Farrukh Nauman

farrukhnauman@gmail.com | (+46) 0702984959 | LinkedIn: fnauman | Github: fnauman
Honnörsgatan 1 LGH 1405 Linköping 58752 (Sweden)

Summary

- **AI Researcher** with 5+ years of experience in data science and nearly 9 years of total work experience. PhD in Physics.
- **Leadership in AI Innovation**: Spearheaded AI automation for two major sustainable fashion projects, demonstrating expertise in leading large-scale initiatives from conception to implementation.
- **Business Development and Financial Planning**: Adept at cultivating business opportunities in the AI domain with demonstrated ability to engage effectively with stakeholders. Successfully built consortia for large projects and secured international funding.

Skills

- **Technical Proficiency**: Advanced Python Development (7+ years) with focus on data science, machine and deep learning.
- **AI**: Computer Vision - Classification and Object Detection (4 years), Time Series - Forecasting and Classification (6 years), Generative and Multi-Modal AI (1.5 years), Natural Language Processing (1 year).
- **Other Programming**: SQL (2 years), C (7 years), Fortran (3 years), IDL (3 years), High Performance Computing (9 years).
- **Languages**: English (fluent), Swedish (beginner), Urdu (native).
- **Leadership and Management**: Project manager for large projects, skilled in resource allocation, proven track record in identifying growth opportunities, engagement with stakeholders. Mentored Master's students and junior developers.

Experience

RISE Research Institutes of Sweden AB — Linköping, Sweden
AI Researcher — *Jul 2021 -*

- **Lead AI Researcher in Sustainable Fashion Initiatives**:
  - Spearheading automation efforts for sustainable fashion in two large projects (Vinnova: AI for Resource Efficient Circular Fashion, CISUTAC).
    - Dataset: We released version 1 in Sep. 2023.
    - Algorithms:
      (1) Self-supervised vision (MAE) and multi-modal models (CLIP) to learn image representations for image similarity analysis (Master's thesis).
      (2) Generative Multi-Modal models OpenFlamingov2, Grounded SAM and ControlNet to (i) Detection: damage like holes and stains in clothes, (ii) Image editing: remove damage and estimate new price.

    Awards/Recognition: These projects were only 1 of 5 projects to be presented at EU event on sustainability and AI, May 2023 and Vinnova Innovation week (Sep. 2022).
- **Other**:
  - Project - Low Energy IoT: AI algorithms and models suitable for analyzing sensor data both offline and online.
    - Report on energy efficient AI models that are suitable for edge devices.
    - Analysis of sensor data from human runners.
    - Report on the state-of-the-art time series classification algorithms.
  - Mentorship: I have mentored several Master's thesis in AI.
    - Generative AI and Computer Vision: Two students in Spring 2023, Two students in Spring 2024 (ongoing).
    - Time Series Forecasting project for two students in Fall 2023 for fashion trends using the multi-modal Visuelle 2.0 dataset.

2MNordic IT Consulting AB — Gothenburg, Sweden
Data Scientist — *Dec 2019 - Jun 2021*

- **Helsingborg secondary schools:** :
  - Project I: First of a kind, early warning system for students in the commune:
    - Identified core subjects and number of fails in 6th grade as the primary indicators of performance in 9th grade.
    - Identified most important features schools that require funding to improve school-wide performance.
  - Project II: Analyze student reviews and new digital Mathematics test
    - Discovered inconsistencies between the heuristic grading scheme and a new Mathematics test with substantial impact on future education policy.
    - Discovered that higher student reviews about the school and teachers correlate negatively with student grades.
  - Reports: Prepared Power BI report for the stakeholder.
  - Cloud Deployment (current): Using Azure Functions and Data Factory.
  - Tools: Azure DevOps, Power BI, SCIKIT-LEARN, PANDAS, Azure Functions and Data Factory.
- **Cloud certifications**: Microsoft Azure Data Engineer Certificate.

Chalmers University of Technology — Gothenburg, Sweden
Research Fellow (Machine Learning, Astrophysical Fluid Modeling) — *Sep 2018 - Nov 2019*

- **Machine Learning models of high dimensional fluid and plasma simulations**:
  - Studied magnetic field growth in turbulent plasmas using time series data.
  - Surrogate modeling of complex ODEs/PDEs using recently proposed algorithms like SINDy.
- **Planet formation**:
  - Set up large scale plasma simulations to understand early stages of massive star formation.
  - Tools: C for high performance computing; Python for post-processing.

Niels Bohr Institute Copenhagen, Denmark
Research Scientist (Computational Fluid Dynamics) *Sep 2015 - Sep 2018*

- **TransitionToTurbulence**: A systematic study of the importance of aspect ratio in the transition to turbulence.
- **LocalDisks**: Used fluid simulations (SNOOPY) to model astrophysical turbulence.

University of Rochester New York, USA
Research Assistant/PhD Student *Sep 2009 - Oct 2015*

- **Accretion disk simulations**: Designed and tested Computational Fluid Dynamics simulations to study accretion flows.
- **Data analysis**: Analyzed data in the excess of 10 TeraBytes using IDL, MATLAB for publication of 4 papers.

EDUCATION

University of Rochester Rochester, New York (USA)
PhD in Physics and Astronomy *Oct 2015*

Thesis: Turbulence in Rotating and Non-Rotating Magnetohydrodynamic Shear Flows.

Quaid-i-Azam University Islamabad, Pakistan
M. Phil. Physics *June 2009*

Thesis: Modified gravity as an explanation for cosmic acceleration.

AWARDS AND & ACHIEVEMENTS

- Horton fellowship from Laboratory for Laser Energetics. 2010-2015
- Susumu Okubo Prize for the highest performance on the graduate physics written comprehensive exam and excellence in coursework. 2011

SELECTED PUBLICATIONS

- **Reducing the complexity of chemical networks via interpretable autoencoders**: Tommaso Grassi, **Farrukh Nauman**, et al., 2020. A&A . (arxiv.org/abs/2104.09516):
  - Reduced a big astrophysically relevant chemical network ODE system to a computationally tractable ODE system.
  - Used regularized autoencoders with ODE solvers in TENSORFLOW.
  - Designed the algorithm with custom layers and loss functions.
- **Machine Learning models of magnetic field generation**: **Farrukh Nauman**, Joonas Nättilä. 2019. A&A 629, A89. (arxiv.org/abs/1905.08193) (Blog: fnauman.github.io, Code: github.com/fnauman/ML_alpha2):
  - Used decision tree and Bayesian algorithms to analyze time series data from magnetic field generation simulations.
  - Using the right features, linear regression outperformed more complex algorithms.

REFEREEING SERVICE FOR JOURNALS

Machine Learning Science and Technology, Astrophysical Journal, Monthly Notices of Royal Astronomical Society, Journal of Cosmology and Astrophysics, European Physical Journal Plus