Nikan Doosti

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Education

- **Iran University of Science and Technology (IUST)** — Tehran, Iran
  Master of Science in Computer Engineering - Artificial Intelligence — *Aug 2019 - Dec 2022*
  - **Thesis:** High Resolution Neural Topology Optimization via Differentiable Physics Engine (code)
  - **Defense:** Achieved **maximum thesis score** accompanied with a peer-reviewed publication
  - **IUST:** Admitted as an exceptional talent to one of the most prestigious universities in the country (**top-3%**)
- **University of Guilan (UoG)** — Rasht, Iran
  Bachelor of Science in Computer Engineering — *Aug 2015 - Aug 2019*
  - **Thesis:** Descreening and Rescreening of Halftone Images via Data-Driven Deep Learning Methods (code)
  - **Class Rank:** Graduated **3rd** out of 55 with a **GPA of 18.64/20.00**

Publications

- **Doosti, Nikan**, Julian Panetta, and Vahid Babaei. "Topology Optimization via Frequency Tuning of Neural Design Representations." In **Symposium on Computational Fabrication**, pp. 1-9. 2021. (ACM, code)

Talks

- "Neural Design Representations" **Toronto Geometry Colloquium** advised by Prof. Alec Jacobson - University of Toronto. March 4, 2022. toronto-geometry-colloquium.github.io. (Length: 10 mins., Video)

Research Experience

Full-time Graduate Researcher — Saarbrücken, Germany

- ***Max Planck Institute for Informatics (MPII)*** — *Jul 2020 - Mar 2021*
  Artificial Intelligence aided Design and Manufacturing Group
  - Project Overview: Novel self-supervised neural design representation for obtaining the optimum design as an inverse problem, showcased in topology optimization
  - Supervisors: Supervised by **Dr. Vahid Babaei** from MPII and **Prof. Julian Panetta** from the University of California, Davis, USA.
  - Outcome: Resulted in a paper published and presented at the **ACM Symposium on Computational Fabrication 2021** (see Publications).
  - Among very few master's students whose thesis led to a publication in a highly regarded venue, and independently collaborated with a well-respected research institute (MPII).
  - Method: Utilized **physics-informed deep learning** by integrating analytical **physical simulators of PDE-constrained density-based topology optimization** into **neural fields**, enabling **generative continuous design** through sub-voxel (pixel) tuning .
  - Details: Applied analytical physics and classical numerical methods, such as Finite Element Methods (FEM), to simulate the objective function. Additionally, explored various neural architectures and reproduced their results, from convolutional neural networks to modern neural fields, to study the potential of deep learning for design representation.
  - Interdisciplinary Work: Successfully navigated and **mastered uncharted domains** beyond my primary field, including topics in mechanical engineering with no prior experience.
  - Experimentation: Managed **large-scale experiments** by extending logging solutions such as MLFlow for model, experiment, config, and report **versioning and tracking**, integrated into Slurm workload manager on compute cluster, particularly enabling **easy follow-up near deadline**.
  - Collaboration: **Shared PyTorch expertise** with group members, focusing on low-level internals and **optimizing workflows with Slurm clusters**.

- Commitment: Dedicated **over 1500 hours** to research and development (excluding paper draft and revision), demonstrating a **strong commitment** to the project and its outcomes.
- Manuscript Development: **Prepared all figures** and contributed approximately **65% to the manuscript**. Also, I oversaw all **administrative tasks** related to the paper's publication, including **handling revisions** and addressing **peer review feedback**.

Undergraduate Research Assistant Rasht, Iran

- ***University of Guilan*** *Sep 2018 - Aug 2019*
  Computer Engineering Group
  - Project Overview: worked on descreening and rescreening of halftone images via supervised deep learning methods
  - Supervisors: Supervised by **Dr. Mahdi Aminian** and **Dr. Vahid Babaei** from MPII.
  - Outcome: On top of deep study of visual computing, I became a top contributor of PyTorch forum, getting invited to the PyTorch Conference

Teaching Experience

- **Head Teaching Assistant - Advanced Programming (AP)**
  Supervisor: Dr. Ghasem Mirroshandel - University of Guilan *Aug 2018 - Feb 2019*
- **Head Teaching Assistant - Algorithms Design (AD)**
  Supervisor: Dr. Mojtaba Shakeri - University of Guilan *Aug 2018 - Feb 2019*
- **Head Teaching Assistant - Computational Intelligence (CI)**
  Supervisor: Dr. Mojtaba Shakeri - University of Guilan *Feb 2018 - Jul 2018*

Taught Java in AP, designed and graded assignments, and **evaluated final projects**. Held **weekly Q&A sessions**, graded assignments, and **created programming tasks** for AD and CI courses (partial materials).

Community and Voluntary Activities

Top Contributor

- *Official PyTorch Forum* *2018 - 2022*
  Official forum with 60K+ members and developers of the PyTorch
  - Ranked 15th (top 0.02%) as an active and helpful contributor with 183 solutions and 566 posts (profile)
  - Publicly praised by Thomas Viehmann (author, *Deep Learning with PyTorch*) for insightful posts (source)
  - Resulted in being awarded three consecutive, fully-waived invitations to the exclusive PyTorch Developer/Ecosystem Day and conference by the core team

Organizer and Mentor

- *IUST Projects* *2019 - 2021*
  An Open and Free Organization For Sharing Ideas, Showcasing Projects, and Mentoring Students
  - Attempted to challenge the university's siloed culture through open scientific/general discussions
  - Mentored junior students in preparation for going through the MSc thesis process, from ideation to publishing, and also job hunting.
  - Couple of the mentees from the start of master's, started working as senior backend developer in large software companies (feedback available upon request)

Mentor and Lecturer

- *Rasht School of AI* *2018 - 2021*
  An Open and Free Organization For Introducing AI and Mentorship
  - Held lectures around classical and neural-based digital image processing (Slides)
  - Mentored students who were interested in artificial intelligence and its applications

Teacher

- *Independent work* *2023 - 2024*
  Teaching Math and Programming to Underprivileged Teenagers in Low-income Regions
  - Held weekly 1.5-hour sessions to teach math and programming
  - Provided mentorship to a select few on pursuing college degrees in STEM fields

Work Experience

Founder and Engineer Tehran, Iran

- *Self-Funded AI Venture (web)* *Mar 2024 - Jul 2024*
  Specializing in Automated Document Image Analysis
  - The problem: Many small to medium companies, **lack structured data pipelines** and use their own specific layout for their documents which degrades inter-company interactions.
  - Developed an automated document image analysis platform to **transform unstructured, denormalized documents into accessible, structured data**, semantically searchable.
  - Created a **no-code/low-code configuration system** for easy customization and business logic validation
  - Integrated a **human-in-the-loop review process** for quality control and compliance
  - Outcome and Insights: While the venture **did not achieve commercial success**, it provided valuable lessons:
    - Impact of **infrastructural inertia** toward data standardization
    - Complexities of **localization** of global tech solutions
    - Effects of **regulatory environments** on innovation
    - **Bureaucratic preferences** for transparency prevention in process management
  - Instabase is showcasing similar capability successfully currently

Full-time Machine Learning Engineer Karaj, Iran

- *Panafor* *Apr 2022 - Jan 2024*
  Specializing in Data-driven Decision Making for Business Optimization
  - The Problem: As the number of customers grows, assigning experts to each one becomes critical, as only a few result in contracts. An "smart operator" that can monitor all customers in real-time, identify high-value ones, and assign experts based on their fitness would help prevent wasted effort.
  - The method:
    - Screen customer input (text converted to categorical data via LLM API, voice to text via Automatic Speech Recognition)
    - Identify high-potential customers using tabular machine learning methods, including XGBoost.
    - Report fitness to the human domain expert via explainable AI, prototyped using Gradio.
    - Engage experts only with the most likely customers.
  - Impact: Decreased personnel error by 10%, and I established myself as **the primary person for onboarding and training** new team members.
  - The **comprehensive screening process automation** (text/voice) coupled with filtering calls based on the complexity of inquiries, **reduced manual workload by 40%.**
  - Oversaw the development of a proprietary data extraction and preprocessing pipeline, resulting in a **35% reduction in poor-quality data**.
  - Deployed **classical machine learning** models alongside **deep learning** methods, coupled with **explainable AI** techniques to prioritize profiles and provide transparent reasoning for each decision.
  - Exhibited **proactive problem-solving** by **manually preparing years of "analog data" within the first 2.5 months**, a critical task which I prioritize over my role-specific duties to ensure project success.
  - **Managed a 15,000-line codebase**, ensuring maintainability and performance. **Designed 7 modules, with 3 adopted by other projects**, enhancing reusability and impact.

Technical Skills

Deeply Involved:	Python, PyTorch, Tensorflow, Git, Windows, Linux/Debian, MLFlow, DVC, Pandas, Sklearn, ExplainableAI, Sphinx Doc, "why you should solve a problem on top of how"
Have Experience With:	Docker, DevOps, CI/CD, Slurm, PostgreSQL, FastAPI, Shell Scripting, HTML/CSS, Latex

Research Interests

- Deep Learning; Physics-Informed Deep Learning
- Computer Graphics, Physics-based Simulation, and Inverse Design
- AI for Engineering and Health; Computational Fabrication and Drug Design

Awards and Certificates

- Awarded for **dedication and leadership** at Panafor 2023
- Completed **training in Workplace Professionalism**, Organizational Behavior, etc. 2023
- Accepted in MSc program as a **National Exceptional Talent**, with **Tuition Waiver** at IUST 2019
- **Ranked 3rd** among BSc graduates in Computer Engineering, with **Tuition Waiver** at the UoG 2019
- Participated in the Deep Learning Summer School at Gdańsk University of Technology 2020
- PyTorch Conference/Developer/Ecosystem Day registration **scholarship and invitation** (**3x**) 2019-21
- MOOC including Coursera ML and DL specialization, NYU DLSP, and many more. -

Language Skills

- English: TOEFL 108 (Reading: 30, Listening: 27, Speaking: 23, Writing: 28)
- Persian: Native (also, Gilaki a Caspian language)