

## Education

- 2015 **PhD**, *Carnegie Mellon University*, Pittsburgh  
Computational Biology/ School of Computer Science  
**Dissertation:** *Inferring And Analyzing The Present And The Past Of Networks From Limited Information*  
**Advisor:** Prof. Carl Kingsford **Committee:** Russell Schwartz, Seyoung Kim, Guy E. Blelloch
- 2011 **M.S.**, *University of Maryland*, College Park  
Computer Science
- 2008 **BEng**, *Bogazici University*, Istanbul, GPA – 3.8/4.0 (Ranked #1 in class)  
Computer Engineering

## Current Interests

Machine and Deep Learning Applications in Finance, Bioinformatics, Social Networks

## Work Experience

### Ozyegin University, Artificial Intelligence and Data Engineering Department Istanbul

2024 May - **Associate Professor**  
Present

### Ozyegin University, Computer Science Department Istanbul

2020 Sep - **Assistant Professor**  
2024 May

### J.P. Morgan Chase, Corporate and Investment Banking New York City

2020 Mar - **AI & Applied ML Researcher, Lead**  
2020 Sep ○ Develop techniques to identify entitlement anomalies through interaction graph analysis

### Goldman Sachs Asset Management, IMD New York City

- 2018 Jan - **Vice President, Quantitative Strategist. Fundamental Equity (FE), \$60 billion mutual fund**  
2019 Nov ○ Generated over 1.5 Sharpe signal on supply-chain dataset for biweekly-rebalanced quantamental fund  
○ Developed hierarchical portfolio construction for \$5 billion Exchange Fund, by backtesting historical inflows  
○ Increased annual Exchange Fund inflow to \$1 billion, by developing rule-based stock acceptance framework  
○ Designed & led the whole IMD Exchange Fund portfolio construction project
- 2015 Dec - **Associate, Quantitative Strategist. Goldman Sachs Investment Partners (GSIP), flagship multistrategy hedge fund**  
2018 Jan ○ Developed systematic allocation strategies for Event driven fund by backtesting merger data  
○ Developed volatility trading strategies for Chinese market through index options  
○ Developed min-cost replication & hedging algorithms to rebalance \$1 billion Liquid Alt. funds under 2 minutes  
○ Responsible for risk management of \$4 billion hedge fund

### CMU, School of Computer Science Pittsburgh

2015 Mar - **Machine Learning Postdoctoral Researcher**, CARNEGIE MELLON UNIVERSITY  
Dec

2012-2015 **Research / Teaching Assistant**, CARNEGIE MELLON UNIVERSITY

### University of Maryland, School of Computer Science College Park

2008-2012 **Research / Teaching Assistant**, UNIVERSITY OF MARYLAND

## Publications

### Journal Publications

- [16] Batur Gezici and **Emre Sefer**. Deep Transformer-based Asset Price and Direction Prediction. IEEE Access, 2024
- [15] Necla Nisa Soylu and **Emre Sefer**. DeepPTM: Protein Post-translational Modification Prediction from Protein Sequences by Combining Deep Protein Language Model with Vision Transformers. Current Bioinformatics, 2024
- [14] Necla Nisa Soylu and **Emre Sefer**. BERT2OME: Prediction of 2'-O-methylation Modifications from RNA Sequence by Transformer Architecture Based on BERT. IEEE/ACM Transactions on Computational Biology and Bioinformatics, 2023
- [13] **Emre Sefer**. MOCMIN: Convex Inferring of Modular Contact Networks over COVID Diffusion Data. Turkish Journal of Electrical Engineering and Computer Sciences, 2022
- [12] **Emre Sefer**. A Comparison of Topologically Associating Domain Callers over Mammals at High Resolution. BMC Bioinformatics, April 2022
- [11] **Emre Sefer**. Biocode: A Data-Driven Procedure to Learn the Growth of Biological Networks. IEEE/ACM Transactions on Computational Biology and Bioinformatics, April 2022
- [10] **Emre Sefer**. ProbC: Joint Modeling of Epigenome and Transcriptome Effects in 3D Genome. BMC Genomics, April 2022
- [9] **Emre Sefer**. Hi-C Interaction Graph Analysis Reveals the Impact of Histone Modifications in Chromatin Shape. Applied Network Science, July 2021
- [8] **Emre Sefer** and Carl Kingsford. Metric Labeling and Semi-metric Embedding for Protein Annotation Prediction. Journal of Computational Biology, May 2021
- [7] **Emre Sefer** and Carl Kingsford. Semi-nonparametric Modeling of Topological Domain Formation From Epigenetic Data. Algorithms for Molecular Biology 14 (1), 4. 2019
- [6] M Kleyman, **Emre Sefer**, Nicola, T., Espinoza, C., Chhabra, D., Hagood, J. S., Kaminski, N., Ambalavanan, N., and Ziv Bar-Joseph. Selecting the most appropriate time points to profile in high-throughput studies. eLife Sciences 2017
- [5] **Emre Sefer**, M Kleyman, and Ziv Bar-Joseph. Tradeoffs between Dense and Replicate Sampling Strategies for High-Throughput Time Series Experiments. Cell systems 3 (1), 35-42. 2016
- [4] **Emre Sefer**, Geet Duggal, and Carl Kingsford. Deconvolution Of Ensemble Chromatin Interaction Data Reveals The Latent Mixing Structures In Cell Subpopulations. Journal of Computational Biology 23 (6), 425-438. 2016
- [3] **Emre Sefer** and Carl Kingsford. Diffusion Archaeology for Diffusion Progression History Reconstruction. Knowledge and Information Systems 2016(2):530-539
- [2] Geet Duggal, Rob Patro, **Sefer, Emre**, Hao Wang, Darya Filippova, Samir Khuller, and Carl Kingsford. Resolving spatial inconsistencies in chromosome conformation measurements. Algorithms for Molecular Biology, 8(1):8, 2013
- [1] Rob Patro, **Emre Sefer**, Justin Malin, Guillaume Marcais, Saket Navlakha, Carl Kingsford. Parsimonious reconstruction of network evolution. Algorithms for Molecular Biology 2012 7:25

### Conference Publications with Proceedings (Refereed)

- [15] Tuna Tuncer, Uygur Kaya, **Emre Sefer**, Onur Uralcam, Tugcan Hoser. Asset Price and Direction Prediction via Deep 2D Transformer and Convolutional Neural Networks. ICAIF 2022, 3rd ACM International Conference on AI in Finance
- [14] Ugur Dolu and **Emre Sefer**. A Novel GBT-based Approach for Cross-Channel Fraud Detection on Real-World Banking Transactions. AIAI 2022, 18th International Conference on Artificial Intelligence Applications and Innovations

- [13] **Emre Sefer**. Joint Modeling of Histone Modifications in 3D Genome Shape Through Hi-C Interaction Graph. Complex Networks 2020
- [12] **Emre Sefer**, and Ziv Bar-Joseph. Shall we dense? Comparing design strategies for time series expression experiments. RECOMB 2016
- [11] **Emre Sefer**, Geet Duggal, and Carl Kingsford. Deconvolution Of Ensemble Chromatin Interaction Data Reveals The Latent Mixing Structures In Cell Subpopulations. RECOMB 2015
- [10] **Emre Sefer** and Carl Kingsford. Convex Risk Minimization To Infer Networks From Probabilistic Diffusion Data At Multiple Scales. ICDE 2015
- [9] **Emre Sefer** and Carl Kingsford. Semi-nonparametric Modeling of Topological Domain Formation From Epigenetic Data. WABI 2015
- [8] **Emre Sefer** and Carl Kingsford. Diffusion Archaeology for Diffusion Progression History Reconstruction. ICDM 2014
- [7] Geet Duggal, Rob Patro, **Sefer, Emre**, Hao Wang, Darya Filippova, Samir Khuller, and Carl Kingsford. Resolving spatial inconsistencies in chromosome conformation measurements. WABI 2012
- [6] Robert Patro, Geet Duggal, **Emre Sefer**, Hao Wang, Darya Filippova, and Carl Kingsford. The missing models: a data-driven approach for learning how networks grow. KDD 2012
- [5] Rob Patro, **Emre Sefer**, Justin Malin, Guillaume Marcais, Saket Navlakha, Carl Kingsford. Parsimonious reconstruction of network evolution. WABI 2011
- [4] Robert Gove, Nick Gramsky, **Emre Sefer**, Ben Shneiderman. NetVisia: Heat map & matrix visualization of dynamic social network statistics & content. SocialCom 2011
- [3] **Emre Sefer** and Carl Kingsford. Metric labeling and semi-metric embedding for protein annotation prediction. RECOMB 2011
- [2] Dana Nau, **Emre Sefer**, Ugur Kuter. Thinking ahead in real-time search. ICAPS 2009
- [1] **Emre Sefer**, Ugur Kuter, Dana Nau. Real-time A\* search with depth-k lookahead. International Symposium on Combinatorial Search, SoCS 2009

#### Journal & Conference Abstracts with Proceedings

- [1] Teodora Nicola, **Emre Sefer**, et al. Identification Of Optimal Time Points And Proteomic Profiling During Murine Lung Alveolar Septation [abstract]. American Journal of Respiratory and Critical Care Medicine 2016;193:A6561
- [2] C. R. Espinoza, D. Chhabra, T. Nicola, N. Ambalavanan, N. Kaminski , **Emre Sefer** , Z. Bar-Joseph, J. S. Hagood. Dynamic Changes of DNA Methylation During Different Stages of Normal Mouse Lung Development [abstract]. American Journal of Respiratory and Critical Care Medicine 2016;193:A2344

#### Supervised Thesis

- Ugur Dolu, 2022, Novel Sampling Technique and Gradient Boosting Tree-based Approach for Cross-channel fraud detection. M.S., Ozyegin University Data Science Department
- Zehra Erva Ergun, 2022, Word Embeddings on Financial Text Datasets. M.S., Ozyegin University Computer Science Department
- Batuhan Eralp, 2023, Utilizing Hi-C Data To Reveal The Proximity of SQTLs and Target Genes in 3D Genome of Cancer Cells. M.S., Ozyegin University Computer Science Department
- Necla Nisa Soylu, 2023, Prediction of RNA and Protein Modifications by Deep Learning Methods. M.S, Ozyegin University Artificial Intelligence Department
- Mustafa Pala, 2023, NFT Sales Characteristics And Price Prediction By Transfer Learning of Visual Attributes. M.S., Ozyegin University Computer Science Department

- Batur Gezici, 2023, Deep Transformer-based Asset Price and Direction Prediction. M.S., Ozyegin University Artificial Intelligence Department
- Tuna Alaygut, 2024, Deep Q-Network Based Cryptocurrency Investment Strategies Using Transformer Function Approximator. M.S., Ozyegin University Computer Science Department
- Yasin Uygun, 2024, Financial Asset Price Prediction with Graph Neural Network-based Temporal Deep Learning Models. M.S., Ozyegin University Computer Science Department

## Thesis In Progress

- Gorkem Yencak, 2021-present. PhD, Ozyegin University Computer Science Department
- Yasin Uygun, 2024-present. PhD, Ozyegin University Computer Science Department
- Necla Nisa Soylu 2024-present. PhD, Ozyegin University Computer Science Department
- Muratcan Kilicci, 2022-present. M.S., Ozyegin University Computer Science Department
- Berkay Celik, 2022-present. M.S., Ozyegin University Computer Science Department
- Baris Arat, 2023-present. M.S., Ozyegin University Computer Science Department
- Ahmet Cagatay Savasli, 2023-present. M.S., Ozyegin University Computer Science Department
- Yigit Demirsan, 2023-present. M.S., Ozyegin University Computer Science Department
- Betul Seyhan, 2023-present. M.S., Ozyegin University Computer Science Department
- Welaa Sekheta, 2024-present. M.S., Ozyegin University Computer Science Department
- Serhat Altindag, 2024-present. M.S., Ozyegin University Computer Science Department
- Merve Zeynep Ozturk, 2024-present. M.S., Ozyegin University Computer Science Department

## Undergraduate Student Researchers

- Zeynep Zual Bekerecioglu, 2023, Predicting Lysine glycation sites. B.S., Bogazici University Mathematics Department
- Bugra Baltaci and Metin Arkanoz, 2023, Company Return Prediction by Analyzing Supply Chain Graphs. B.S., Ozyegin University Industrial Engineering and Computer Science Departments
- Selinay Cetin, 2022-present, TAD Prediction from RNA-associated Interactions. B.S., Ozyegin University Electrical and Electronics Engineering Department
- Azra Oymaagac, 2023, Bioinformatics. B.S., Ozyegin University Computer Engineering Department
- Kerem Bekmez and Utku Ayten, 2023, NFT Dynamics. B.S., Ozyegin University Electrical and Electronics Engineering Department

## Honors and Awards

- Received Best Paper Award at RECOMB 2016
- 2020 Marie Skłodowska-Curie Actions Seal of Excellence winner (MSCA proposal 101031511 – DeepGenome)
- TUBITAK, H2020 Programs, "Over the threshold" award in 2020 for scoring 86.4/100 in H2020-MSCA-IF-2020 proposal with "DeepGenome" project
- Received University of Maryland Computer Science Fellowship during graduate studies
- Graduated from Bogazici University in the 1st rank with High Honors
- Received Bogazici University Full Scholarship during undergraduate studies
- Co-received Best Video Award at KDD 2012 conference

- Received fellowships for RECOMB 2011, RECOMB 2015, ICDM 2014, ICDE 2015, ICAPS 2009 conferences
- Ranked in 0.01% in 1.500.000 people in Turkey University Entrance Exam (OSS)

## Research Grants

- TUBITAK (Scientific and Technological Research Council of Turkey) 3501: DeepGenome: Inferring and Analyzing Genome Shape and Its Dynamics Across Species and Cell Types by Deep Learning
- TUBITAK (Scientific and Technological Research Council of Turkey) 1002: RNA Modification Prediction by Combining Deep Learning with Natural Language Processing Techniques across Species

## Invited Talks & Tutorials

### Peer-reviewed Conference Presentations

- Asset Price and Direction Prediction via Deep 2D Transformer and Convolutional Neural Networks. ICAIF 2022, New York City, USA. 2/11/2022
- MOCMIN: Convex Inferring of Modular Low-Rank Contact Networks over COVID Diffusion Data. BIODKDD workshop in KDD 2022, Washington DC, USA. 15/08/2022
- Biocode: A Data-Driven Approach for Learning How Biological Networks Grow. BIODKDD workshop in KDD 2021, Singapore. 15/08/2021
- MOCMIN: Convex Inferring of Modular Contact Networks over COVID Diffusion Data. Communities in Networks Satellite in Networks 2021, Indiana, USA. 01/07/2021
- Joint Modeling of Histone Modifications in 3D Genome Shape Through Hi-C Interaction Graph. Complex Networks 2020, Madrid, Spain. 02/12/2020
- Shall we dense? Comparing design strategies for time series expression experiments. RECOMB 2016, Los Angeles, USA. 10/04/2016
- Semi-nonparametric Modeling of Topological Domain Formation From Epigenetic Data. WABI 2015, Atlanta, USA. 15/09/2015
- Deconvolution Of Ensemble Chromatin Interaction Data Reveals The Latent Mixing Structures In Cell Subpopulations. RECOMB 2015, Warsaw, Poland. 18/04/2015
- Convex Risk Minimization To Infer Networks From Probabilistic Diffusion Data At Multiple Scales. ICDE 2015, Seoul, South Korea. 12/04/2015
- Diffusion Archaeology for Diffusion Progression History Reconstruction. ICDM 2014, Shenzhen, China. 18/12/2014
- Metric labeling and semi-metric embedding for protein annotation prediction. RECOMB 2011, Vancouver, Canada. 10/04/2011
- Real-time A\* search with depth-k lookahead. International Symposium on Combinatorial Search. SoCS 2009, Los Angeles, USA. 14/08/2009

### Tutorials

- Finding Topological Domains in Genome. ACM-BCB 2015, Atlanta, USA. 12/09/2015

### Special Invited Talks

- Derin Öğrenme Varsıtasıyla RNA ve Protein Değişimlerinin Tahmini. Association for Systems Biology and Bioinformatics, Istanbul, Turkey. 02/12/2023
- Temporal Deep Learning and Graph Neural Networks for Asset Price Prediction. Ozyegin University School of Management Seminar, Istanbul, Turkey. 10/11/2023

- ChatGPT: Advantages and Limitations. Basic Oncology Association (TEOD) Seminar, Istanbul, Turkey. 31/05/2023
- Analyzing The Present And The Past Of The Networks From Limited Information. Ozyegin University Computer Science Department, Istanbul, Turkey. 14/04/2020
- Analyzing The Present And The Past Of The Networks From Limited Information. Istanbul Technical University, Faculty of Computer Engineering, Istanbul, Turkey. 04/04/2020
- Analyzing The Present And The Past Of The Networks From Limited Information. Yeditepe University, Computer Engineering Department, Istanbul, Turkey. 27/03/2020
- Analyzing The Present And The Past Of The Networks From Limited Information. Kadir Has University Computer Science Department, Istanbul, Turkey. 20/03/2020
- Deconvolution Of Ensemble Chromatin Interaction Data Reveals The Latent Mixing Structures In Cell Subpopulations. Ziv-Bar Joseph's Systems Biology Research Group at CMU Machine Learning Department, Pittsburgh, PA. 14/02/2015

### Posters

- Convex Risk Minimization To Infer Networks From Probabilistic Diffusion Data At Multiple Scales. GLBIO 2015, Pittsburgh, USA. 12/04/2015
- Real-time A\* search with depth-k lookahead. International Symposium on Combinatorial Search. SoCS 2009, Los Angeles, USA. 14/08/2009

## Professional Contributions

- Serving as **editor** for BMC Bioinformatics, Frontiers in Artificial Intelligence, Frontiers in Big Data, and Journal of Advances in Management Sciences & Information Systems journals
- Gave **tutorial** about topological domains in 3D genome at ACM-BCB 2015
- Served as a **Program Committee Member** and reviewed papers for ICAIF 2024, SDM 2024, Complex Networks 2024, ISMB MLCSB COSI 2024, ACML 2024, ECAI 2024, IIAI AAI 2024, KDD 2024, WWW 2024, NLDL 2024, ISMB MLCSB COSI 2023, ACML 2023, KDD 2023, ASYU 2022 & 2023, IJCAI 2021 & 2022, Complex Networks 2021 & 2022, ACM-BCB 2015
- Co-organized Artificial Intelligence Summer School at Ozyegin University, with almost 500 participants
- Worked as a part of NIH funded **LungMAP** project to map lung dynamics (<https://www.lungmap.net/>)
- Contributed to the writing of NIH grant proposal on investigating 4D dynamics of chromosome conformation
- Academic Coordinator for Erasmus and International Exchange Programs, Computer Science Department, Ozyegin University, since Spring 2021
- Reviewed papers for Computational and Structural Biotechnology, Plos Computational Biology, Nature Scientific Reports, International Review of Financial Analysis, Bioinformatics Advances, Frontiers in Big Data, Frontiers in Artificial Intelligence, Frontiers in Psychology, Frontiers in Cell and Developmental Biology, Genome Research, Bioinformatics, BMC Bioinformatics, Journal of Computational Biology, Nucleic Acids Research, IEEE Transactions on Computational Biology and Bioinformatics, Optimization Letters, Journal of Global Optimization, Briefings in Bioinformatics, General Physiology and Biophysics, Heliyon, Financial Innovation, Turkish Journal Of Electrical Engineering & Computer Sciences journals

## Teaching Experience

- CS 104: Introduction to Programming



- CS 201: Data Structures and Algorithms
- CS 333: Algorithms Analysis
- CS 412/512: Bioinformatics Algorithms
- CS 440/540: Machine Learning in Finance
- CS 452/552: Data Science with Python
- CS 533: Advanced Algorithms

## Undergraduate Senior Project Supervision

- NFT Image Synthesis via Generative Models. Emir Ulurak, Beyza Kaya, 2024
- Machine Learning for Company Earnings Prediction. Deniz Ozbakir, Arda Erdogan, Uygur Kaya, 2024
- LLM Supported SEC Report Analyzer Chat Assistant. Selim Cavas, Salih Metin Arkanoz, 2024
- Music recommendation system that addresses the Problem of stress reduction and improved work performance. Defne Sirvanci, Sezin Sayan, Doga Yilmaz, 2024
- Deep Learning for Predicting Tumor T cell Antigens. Umut Oskay, Baris Tudes, 2024
- Enhancing Pairs Trading with Machine Learning Models. Selin Yilmaz, Efsa Caliskan, Emre Erkus, 2024
- Chaotic Time Series Prediction via Transformers. Semanur Yasar, Utku Akkas, 2024
- Prediction of SARS-CoV-2 Variants From Protein Sequence by Federated Transformer Architecture Based on BERT. Jana Ayoub, 2023
- Bitcoin Price Prediction Regarding Transaction Graphs. Atahan Caldir, Ezgi Maden, Emre Kenar, 2023
- NFT Primary Sale Price and Secondary Sale Prediction. Ege Gungordu, Betul Seyhan, Irem Karabacakogullarindan, 2023
- Bullseye: Stock Market Index Calculator. Gufran Yesilyurt, Murat Can Altun, Kaan Yilmaz, 2023
- Cryptocurrency Price Prediction via On-Chain Analysis. Ceren Yildizdogan, Furkan Kerem Selimoglu, Yigit Demirsan, 2023
- MergerBERT: Predicting Merger Targets and Acquirers from Text via Pretrained Language Models. Alanur Bilgili, Ahmet Cagatay Savasli, Damla Tutuncu, 2023
- Commodity Price Forecasting by Deep Learning. Mert Dallar, Israh Zahid, Isam Barghothi, 2023
- Price Prediction via earnings transcript calls. Zeynep Basik, Batuhan Uz, 2023
- Stock Price and Direction Prediction via Deep Attention-Based Convolutional Neural Networks. Onur Alacam, Tugcan Hoser, Uygur Kaya, Tuna Tuncer, 2022
- Analyzing Transaction Graphs for Price Prediction of Bitcoin. Peker Celik, Eray Erdogan, Umut Cirak, 2022
- Simultaneous FX Price Prediction by Using Temporal Multivariate Graph Neural Networks. Hamza Ayberk Akbalik, Nurettin Burak Altintas, Ege Öztas, 2022
- Comprehensive Financial Domain Specific Language for Algorithmic Trading. Egemen Iscan, Hasan Erdem Bilgin, Yamac Demirkan Yilmaz, 2022
- Cryptocurrency Price Prediction by Using Sentiment Data and Attention Based Architectures. Berkay Celik, Erdem Er, Muratcan Kılıcci, 2022

- Natural Language Processing and Deep Reinforcement Learning Technologies in Cryptocurrency Trading. Alperen Akyol, Ayberk Orhon, 2022
- Essential Protein Prediction Using Graph Neural Networks. Abdullah Saydemir, Burcu Arslan, 2022
- Crypto-currency Price Prediction Using News and Social Networks Data. Baris Karaer, Ertan Ayanlar, 2021
- Predicting Market Movements over Supply Chain Network via Graph Neural Networks. Dogukan Dincer Duduoglu, Ertugrul Ozvardar, 2021
- A Cloud-Based Web Platform for Electricity Market Price Forecast. Yaren Sever, 2021
- Financial Sentiment Analysis with BERT. Ilhami Berker Gurcay, Cem Denizsel, Emirhan Demir, 2021
- Match Score Prediction Using Machine Learning. Ahmet Erdem Gonul, 2021
- SCAN EAT AND TREAT(SEAT). Muhammad Abdulwahab Shafiq, Muhammad Ibrahim, 2021
- Predicting Default Probability and Providing an Investment Strategy for P2P Loan Selection. Cem Taha Aker, 2021