PARSA ESMATI

MACHINE LEARNING ENGINEER

UK https://parsaesmati.github.io/ parsa.esmati@bristol.ac.uk github.com/ParsaEsmati

RESEARCH EXPERIENCE

Enhancing temporal and coherence consistency in generative models specifically text-to-video diffusion models with inflated U-Net — **Currently**

SEA: State-Exchange Attention for High-Fidelity Physics-Based Transformers NeurIPS 24 — **Mar 2024- May 2024**

- A first step towards physics aware models with information exchange mechanisms amongst physical states. Setting the foundations for physics aware video generative models.
- Introduction of a ViT-like encoder for meshed data in 2D and 3D space
- Assembly of a LLAMA 3 inspired temporal transformer with an additional adaptive layer norm for physics domain conditioning. Full code written with pytorch and open sourced on github.

Authors: **Parsa Esmati**, Amirhossein Dadashzadeh, Vahid Goodarzi, Nicolas Larrosa, Nicolo Grilli

[redacted] CVPR 25 — **Jul 2024- Nov 2024**

(Under review)

- Unsupervised video domain adaptation for classification task (Detail will be disclosed upon request).
- Code written with pytorch and will be open sourced after the final decision date.

Authors: Amirhossein Dadashzadeh, **Parsa Esmati**, Majid Mirmehdi

Simulating chemical mixing and molten pool shape in dissimilar welds using thermal fluid dynamics IJHMT — **Nov 2023- Jan 2024**

- Development of a computational framework to simulate fluid flow, mixing of liquids, heat transfer via ray tracing etc.
- Rigour validation of the framework on manufacturing processes in nuclear industry
- Solver package written in C++ and open sourced on github

Authors: **Parsa Esmati**, Thomas Flint, Fatma Akyel, Simon Olschok, Uwe Reisgen, Philip Cardiff, Nicolas Larrosa, Nicolo Grilli

Version 2.0 — LaserbeamFoam: Laser ray-tracing and thermally induced state transition simulation toolkit SoftwareX — **Nov 2023- Dec 2024**

- Addition of a multiphase interaction capabilities to a computational framework designed for manufacturing in nuclear industry and advance materials.

Authors: Thomas Flint, Joseph Robson, **Parsa Esmati**, Nicolo Grilli, Gowthaman Parivendhan, Philip Cardiff

EDUCATION AND WORK

Bachelor and Masters degree in Engineering — **2018 - Sep 2022**

University of Bristol

School of Electrical, Electronics and Mechanical Engineering

PhD at Mechanics Research Group **Sep 2022 - Ongoing**
University of Bristol
School of Electrical, Electronics and Mechanical Engineering

TEACHING EXPERIENCE

- Engineering sciences (EEME University of Bristol)
- Python Programming (EEME University of Bristol)
- C++ Programming
- Fluid Mechanics and Heat Transfer (EEME University of Bristol)
- Aerospace Vehicle Design and System Integration (CAME University of Bristol)

SKILLS

Programming
Python (Proficient), C++ (Expert), C (Expert), Java (Intermediate), Matlab (Expert)

ML Packages and Tools
Pytorch (Proficient), NumPy (Proficient), Tensorflow (Comfortable), Keras (Basic), Jax (Basic)

Engineering and design Packages
Fusion360 (Proficient), Inventor (Proficient), SOLIDWORKS (Comfortable), Gmsh (Comfortable), OpenFOAM (Proficient), MOOSE (Comfortable)

Other skills
1) Collaboration
2) Communication
3) Resilience
4) Strong independent research capabilities

FURTHER INFORMATION

Research interest (Keywords)
- **Generative models for graphics**
- **Generative models for engineering**
- **Spatio-temporal Diffusion models**
- **Spatio-temporal autoregressive generation**
- **Physics aware video generation**
- **Computer vision**

Research style
Rapid and precise iterative approach over the problems