subsequent AI and health informatics studies.

**A Mixed Information Source Approach for Biomedical Question Answering: MindLab at BioASQ 7B**

*A. Rosso-Mateus, F. A. Gonzalez, and M. Montes-y-Gomez. Proceedings of the 7th BioASQ Workshop*

Author *2019*

- **Focus:** Describes a hybrid retrieval and QA system leveraging textual corpora, knowledge bases, and ontologies.
- **Methods & Results:** Earned top placements in BioASQ 7B, underscoring improved accuracy in biomedical passage retrieval and QA.
- **Impact:** Demonstrated a strong combination of symbolic and neural methods, influencing subsequent teams in BioASQ competitions.

**MindLab Neural Network Approach at BioASQ 6B**

*A. Rosso-Mateus, F. A. Gonzalez, and M. Montes-y-Gomez. 6th BioASQ Workshop (ACL), pp. 40–46*

Author *2018*

- **Focus:** Presents an end-to-end neural system for snippet retrieval and ranking in biomedical QA.
- **Methods & Results:** Achieved competitive results in the BioASQ 6B challenge, highlighting the value of neural embeddings.
- **Impact:** Pioneered an integrated embedding approach later adapted by multiple participants in subsequent BioASQ iterations.

**Two-Step Neural Network Approach to Passage Retrieval for Open Domain Question Answering**

*A. Rosso-Mateus, F. A. Gonzalez, and M. Montes-y-Gomez. Iberoamerican Congress on Pattern Recognition (CIARP), pp. 566–574*

Author *2017*

- **Focus:** Introduces a two-stage neural pipeline—broad recall followed by focused re-ranking—for improved QA accuracy.
- **Methods & Results:** Demonstrates increased recall and precise passage selection vs. single-stage approaches.
- **Impact:** Published at CIARP (a key Latin American pattern recognition conference), drawing attention to deep QA methods in Spanish-speaking AI communities.

**A Shallow Convolutional Neural Network Architecture for Open Domain Question Answering**

*A. Rosso-Mateus, F. A. Gonzalez, and M. Montes-y-Gomez. Colombian Conf. on Computing (Springer), pp. 485–494*

Author *2017*

- **Focus:** Explores a lightweight CNN for QA tasks, balancing efficiency and effectiveness.
- **Methods & Results:** Achieves strong results on open-domain benchmarks, showcasing shallow architecture potential.
- **Impact:** Demonstrated that less-complex CNN models can rival deeper architectures, influencing subsequent open-domain QA research in Latin America.

**Sistema de Control Inteligente para un Grupo de Elevadores (Parametric Building Elevator Group Simulator)**

*A. Rosso-Mateus, and J. J. Soriano. Ciencia e Ingenieria Neogranadina, vol. 18(2)*

Author *2008*

- **Focus:** Investigates an intelligent control system to optimize multi-elevator dispatching in high-rise buildings.
- **Methods & Results:** Employs heuristic and AI-driven algorithms to reduce wait times and energy consumption.
- **Impact:** Represented an early venture into adaptive systems, laying groundwork for subsequent R&D in smart building management.

## Key Skills & Competencies

### Languages

- **Spanish**: Native proficiency
- **English**: Advanced (professional fluency, technical communication)
- **French**: Basic conversational

### Core Expertise

- **Large Language Models & NLP**: Comprehensive hands-on experience with transformer architectures (BERT, GPT, T5) for text classification, question answering, and generative tasks. Achieved top global rankings in BioASQ via pioneering metric-learning methods.
- **AI-Driven Fraud Assessment & Risk Prediction**: Co-inventor of patented systems for real-time transaction authorization, credit risk evaluation, and fraud detection, contributing to secure fintech platforms with quantifiable operational impact.
- **Financial Data Science**: Specialized in credit scoring and lending analytics, integrating ML pipelines at scale to reduce default rates and improve decision-making for structured/unstructured datasets.
- **Patent-Backed Fintech Innovations**: Architected a locked-in settlement card (US 18/508,280) and ML-based loan-issuance framework (US 16/183,782), adopted internationally by fintech companies.
- **Healthcare Data Interoperability (HL7)**: Familiar with HL7 FHIR standards, enhancing biomedical data exchange and AI-driven healthcare solutions.
- **Enterprise Architecture & Leadership**: Led cross-functional teams (engineering, data science, product) to deploy microservices, knowledge-graph pipelines, and cloud-based AI for global clients.

### Technical Skills

- **Technologies**: LLMs (transformer-based), NLG (Generative AI), Computer Vision (CNNs), Real-time Fraud Detection, Transfer/Metric Learning, Graph-Based Data Modeling.
- **Tools & Frameworks**: TensorFlow, PyTorch, Hugging Face Transformers, Spark (distributed computing), ElasticSearch (AI-driven search), Docker/Kubernetes (scalable deployment), AWS/GCP (cloud integration).
- **Programming Languages**: Python, Java, R, C/C++, JavaScript (Node.js, Angular), PHP.