

Saeed Fathollahzadeh

Curriculum Vitae

CONTACT INFO

Current Location: Data Management Group, Inffeldgasse 13, 8010 Graz

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Research Gate: https://www.researchgate.net/profile/Saeed_Fathollahzadeh

dblp: <https://dblp.uni-trier.de/pers/hd/f/Fathollahzadeh:Saeed>

Google Scholar: <https://scholar.google.com/citations?user=zIODCOoAAAAJ&hl=en>

EDUCATION

M.Sc. in Software Engineering, Iran University of Science and Technology

Tehran, Iran

Thesis: *A Middleware for Distributed Processing of Complex Events*

2012–2014

- **Major:** Operations research — **Supervisor:** Prof. [Mohsen Sharifi](#)

Gpa: 16.5/20

B.Sc. in Software Engineering, University College of Daneshvaran

Tabriz, Iran

Project: *Design and Implementation a Hospital Software with BPM Approach*

2007–2009

- **Major:** Operations research — **Advisors:** Prof. [Ayaz Isazadeh](#) and Dr. [Javad Mehri](#)

Gpa: 17.66/20

A.Sc. in Software Engineering, Islamic Azad University of Malekan

Malekan, Iran

Project: *Design and Implementation an Agency Software with BPM Approach*

2005–2007

- **Major:** Operations research — **Advisor:** Dr. Babak Nariman Jahan

Gpa: 18.95/20

WORK EXPERIENCE

- **Know Center**

Graz, Austria

Researcher at DAMSLab (<https://damslab.github.io/>)

April 2021–Present

- Working on "Machine Learning and Systems"

- **Free University of Bolzano, Faculty of Computer Science**

Bolzano, Italy

Research Assistant at Database Systems Research Group (<https://dbs.inf.unibz.it/>) March 2020–April 2021

- Working on "Efficient and Scalable Solutions for Time Series Analysis"

- Implementing different approaches for time series prediction.

- Working on state-of-the-art Machine/Deep Learning frameworks (e.g., RNN, TensorFlow, Clustering Methods,...) to analyze raw data.

- **Bimito (<https://bimito.com>)**

Tehran, Iran

Director of Web Applications

August 2017–March 2020

- Working with my team on making the Web Applications of Bimito faster, smaller, smarter, and more powerful!

- **Bimito (<https://bimito.com>)**

Tehran Iran

Lead Software Engineer

2016–2017

- Led a team of up to 8 developers in Web Environment (JAVA back-end, JSP, HTML, and CSS) and Growth (Full Stack) teams and managed to build tens of features at Bimito.

- Designed and implemented a system to reduce the load of Web client on back-end by 40+ % via implement a special Cache through a server side processing.

- Ran planning, scheduling, resourcing, and deploying codes for 20+ Agile sprints of 2 weeks each.
- Delivered tens of new features, technical projects, and winning improvements with the team, and collectively worked with the management to refine our processes and systems.
- As the hiring manager conducted more than 20 phone and onsite interviews to grow the team to double and shrink when required.

- **Informatics Services Corporation (<http://en.isc.co.ir>)** Tehran, Iran
Software Engineer Intern 2015–2016
 - Industrial research in affiliation with central banking of Iran, where I started to research on the state-of-the-art solution for online fraud detection and integrated **Complex Event Processing** with Debit card transactions over different monitoring software systems produced by different vendors and distributed over the network.
 - Worked on “Esper event processing language”. Implemented a CEP engine to collect and process fraud detection patterns on financial debit card transactions.
- **Ministry of Economy and Affair Finance (<http://mefa.ir>)** Tehran, Iran
Project Manager 2014–2015
 - Managed government finances(immovable) resource, and utilized process mining techniques for finding control flow.
- **Ministry of Economy and Affair Finance (<http://mefa.ir>)** Tehran, Iran
Software Engineer 2013–2014
 - As a member of Web team worked on a huge codebase of C#.Net, Asp.Net, HTML, and CSS integrated with MS SQL Server.
- **Ministry of Education (<http://www.medu.ir>)** East Azarbijan, Iran
Teacher of Computer Courses 2012–2013
 - Teach some fundamental courses include C, C++, Pascal, and Computer Networks.

RESEARCH INTERESTS

Time Series, Machine Learning, Large Scale Data Processing, Data Stream Processing, Database Systems, Event-based Systems

PROJECTS

- **Ongoing Project [1, 2]:** Working on “Efficient and Scalable Solutions for Time Series Analysis” One major demand in many of today’s business applications is to process and analyze high-dimensional time-series data in real-time and accurately. Examples of such applications are monitoring systems, stock markets, Internet Of Things (IoT). In most of these applications, the time-series data streams have a high throughput rate and high dimensional. In the academic setting over the last decade, there has been significant progress in time series classification, clustering, anomaly detection, predictive maintenance, and missing value imputation. This problem requires innovative solutions to optimize data processing in many aspects.

We extend our research research topics in a few real-world case studies from the industrial partner Durst. The company has started to collect sensor data from the newest generation of printing devices and to explore this data for predictive maintenance, with the promise to reduce the downtime for maintenance operations, to reduce maintenance costs, and to increase productivity. In this research project, we developed an event prediction system from a multivariate time series data stream. My research topic lies at the intersections of 3 crucial stages, 1. Representation of the Data: store the enormous time-series data in current RDMS systems and adapt it with current index systems is a challenging problem. 2. Clustering and distance metrics methods: we divide large data into a slice of windows and apply multiple clustering techniques for labeling. This stage of the system required to predict when an anomaly will be started. But current clustering and metrics available for univariate time-series data so for multivariate time-series data they have low accuracy or in more times it is impossible to apply the clustering methods. 3. Recurrent Neural Networks (RNNs) have become the state-of-the-art choice for extracting patterns from temporal sequences. However, current RNN models are ill-suited to process irregularly sampled data triggered by events generated in continuous-time by sensors or other neurons.

- **Masters Project [3]:** Development of a *"Middleware for Distributed Processing of Complex Events"*. The main focus of this project is to provide a middleware that can get use of complex event processing nodes so that the order of events in them is the same as the order of events in central systems and the time delay between CEP engines is minimum. In addition, it provides approaches to perform event processing related operations in distributed systems. The results indicate that our middleware is able to operate in distributed systems to increase the high processing throughput in CEP engines. Moreover, our middleware can use the maximum amount of system resource.
- **Analysis of Taxi Location Data[4]:** Development of a *"Parallel Event Processing on Unbound Streams"*. In this project I describe an approach for a custom complex event processing engine using Message Passing Interface (MPI) in C++ programming language. Our approach utilizes a multi-processor infrastructure and distributes its load on multiple processes, expecting each process to run on one processor. A dispatching process receives events and distributes them on several query processes which are responsible for updating the actual queries. Query processes forwards any updates to a presentation process that output the results in an appropriate format. The distribution of roles among processes allows better scalability since further query processes can be added dynamically to handle more queries. In our evaluation we measured event processing up to a throughput of 12k events/sec using 4 processor cores.
- **Analysis Metrics for a Dynamic (Evolving) Social-Network Graph[5]:** Development of a *"Stateful Complex Event Detection on Event Streams"*. Detection of stateful complex event patterns using parallel programming features is a challenging task because of statefulness of event detection operators. Parallelization of event detection tasks needs to be implemented in a way that keeps track of state changes by new arriving events. In this paper, we describe our implementation for a customized complex event detection engine by using Open Multi-Processing (OpenMP), a shared memory programming model. In our system event detection is implemented using Deterministic Finite Automata (DFAs). We implemented a data stream aggregator that merges 4 given event streams into a sequence of C++ objects in a buffer used as source event stream for event detection in a next processing step. We describe implementation details and 3 architectural variations for stream aggregation and parallelized of event processing. We conducted performance experiments with each of the variations and report some of our experimental results. A comparison of our performance results shows that for event processing on single machine with multi cores and limited memory, using multi-threads with shared buffer has better stream processing performance than an implementation with multi-processes and shared memory.
- **Real-Time Object Recognition from Streaming LiDAR Point Cloud Data[6]:** In many robotic applications, LiDAR (Light Detection and Ranging) scanner is used to gather data about the environment. Applications like autonomous vehicles require real-time processing of LiDAR point cloud data with high accuracy. We developed an object recognition system from high-speed LiDAR data stream. Our system includes a data processing pipeline with 3 main stages, 1. LiDAR data filtering 2. Object segmentation and noise reduction 3. Multi-class object classification using Convolutional Neural Network (CNN).
- **Complex Objects Implementations for Big Data Systems :** I have been working on an experimental research study to evaluate complex object implementation methods for big data computation. I conducted a series of experiments to evaluate existing methods for complex object implementations. The significant outcome of those experiments is that the choice of complex object implementation (including data serialization) has a profound effect on overall computation performance. These experiments helped us choose the optimal method for object implementation in big data stream processing.

PUBLICATIONS AND PRESENTATIONS

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- [1] S. Fathollahzadeh, "Matrix profile to search for motifs." Database Systems Group, [Presentation], 2020.
 - [2] S. Fathollahzadeh, "Blind cane: A framework for time series analysis." Database Systems Group, [Presentation, Demo], 2020.
 - [3] S. Fathollahzadeh, "A middleware for distributed processing of complex events," master of science thesis, Iran University of Science and Technology, Iran, 2014.
 - [4] S. Fathollahzadeh, R. Karimi, M. Sharifi, K. Teymourian, A. Hasan, and A. Paschke, "Parallel event processing on unbound streams with multi-step windowing," in *Proceedings of the 9th ACM International Conference on Distributed Event-Based Systems*, DEBS '15, (New York, NY, USA), pp. 328–329, ACM, 2015.
 - [5] S. Fathollahzadeh, K. Teymourian, and M. Sharifi, "Stateful complex event detection on event streams using parallelization of event stream aggregations and detection tasks," in *Proceedings of the 10th ACM*

International Conference on Distributed and Event-based Systems, DEBS '16, (New York, NY, USA), pp. 390–393, ACM, 2016.

- [6] S. R. Gangineni, H. R. Nalla, S. Fathollahzadeh, and K. Teymourian, “Real-time object recognition from streaming lidar point cloud data,” in *Proceedings of the 13th ACM International Conference on Distributed Event-Based Systems*, DEBS '19, (New York, NY, USA), pp. 328–329, ACM (**The DEBS'19 Grand Challenge and Grand Challenge Audience Won Award**), 2019.

HONORS AND AWARDS

- **1st Rank**, Achieving first in the ranking list of research assistant procedure among all applications, Faculty of Computer Science at the Free University of Bozen-Bolzano, (2019).
- **2nd Rank**, Nationwide M.Sc. entrance exam in Computer Engineering of Iranian Universities (Islamic Azad University of Qazvin), (2012).
- **1st Rank**, Achieving the highest GPA among all university Computer Engineering Bachelor students, (2009).
- **1st Rank**, Achieving the highest GPA among all university Computer Engineering Associate students, (2007).

PATENTS

1. **Saeed Fathollahzadeh**, Habib Vahidi. *”Phones Positioning Systems,”*, Islamic Republic of Iran Patent 85761, 2014.

SKILLS

- **Programming Languages**: JAVA(Java Core, Java EE(Servlets, JavaBeans, JSP, Spring Framework, Hibernate ORM, RMI Distribution)), C/C++, familiar with Python, Apache Storm, Apache Spark
- **Database Systems**: mySql, MS SQL Server, familiar with Oracle database
- **Operating Systems**: Linux(Ubuntu, CentOS), MS Windows
- **Tools**: SVN, Git

REFERENCES

- Professor **Johann Gamper**, Head of the database systems group and supervisor of my research projects, [Faculty of Computer Science, Free University of Bozen-Bolzano](#), Bolzano, Italy. *Home*: <https://www.inf.unibz.it/gamper/>, *Email*: johann.gamper@unibz.it
- Professor **Mohsen Sharifi**, Supervisor of my master study, [School of Computer Engineering, Iran University of Science and Technology](#), Tehran, Iran. *Home*: <http://webpages.iust.ac.ir/msharifi/>, *Email*: msharifi@iust.ac.ir
- Dr. **Kia Teymourian**, Research Cooperator, [Department of Computer Science, Metropolitan College, Boston University \(BU\)](#), Boston, USA. *Home*: <http://www.teymourian.de/>, *Email*: kiat@bu.edu