Ezgi Özyılkan

pronouns she/they

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Education

2021–present Ph.D., Electrical and Computer Engineering, NYU Tandon School of Engineering, USA.
Current GPA: 4.0.
Area: Neural lossy data compression.
Advisor: Prof. Elza Erkip.

2017–2021 Integrated M.Eng., Electrical Electronics Engineering, Imperial College London, **first class honors**.
M.Eng. Thesis: *"Deep Stereo Image Compression with Decoder Side Information using Wyner Common Information"*.
Advisor: Prof. Deniz Gündüz.

Interests and Skills

data compression (image, 3D/point cloud, task-aware/semantic features), **information theory** (source coding, multi-terminal), **quantization** (lossy, entropy-constrained), **signal processing** (data analysis, density modeling), **telecommmunications** (distributed, cooperative), **deep learning** (explainable AI, interpretability), **programming** (mostly Python, JAX, PyTorch).

* denotes equal contribution.

Profile

I am a collaborative researcher and enjoy working with people from diverse backgrounds, which is reflected in my experiences. My current research is driven by a passion for connecting theory and practice in compression and telecommunication problems, particularly in distributed scenarios. I use tools from deep learning, signal processing, data compression and information theory, yielding interpretable results.

Industry Experience

PhD R&I Intern at InterDigital Video Lab Manhattan, NY, USA **6/2024–8/2024**
Worked on learning-based lossy 3D/point cloud compression and generative models, focusing on geometry. Hosts: Jiahao Pang, Dong Tian. *Patent application in preparation.*

PhD R&I Intern at InterDigital AI Lab Los Altos, CA, USA **6/2022–8/2022**
Worked on learning-based image compression for humans and machines, focusing on scalability. Hosts: Hyomin Choi, Fabien Racapé. *Co-developed a patent and submitted a conference paper, which appeared in IEEE Data Compression Conference (DCC) 2023.*

Business and Data (Summer) Analyst at Morgan Stanley London, UK **6/2019–8/2019**

Patents

H. Choi, F. Racapé, **E. Özyılkan**, and S. M. Ulhaq, "Method or apparatus rescaling a tensor of feature data using interpolation filters," Int. Patent App. No. PCT/US2023/034255, pending.

Teaching Experience

Head Course Assistant at NYU Tandon Brooklyn, NY, USA **1/2022–present**
Probability and Stochastic Processes (Fall 2024, Fall 2022) and Deep Learning (Spring 2022).

Journal Papers

E. Özyılkan, J. Ballé, and E. Erkip, "Neural distributed compressor discovers binning," *IEEE Journal on Selected Areas in Information Theory*, 2024. DOI: 10.1109/JSAIT.2024.3393429.

Conference Papers

E. Özyılkan*, F. Carpi*, S. Garg, and E. Erkip, "Neural compress-and-forward for the relay channel," in *2024 IEEE 25th Int. Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*, to appear, 2024.

E. Özyılkan and E. Erkip, "Distributed compression in the era of machine learning: A review of recent advances," in *2024 58th Annual Conf. on Information Sciences and Systems (CISS)*, 2024. DOI: 10.1109/CISS59072.2024.10480175.

S. F. Yilmaz, **E. Özyılkan**, D. Gündüz, and E. Erkip, "Distributed deep joint source-channel coding with decoder-only side information," in *2024 IEEE Int. Conf. on Machine Learning for Communication and Networking (ICMLCN)*, 2024. DOI: 10.1109/ICMLCN59089.2024.10625214.

N. Mital*, **E. Özyılkan***, A. Garjani*, and D. Gündüz, "Neural distributed image compression with cross-attention feature alignment," in *2023 IEEE/CVF Winter Conf. on Applications of Computer Vision (WACV)*, 2023. DOI: 10.1109/WACV56688.2023.00253.

E. Özyılkan, J. Ballé, and E. Erkip, "Learned Wyner–Ziv compressors recover binning," in *2023 IEEE Int. Symp. on Information Theory (ISIT)*, 2023. DOI: 10.1109/ISIT54713.2023.10206542.

E. Özyılkan*, M. Ulhaq*, H. Choi, and F. Racapé, "Learned disentangled latent representations for scalable image coding for humans and machines," in *2023 Data Compression Conf. (DCC)*, 2023. DOI: 10.1109/DCC55655.2023.00012.

N. Mital*, **E. Özyılkan***, A. Garjani*, and D. Gündüz, "Neural distributed image compression using common information," in *2022 Data Compression Conf. (DCC)*, 2022. DOI: 10.1109/DCC52660.2022.00026.

Workshop Papers

E. Taşçı, **E. Özyılkan**, O. K. Ülger, and E. Erkip, "Robust distributed compression with learned Heegard–Berger scheme," in *2024 IEEE Int. Symp. on Information Theory Workshops (ISIT-W)*, 2024. DOI: 10.1109/ISIT-W61686.2024.10591775.

E. Özyılkan, J. Ballé, and E. Erkip, "Neural distributed compressor does binning," in *ICML 2023 Workshop on Neural Compression*, **selected for 1 of 4 contributed/spotlight talks**, 2023. OpenReview: 3Dq4FZJSga.

Preprints and Manuscripts in Preparation

E. Özyılkan, J. Ballé, S. Bhadane, A. B. Wagner, and E. Erkip, "Breaking smoothness: The struggles of neural compressors with discontinuous mappings," under review, 2024.

E. Özyılkan, J. Ballé, A. B. Wagner, and E. Erkip, "A survey on neural lossy data compression: Theory, learning and beyond," tutorial paper in preparation, 2024.

E. Özyılkan*, F. Carpi*, S. Garg, and E. Erkip, "Learning-based compress-and-forward schemes for the relay channel," journal submission under review, 2024.

Selected Honors and Awards

IEEE Signal Processing Society Scholarship (2024–2026).

Best Reviewer Award at the Neural Compression Workshop @ ICML 2023.

Future Leader Ph.D. Fellowship (2021–2023), awarded by NYU Tandon.

Several **student travel grants** by IEEE venues, such as SPAWC 2024, ISIT 2023-2024 and North American School of Information Theory 2023, and by UC Berkeley Simons Institute to attend *"Information-Theoretic Methods for Trustworthy Machine Learning"*, Berkeley, 2023.

2021 Ivor Tupper Prize in Signal Processing, awarded by Imperial College London.

Community Service

Co-organizer of the NeurIPS 2024 Machine Learning and Compression Workshop.

Lead organizer of the IEEE ISIT 2024 "Learn to Compress" Workshop.

Member of the IEEE IT Society Student and Outreach Subcommittee since 2024.

Reviewer for publications in both machine learning, information theory and engineering, such as **NeurIPS, JMLR, ICML, MLSys**, International Symposium on Information Theory (**ISIT**), Data Compression Conference (**DCC**), and several **IEEE Transactions** journals, such as Journal on Selected Areas in Commmunications (**JSAC**), **Transactions on Information Theory**, Transactions on Communications.

References

Elza Erkip, Tandon School of Engineering, New York University
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Aaron B. Wagner, School of Electrical and Computer Engineering, Cornell University
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Deniz Gündüz, Dep. of Electrical and Electronic Engineering, Imperial College London
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Fabien Racapé, Interdigital AI Lab
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