

# Emirhan Koç

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## Research Interests

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- Image Processing
- Natural Language Processing
- AI for Science
- Graph Representation Learning
- Statistical Signal Processing
- AI in Computational Biology

## Education

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<b>Bilkent University</b> <i>Doctor of Philosophy in Electrical and Electronics Engineering</i> <b>Supervisor:</b> Asst. Prof. Aykut Koç	Sep. 2024 - Present Ankara, Turkey
<b>Bilkent University</b> <i>Master of Science in Electrical and Electronics Engineering</i> <b>Supervisor:</b> Asst. Prof. Aykut Koç <b>GPA:</b> 3.54/4.00 <b>Thesis Title:</b> Deep Fractional Fourier Networks	Sep. 2021 - Aug 2024 Ankara, Turkey
<b>Sabancı University</b> <i>Bachelor of Science in Electronics Engineering</i> <b>GPA:</b> 3.88/4.00	Sep. 2016 - June 2021 İstanbul, Turkey

## Honors & Awards

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- Graduate Research Conference 2025:** Best Poster Award in Bilkent University's annual conference for graduate students
- Scientist Supporting Program Scholarship:** Scientific and Technological Research Council of Turkey, Merit-based monthly stipend during M.Sc and Ph.D.
- Turkcell & Information and Communication Technologies Authority:** Awarded 5G and Beyond Joint Graduate Support Programme, a merit-based fellowship of monthly stipend during M.Sc.
- Bilkent University, Comprehensive Graduate Scholarship:** Full tuition waiver, a monthly stipend, and accommodation support during M.Sc.
- Sabancı University Undergraduate Scholarship:** Full tuition waiver, a monthly stipend, and accommodation support during B.Sc.
- Turkish National University Entrance Exam:** Ranked in **top %0.03** among 2.5 million candidates.
- Turkish Ministry of National Education Scholarship:** A merit-based scholarship until university from middle school.

## Publications

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### Journal Papers

1. **E Koç**, A.C. Aras, T. Alikasıfoğlu, A. Koç, “ Transductive Graph Neural Networks for Transformer Fine-Tuning”, IEEE Transactions on Artificial Intelligence (*Submitted, Double Blind*)
2. **E. Koç**, E. Kulkul, G. Kaynar, M. Acar, T. Çukur, and A. Koç, “ scGraPhT: Merging Transformers and Graph Neural Networks for Single-Cell Annotation,” in IEEE Transactions on Signal and Information Processing over Networks

3. E. Şimşek, A. Topçu\*, **E. Koç\***, E. Ülkü Sarıtaş, and A. Koç, “ Emotion Classification with Visibility Graphs,” in IEEE Signal Processing Letters
4. **E. Koç**, T.Alikaşifoğlu, A. C. Aras, A. Koç, “ Trainable Fractional Fourier Transform,” in IEEE Signal Processing Letters, vol. 31, pp. 751-755, 2024, doi: 10.1109/LSP.2024.3372779
5. **E. Koç** and A. Koç, “ Fractional Fourier Transform in Time Series Prediction,” in IEEE Signal Processing Letters, vol. 29, pp. 2542-2546, 2022, doi: 10.1109/LSP.2022.3228131.
6. A. Y. Yıldız, **E. Koç** and A. Koç, “ Multivariate Time Series Imputation With Transformers,” in IEEE Signal Processing Letters, vol. 29, pp. 2517-2521, 2022, doi: 10.1109/LSP.2022.3224880.

## Conference Proceedings

1. **E. Koç**, T. Alikaşifoğlu, A. C. Aras, and A. Koç, “ Trainable Fractional Fourier Transform,” 31st IEEE International Conference on Image Processing (ICIP), Abu Dhabi, UAE, October 27-30, 2024. (Oral - Journal Presentation)
2. **E. Koç**, Y. E. Ekiz, H. Özaktaş, A. Koç, “ Maximally Selective Fractional Fourier Pooling,” 2024 32nd Signal Processing and Communications Applications Conference (SIU), Mersin, Türkiye, 2024, pp. 1-4, doi: 10.1109/SIU61531.2024.10600916.
3. **E. Koç** and A. Koç, “ Fractional Fourier Transform in Time Series Prediction”, 49th IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Seoul, Korea, April 14-19, 2024. (Poster - Journal Presentation)
4. A. Y. Yıldız, **E. Koç** and A. Koç, “ Multivariate Time Series Imputation With Transformers,” 30th IEEE International Conference on Image Processing (ICIP), Kuala Lumpur, Malaysia, October 8-11, 2023. (Oral - Journal Presentation)
5. O. B. Güney, **E. Koç**, C. Aksoy, Y. Çatak, Ş. S. Arslan and H. Özkan, “ Adaptive Boosting of DNN Ensembles for Brain-Computer Interface Spellers,” 2021 29th Signal Processing and Communications Applications Conference (SIU), Istanbul, Turkey, 2021, pp. 1-4, doi: 10.1109/SIU53274.2021.9477841.

## Academic Experiences

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### Reviewer

- IEEE Signal Processing Letters
- IEEE International Symposium on Biomedical Imaging
- Springer Scientific Reports
- International Journal of Data Science and Analytics

### Graduate Research Assistant

2021 - present

*National Magnetic Resonance Research Center, KOCLAB, Bilkent University*

### Graduate Teaching Assistant

2021 - present

*Bilkent University*

- EEE 486/586: Statistical Foundations of Natural Language Processing
- EEE 443/543: Neural Networks
- EEE 424: Digital Signal Processing
- EEE 321: Signals and Systems

### Undergraduate Teaching Assistant

2018 - 2021

*Sabancı University*

- EE 314: Digital Communications
- MATH 203: Introduction to Probability
- SPS 101-102: Social and Political Sciences 1-2

## Computer Skills

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**Programming:** C++, Python, MATLAB, HTML, Flutter

**Frameworks:** Pytorch, Tensorflow, HuggingFace

**Tools:** L<sup>A</sup>T<sub>E</sub>X, Bash, VSCode, EEGLAB, Qt Designer, Scanpy, Anndata

## Industrial Experience

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### 5G VATS R&D Associate

April 2022- Aug 2024

*Turkcell Communication Services Inc, TTech.*

- Research on combining machine learning and classical signal processing in the context of 5G

### Network Engineer, Intern

October 2020 - March 2021

*Turkcell Communication Services Inc*

- Prepared reports using data analysis tools for fiber optic network in terms of location, region, and budget
- Gained familiarity with network devices such as routers, switches, and optical amplifiers
- Used Python to automate network tasks