

Ricardo Rei

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in ricardo-rei 🎓 Scholar - Ricardo Rei

I am a Senior Research Scientist at Unbabel, working on multilingual Large Language Models. I hold a Ph.D. from Instituto Superior Técnico, in collaboration with Carnegie Mellon University. Over the past few years, I have led research on **model evaluation** and, more recently, on **LLM post-training**.

Education

Doctoral Studies (PhD) in Artificial Intelligence

Lisbon

Instituto Superior Técnico & Carnegie Mellon University

Sept 2020 – April 2024

During my Ph.D., I focused on machine translation (MT) evaluation and developed COMET, which has become the de facto standard metric for MT evaluation and has inspired a wide range of follow-up work on model-based evaluation. In addition, I contributed to research in related areas such as NLP efficiency, interpretability, and decoding.

- **Thesis title:** [Robust, Interpretable and Efficient MT Evaluation with Fine-tuned Metrics](#) [🔗](#)
- **Advisors:** [Luisa Coheur \(IST\)](#) and [Alon Lavie \(CMU\)](#)
- Graduated with the distinction of *Summa cum laude*

Master of Science in Information Systems and Computer Engineering

Lisbon

Instituto Superior Técnico

2017 – 2019

- Conducted M.Sc. thesis on dialog systems, comparing generative and retrieval-based approaches.
- Specialized in Artificial Intelligence.
- Graduated with distinction (18/20).

Graduation in Computer Science and Engineering

Lisbon

Instituto Superior Técnico

2013 – 2017

Graduated with Merit, with top marks in core algorithm and programming courses.

Experience

Senior Research Scientist

Lisbon and London

Unbabel

2018 – Present

- Principal researcher and developer of [Tower LLM](#), a suite of multilingual large language models optimized for translation-related tasks. Our latest model, with up to 70B parameters, achieved state-of-the-art results on the WMT Translation Shared Task across multiple language pairs. I am currently working on a new version of Tower that uses advanced post-training techniques to better balance general chat capabilities with specialized translation performance, while also extending the model from text-only to a vision-language model (VLM).
- Principal researcher and developer of the [COMET](#) framework and its derivative models. Since its initial release, COMET models have become go-to metrics for MT evaluation and quality estimation, with significant impact in both academia and industry.
- Core developer on the [EuroLLM](#) project. I worked on pretraining by designing and applying quality filtering techniques, contributed to the annealing phase, and led all aspects of post-training for two EuroLLM models (1.7B and 9B parameters). These models were trained from scratch on 4 trillion tokens across 30+ languages and are competitive with Mistral and Meta models of similar size for European languages.
- Senior advisor on the development of [EuroBERT](#), a family of multilingual encoders with up to 2B parameters, trained on 4 trillion tokens. EuroBERT incorporates several recent innovations from decoder-only models, bringing those advancements into the encoder-based paradigm.

Teaching Assistant

Instituto Superior Técnico

Lisbon, Portugal

Sep 2021 – Feb 2023

- Teaching Assistant for the MSc course in Natural Language Processing and the BSc course in Logic Programming at Instituto Superior Técnico since 2021.
- Received the “[Outstanding Teacher](#)” award from the Computer Science Department (DEI) at IST in both 2021/2022 and 2022/2023 academic years.

Visiting Student

Carnegie Mellon University

Pittsburgh, United States

May 2022 – Sep 2022

As part of my PhD program, I was a visiting student at CMU’s Language Technologies Institute (LTI), where I worked alongside my co-advisor, Alon Lavie.

Invited Lecturer

NOVA IMS Information Management School

Lisbon, Portugal

Jan 2019 – Dec 2021

Invited teacher at NOVA IMS for two prominent programs: Data Science and Advanced Analytics MSc: Professor of **Text Mining**, Information Management MSc: Professor of **Text Analytics**

Students and Mentorship

Currently, I am **co-advising 2 PhD students**:

- **José Pombal**: Working on LLM evaluation and post-training. He is one of the main authors of [Tower LLM](#).
- **Helena Wu**: Developing Culturally-Informed AI Agent and Personae.

Co-advised M.Sc. thesis from Instituto Superior Técnico (Finished):

- [NLP-Telescope: Extending MT-Telescope for Natural Language Processing Models \(2023\)](#) – Rita Oliveira
- [Energy-Efficiency in Natural Language Processing \(2023\)](#) – Pedro Ramos
- [Robust Machine Translation Evaluation Focusing on Critical Errors \(2022\)](#) – Duarte Alves
- [Sentiment-Aware Conversational Agent \(2021\)](#) – Isabel Dias

Co-advised M.Sc. thesis from NOVA IMS (Finished):

- [Multi-language Email Classification Using Transfer learning \(2022\)](#) - Mário Sousa
- [Document Clustering as an approach to template extraction \(2022\)](#) - André Rodrigues
- [Multilingual Email Zoning: Segmenting Multilingual Email Text Into Zones \(2021\)](#) - Bruno Jardim
- [Classification problem in real estate corpora: Furniture detection in real estate listings \(2021\)](#) - Alexandra Ordina

Selected Publications

For a complete list, please visit my [Google Scholar profile](#).

* = (co-)first author

[Zero-shot Benchmarking: A Framework for Flexible and Scalable Automatic Evaluation of Language Models \(2025\)](#). J. Pombal, N.M. Guerreiro, **R. Rei**, A.F.T. Martins. [ArXiv](#).

[EuroBERT: Scaling Multilingual Encoders for European Languages \(2025\)](#). N. Boizard*, H. Gisserot-Boukhlef*, D.M. Alves*, A. Martins, A. Hammal, C. Corro, C. Hudelot, E. Malherbe, E. Malaboeuf, F. Jourdan, G. Hautreux, J. Alves, K. El-Haddad, M. Faysse, M. Peyrard, N.M. Guerreiro, P. Fernandes, **R. Rei**, P. Colombo. [ArXiv](#).

[EuroLLM: Multilingual language models for europe \(2025\)](#). P.H. Martins*, P. Fernandes*, J. Alves*, N.M. Guerreiro*, **R. Rei***, D.M. Alves, J. Pombal, A. Farajian, M. Faysse, M. Klimaszewski, P. Colombo, B. Haddow, J.G.C. de Souza, A. Birch, A.F.T. Martins. [ArXiv](#).

[Tower v2: Unbabel-IST 2024 Submission for the General MT Shared Task \(2024\)](#). **R. Rei***, J. Pombal*, N.M. Guerreiro*, J. Alves, P.H. Martins, P. Fernandes, H. Wu, T. Vaz, D. Alves, A. Farajian, S. Agrawal, A. Farinhas, J.G.C. De Souza, A.F.T. Martins. **WMT 24**. 🏆 Winners of the WMT24 General Translation Shared Task

[Tower: An Open Multilingual Large Language Model for Translation-Related Tasks \(2024\)](#). D. Alves*, J. Pombal*, N.M. Guerreiro*, P.H. Martins, J. Alves, A. Farajian, B. Peters, **R. Rei**, P. Fernandes, S. Agrawal, P. Colombo, J.G.C. Sousa, A.F.T. Martins. **COLM**. Spotlight Paper.

QUEST: Quality-Aware Metropolis-Hastings Sampling for Machine Translation (2024). G.R.A Faria, S. Agrawal, A. Farinhas, **R. Rei**, J.G.C de Souza, A.F.T Martins **NeurIPS 2024**.

xCOMET: Transparent Machine Translation Evaluation through Fine-grained Error Detection (2024). N.M. Guerreiro*, **R. Rei***, D. Stigt, L. Coheur, P. Colombo, A.F.T Martins **TACL**. 🏆 Winners of the WMT23 and WMT24 Metrics Shared Task

Scaling up CometKiwi: Unbabel-IST 2023 Submission for the Quality Estimation Shared Task (2023). **R. Rei***, N.M. Guerreiro*, J. Pombal, D. van Stigt, M. Treviso, L. Coheur. J.G.C Souza, A.F.T Martins. **WMT 23**. 🏆 Winners of the WMT23 QE Shared Task

CometKiwi: IST-Unbabel 2022 Submission for the Quality Estimation Shared Task (2022). **R. Rei***, M. Treviso*, N.M. Guerreiro*, C. Zerva*, A. Farinha, C. Maroti, J. Souza, T. Glushkova, D. Alves, A. Lavie, L. Coheur, A.F.T. Martins **WMT 22**. 🏆 Winners of the WMT22 QE Shared Task

COMET: A Neural Framework for MT Evaluation (2022). **R. Rei**, C. Stewart, A.C. Farinha, A Lavie **EMNLP 2020**.

Selected Talks

Keynote at WMT 24: “What Makes MT Research Special in the LLM Age?” URL: <https://www2.statmt.org/wmt24/program.html>

Keynote at Sword AI Summit 24: “Tower LLM: An Open Multilingual LLM for Translation” URL: <https://aisummit.swordhealth.com/>

Keynote at First International Workshop on Knowledge-Enhanced Machine Translation “TowerLLM: Improving Translation Quality through Prompting with Terminology and Translation Guidelines” URL: <https://kemt2024.wixsite.com/home>

Keynote at MT Marathon 2024 “Large Language Models for Translation” URL: <https://ufal.mff.cuni.cz/mtm24/programme.html>

Keynote at MT Marathon 2022 “Machine Translation Quality Estimation” URL: <https://ufal.mff.cuni.cz/mtm22/programme.html>

Awards

🏆 Best 2024 European Ph.D. Thesis in Machine Translation: 2024 Anthony C Clarke Award

🏆 PhD student of the year 2023 INESC-ID Award

🏆 Best paper award: European Association for Machine Translation (EAMT 2022)

Skills

Languages: Portuguese (native), English (fluent, fully proficient)