Mustafa Akur

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PROFESSIONAL SUMMARY

Experienced software engineer specializing in deep learning and streaming query engines, with expertise in Rust, Python, and C++. PMC member of Apache DataFusion, with significant contributions to query optimization and streaming execution. Patent holder with a proven track record of developing innovative solutions for distributed acoustic sensing systems.

PROFESSIONAL EXPERIENCE

- **Apache Datafusion**
  PMC (Project Management Committee) Member *May 2024 - Today*
  Apache Datafusion is an extensible query engine written in RUST that uses Apache Arrow as its in-memory format I contribute to the Apache Datafusion project in the following areas:
  - Query Planning: Implemented the Functional dependency support. Implemented the multiple ordering tracking and propagation mechanism. With this mechanism, coverage of the streaming plan generation is increased.
  - Query Optimization: Implemented the optimizer rule to satisfy ordering and distribution requirement of the operators. With this rule, we can generate streaming friendly physical plans that work on multiple partitions.
  - Implementing Streaming friendly executors (operators): Implemented Order Preserving Repartitioning Operator, Streaming Window Operator (this algorithm has a blog post, can be found here), Streaming Aggregation Operator.

  List of my contributions can be found in the following page.

- **OHSU - CEDAR** Portland, OR
  Graduate Student *Sep 2024 - Today*
  - I am currently working on enhancing the stratification of early prostate cancer through deep learning techniques applied to multimodal patient data

- **Synnada** Ankara, Turkey
  Founding Engineer *May 2022 - Aug 2024*
  - Architected and implemented a streaming query execution engine from ground up
  - Led technical design decisions and implementation strategies
  - Designed and optimized core database functionalities for real-time data processing
  - Established engineering practices and technical documentation standards

- **Aselsan** Ankara, Turkey
  Software Design Engineer *Apr 2019 - May 2022*
  - Developed a multi-target tracking algorithm to accurately track vehicles under conditions of missing observations for Distributed Acoustic Sensing (DAS) systems. The algorithm achieved 97% accuracy in detecting vehicles during passages along fiber optic cables.
  - Designed a patented fiber optic cable termination point detection algorithm capable of identifying cable cuts and pinpointing their locations within one minute, achieving 99.5% accuracy.
  - Developed an internal tool for labeling training data derived from acoustic signals.
  - Implemented a Selective Group Acknowledgement algorithm to efficiently transmit image data over low-bandwidth wireless networks in noisy environments, commonly used in walkie-talkies.

PATENTS & PUBLICATIONS

Patents

- "Road-railway Vehicles Detection and Tracking Method with Distributed Acoustic Sensing (WO2022146341A1)", Jul 2022
- "Frequency Response Estimation Method to Compensate for Channel Differences in Distributed Acoustic Sensing Systems (US20230213673A1)", Jul 2023
- "Signal Loss Detection Method for Distributed Acoustic Sensing Systems (US20230213376A1)", Jul 2023
- "Method for Extracting Channel-Frequency Features in Distributed Acoustic Sensing Systems (US20230384148A1)", Nov 2023

Publications

- "Vehicle Tracking in Land Roads and Railways Using DAS Systems", Jan 2021
- "Fiber Optic Cable Termination and Signal Loss Detection in DAS Systems", May 2022

TECHNICAL SKILLS

- **Programming Languages**: RUST, Python, C++, C, SQL
- **Big Data & Streaming**: Apache Datafusion, Apache Flink
- **Machine Learning**: PyTorch, LibTorch, Tensorflow, Keras, ONNX Runtime
- **Development Tools**: Git, Docker

EDUCATION

- **Boğaziçi University** İstanbul, Turkey
  Bachelor of Engineering in Electrical and Electronics; GPA: 3.66 *Sept. 2014 – Jun. 2019*

LANGUAGES

- **Turkish**: Mother Tongue **English**: 105/120 (TOEFL) **French**: Beginner

ONLINE PRESENCE

- **Github (work):** mustafasrepo **Linkedin:** https://www.linkedin.com/in/akurmustafa/
- **Github (personal):** akurmustafa **Blog:** akurmustafa.github.io