Hakan Emekci

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RESEARCH INTERESTS

Large language models and their reliability in high-cost decision settings: retrieval-augmented generation, reranking and retrieval evaluation; LLM security, including prompt-injection and jailbreak defence through dual-model architectures; domain-specific language models for medicine; and artificial intelligence in education. A second line applies computational methods to economics, through natural language processing of central bank communication, stylometry and monetary policy analysis. Further work covers computer vision and speech recognition.

ACADEMIC APPOINTMENTS

2026– **Associate Professor**, Hacettepe University
Department of Artificial Intelligence, Institute of Informatics

2022–2026 **Assistant Professor**, TED University
Graduate School — Applied Data Science

EDUCATION

2013–2017 **PhD in Economics**, Hacettepe University
Institute of Social Sciences. Thesis: *Computational Analysis of CBRT's Policy Statements and Quantifying the Effects on Financial Markets*. Advisor: Prof. Dr. İbrahim Özkan.

2019–2020 **Master's in Finance**, London Business School
London, United Kingdom

2005–2011 **BSc in Computer Engineering**, Middle East Technical University
Faculty of Engineering, Ankara

2009–2010 **Exchange Student in Informatics**, Saarland University
and Max Planck Institute for Informatics, Saarbrücken, Germany

PROFESSIONAL EXPERIENCE

2023– **Founder and Director**, NavigaAI Inc.
Bilkent Cyberpark, Ankara. Registered as NavigaAI A.Ş. Design, development and commercialisation of LLM-based software: scalable architectures for natural language processing, machine learning and data-driven decision support, with R&D in educational technology and intelligent assistants. Products: Robomentor, DataMentor.

2022– **AI Expert**, UNDP SDG AI Lab
AI-based data analysis, decision support systems and digital solutions aligned with the UN Sustainable Development Goals; analyses supporting policy development.

2021–2023 **Senior Research Fellow**, Oxford Centre for Technology and Development
Interdisciplinary research on AI, data science and digital transformation applied to socio-economic development, policy analysis and technology impact assessment.

2011–2022 **Economist**, Macro-Economic Modelling Department, Undersecretariat of Treasury
Directorate General of Research. Macroeconomic modelling, forecasting, data mining and information systems development; integration of AI-based methods into decision support processes.

PUBLICATIONS

ARTICLES IN SCI-E, SSCI AND AHCI INDEXED JOURNALS

1. SCI-E · AHCI Şakar, T., & **Emekci, H.** (2025). Maximizing RAG efficiency: A comparative analysis of RAG methods. *Natural Language Processing* (Cambridge University Press), 31(1), 1–25. doi:10.1017/nlp.2024.53
2. SCI-E Budakoğlu, G., & **Emekci, H.** (2025). Unveiling the power of large language models: A comparative study of retrieval-augmented generation, fine-tuning, and their synergistic fusion for enhanced performance. *IEEE Access*, 13, 30936–30951. doi:10.1109/ACCESS.2025.3542334
3. SCI-E **Emekci, H.**, & Budakoğlu, G. (2025). Securing with dual-LLM architecture: ChatTEDU an open-access chatbot's defense. *IEEE Access*, 13, 183156–183170. doi:10.1109/ACCESS.2025.3623268
4. SCI-E · SSCI **Emekci, H.**, & Özkan, İ. (2025). Stylometric analysis of sustainable central bank communications: Revealing authorial signatures in monetary policy statements. *Sustainability*, 17(20), 8979, 1–15. doi:10.3390/su17208979
5. SSCI Başçı, E., **Emekci, H.**, & Apaydın, M. O. (2025). Is there a threshold effect of money growth on inflation? *Applied Economics Letters*, 1–5. doi:10.1080/13504851.2025.2596815

ARTICLES IN OTHER REFEREED JOURNALS

1. Roxas, D. Q., & **Emekci, H.** (2026). Comparative analysis of medical-domain and general-purpose large language models: Evaluating specialization in healthcare applications. *Journal of Polytechnic*, 29(1), 1–7. doi:10.2339/politeknik.1719005
2. **Emekci, H.**, & Roxas, D. Q. (2026). Dissecting medical RAG: Why reranking matters more than complexity in question answering. *Black Sea Journal of Engineering and Science*, 9(2), 549–561. doi:10.34248/bsengineering.1849342
3. **Emekci, H.** (2026). Can large language models act as "co-auditors"? *Denetişim*, (34), 174–184. doi:10.58348/denetisim.1782835
4. **Emekci, H.** (2025). Central bank communication as a social practice in crisis: AI-driven insights into language, trust, and collective behavior in Türkiye. *OPUS Journal of Society Research*, 162–175. doi:10.26466/opusjsr.1774545

CONFERENCE PAPERS

1. Metin, A., & **Emekci, H.** (2026). Cross-model knowledge distillation: Enhancing Whisper Small via teacher-generated pseudo labels. *34th Signal Processing and Communications Applications Conference (SIU)*.
2. Başaran, B., & **Emekci, H.** (2025). Classification of flying objects with a computer vision and deep learning integrated system. *10th International Conference on Computer Science and Engineering (UBMK)*, 969–974. doi:10.1109/UBMK67458.2025.11206844
3. Akkuş, Ş. G., & **Emekci, H.** (2025). Ranking matters: A comparative study of BM25, BERT-E5, and hybrid (BM25 + BERT-E5) retrieval systems on the SQuAD 2.0 dataset. *International Conference on Artificial Intelligence, Computer, Data Sciences and Applications (ACDSA)*, 1–6. doi:10.1109/ACDSA65407.2025.11166004
4. **Emekci, H.** (2025). AI-driven personalized learning: Leveraging large language models for transformative tutoring solutions. *6th International Conference on Artificial Intelligence in Education Technology (AIET)*, 247–258. Lecture Notes on Data Engineering and Communications Technologies, Springer. doi:10.1007/978-981-95-4423-3_16
5. **Emekci, H.** (2024). Artificial intelligence in education: A comprehensive review of opportunities, challenges, and implications in the digital era. *5th International Conference on Distance Learning and Innovative Educational Technologies (DILET)*, 13–20.

BOOKS AND BOOK CHAPTERS

1. **Emekci, H.** (2025). Are LLMs and RAG trustworthy enough for your business? A deep dive into AI's reliability. In P. F. Katina, J. Richards & J. Zhao (Eds.), *Humans and Generative AI Tools for Collaborative Intelligence* (pp. 87–106). IGI Global. ISBN 979-8-3693-8332-2. doi:10.4018/979-8-3693-8332-2.ch004

2. Atan, S., & **Emekci, H.** (2021). *R ile Veri Analizi* (2nd ed., 167 pp.). Seçkin Yayıncılık. ISBN 978-975-02-5010-1.

FUNDED PROJECTS

2026– **AI-Assisted Tax Ruling Response System** — TÜBİTAK 1007
Researcher. Principal investigator: Kasım Murat Karakaya. In progress.

2025– **DataMentor: LLM-Based Intelligent Code Generation and Data Analytics Platform with AI Agents** — TÜBİTAK
Principal investigator. In progress.

2024 **Robomentor** — TÜBİTAK 1512 (BiGG)
Principal investigator. A generative AI tutoring system integrated into Machine Learning and Data Analytics courses at TED University.

2019–2023 **IMF Decides, Machine Learns: An AI Approach to IOs** — TÜBİTAK 2232
Researcher. Principal investigator: Merih Angin, Koç University. Machine learning models of IMF programme design and NLP analysis of Executive Board minutes.

SYSTEMS DEVELOPED

- **ChatTEDU** (2024) — AI-based advisory platform for prospective and current students at TED University; served over 5,000 users during the admissions period. Basis of the dual-LLM defence architecture published in *IEEE Access* (2025), and cited by TED University in its 23rd-place WURI 2025 ranking.
- **Robomentor** — generative AI tutoring system for university courses.
- **DataMentor** — agent-based platform for code generation and data analytics.

SUPERVISED THESES

1. Kılas, F. *Efficient intelligence with neuroplasticity: Hardware-aware structural and functional plasticity.* Hacettepe University, Institute of Informatics, Artificial Intelligence. In progress.
2. Koyuncu, S. (2026). *SelAI: Agent-orchestrated multilingual large language model pipeline for software engineering — code generation, unit testing, and vulnerability detection.* TED University, Applied Data Science.
3. Roxas, D. Q. (2026). *Graph-augmented retrieval for biomedical question answering: When do knowledge graphs help?* TED University, Applied Data Science.
4. Süerkan, M. M. (2026). *AI agents for Kubernetes incident remediation: Evaluating the Reflexion framework.* TED University, Computer Engineering.
5. Hoşver, S. (2026). *Resolving the accuracy–interpretability trade-off in small and imbalanced datasets: An explainable black box approach.* TED University, Computer Engineering.
6. Korkut, E. (2026). *A data-driven comparative analysis of national artificial intelligence strategies: Identifying Türkiye's strategic position.* TED University, Applied Data Science.
7. Halim Kırlı, D. (2026). *Machine learning-based prediction of export participation from firm-level financial data.* TED University, Economics and Finance.
8. Yıldırım, T. (2025). *Comparison and evaluation of large language models in mathematics education.* TED University, Applied Data Science.
9. Budakoğlu, G. (2024). *Optimizing large language models: A comparative study of retrieval-augmented generation, fine-tuning, and hybrid approaches.* TED University, Applied Data Science.

TEACHING

HACETTEPE UNIVERSITY — ARTIFICIAL INTELLIGENCE MSC PROGRAMME

AIE 683	Machine Learning	MSc
AIE 640	Artificial Intelligence Applications	MSc

AIE 635	Reinforcement Learning	MSc
AIE 639	AI Product Lifecycle and Process Management	MSc

TED UNIVERSITY

ADS 525	Generative AI Engineering with LLMs	MSc
ADS 531	Information Retrieval	MSc
ADS 542	Statistical Learning	MSc
ADS 577	Data Analytics	MSc
ADS 511	Statistical Inference Methods with Applications	MSc
ADA 442	Statistical Learning	BSc
CMPE 223/242	Data Structures and Algorithms I	BSc

AWARDS AND RECOGNITION

2025 **World University Rankings for Innovation (WURI)** — 23rd worldwide
Student Support and Engagement category, out of 1,350 universities. TED University credited the project *A Revolutionary Chatbot for Enhancing University Engagement* as a contributor to the result.

2024 **Seal of Excellence**, TÜBİTAK

2024 **TEKNOFEST Finalist**

2024 **TechAnkara Project Market Finalist**
Ministry of Industry and Technology

PROFESSIONAL SERVICE

- Jury member, UNDP Innovation Campus — AI Applications and United Nations Applications. Istanbul, 2024.
- Assessor, deep learning assessment report for UNDP *Digital Solutions for the SDGs* (DS4SDGs). Istanbul, 2025.

EXECUTIVE AND PROFESSIONAL TRAINING DELIVERED

- Artificial Intelligence Applications, E-Commerce Specialisation Programme, Union of Chambers and Commodity Exchanges of Türkiye (TOBB). Online, 2025–2026.
- Digital Transformation and New Technologies, Organised Industrial Zones Supreme Organisation (OSBÜK). Online, July 2024.
- Applicability of Artificial Intelligence for Businesses, Afyonkarahisar Chamber of Commerce and Industry. October 2024.

MEMBERSHIPS

- Institute of Electrical and Electronics Engineers (IEEE), Member, since 2024.

LANGUAGES

- Turkish (native) · English (C1, Advanced)