CV

Fikrat Talibli

PhD Candidate – Computational Biology & Algorithmics
University of Stuttgart • Expected defense: April–June 2026
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Research focus

Error-correcting codes for DNA data storage • Trace reconstruction • Succinct de Bruijn graphs • Metagenomics • Graph algorithms • Probabilistic models • Neural nets • Abstract algebra

Selected projects & publications

- **rs-dna-pipeline** – Modular Reed–Solomon library for DNA storage (v0.2.0, Dec 2025)
  99 %+ recovery at 2 % indel noise (benchmarks in repo) → GitHub
- **MCAAT** – Metagenomic CRISPR Array Analysis Tool (first author, microLife 2025)
  Scales to billion-node de Bruijn graphs, detecting CRISPR arrays in unassembled metagenomes using cycle detecting algorithms → DOI:10.1093/femsml/uqaf016 • GitHub
- **Master's thesis (2020)** – Cyclic codes for error detection in DNA storage
  Low-overhead cyclic parity layer that reliably flags synthesis/sequencing errors (insertions, deletions, substitutions) when combined with outer Reed–Solomon correction → PDF • ResearchGate
- **Study project (2019)** – Reed–Solomon codes & finite-field implementations → PDF • GitHub
- **MCAAT 2.0** – Spacer ordering and phage detection in metagenomic data (in progress)
  Enumerates long paths in de Bruijn graphs using beam search for phage sequence recovery → GitHub

Recent talks & seminars

- **Efficient trace reconstruction using Bidirectional Beam Search** (Gu et al. 2025) – Nov 2025 → slides

- Succinct de Bruijn graphs & Metagraph – Group meeting, 2025
- Beam search for phage detection in human gut virome – Oct 2025
- Machine Learning in Biology – Lecturer, WS 2025/26

Education

- **M.Sc. INFOTECH**, *University of Stuttgart, Germany, October 2017 – June 2020*
- **B.Sc. Computer Engineering**, *ASOIU, Azerbaijan, September 2013 – June 2017*

Experience

- **PhD Researcher in Computational Biology**, *University of Stuttgart, December, 2020 - April, 2026*
  - graph algorithms, bounded cycle enumeration algorithm on directed graphs, succinct data structures, Viterbi, A*, BeamSearch for pathfinding
  - advanced memory management techniques in a multi-threaded environment, e.g., data structures and prefetching techniques in HPC
  - tools: C++, CMakeLists, Python, HMMER, HMM file, MegaHit assembly tool for succinct data structure/succinct de Bruijn graph, OpenMP, edlib for edit distance calculations, pyhmmer, MegaGTA
  - taught machine learning in biology for master students, and worked with neural ordinary differential equations
- **Working Student - Web Developer**, *Libelle AG, Stuttgart January 2018 - July 2018*
  - developed a communication module using Node.js, redesigned the web platform with React.js, and documented the code
  - was involved with various departments and teams throughout the development of the project, and presented the product to the team members
- **Junior Developer and Technical Support**, *R.I.S.K. Company, Baku, June 2013 - September 2016*
  - collaborated with clients across diverse countries and age groups, ensuring clear communication and tailored support
  - delivered software presentations and provided comprehensive technical assistance
  - designed and developed user-focused helper applications in C#
  - created detailed software manuals and documentation to enhance user experience

Skills

C++ • Succinct data structures • OpenMP • Python (NumPy, PyTorch, pyhmmer) • HMMs & Viterbi • Beam search • Gupta-Suzumura bounded length cycle algorithm • Neural networks • Abstract algebra • Error control codes • Trace reconstruction algorithms • Compiler-level HPC memory optimisation

Languages

Azerbaijani (native) • English (C1/C2) • Russian (C1/C2) • German (B2) • French (B1/B2)