Aaditya Salgarkar

✉ salgarkaraaditya@gmail.com   +91-9529235066   in aaditya-salgarkar   ⌂ aadityasalgarkar   ⌂ salgarkaraaditya

Education

University of Porto: Simons collaboration   **Sep. 2017 – Aug. 2023**
PhD in theoretical physics with Dr. Miguel Costa, Department Head   *Porto, Portugal*
- **Grade 18/20** for the coursework, thesis on **Topics in conformal Regge theory**.
- Research fellowship from **Simons collaboration** for nonperturbative bootstrap.
- Mathematical and numerical study of **phase transitions in statistical systems**.

International Center for Theoretical Sciences   **Sep. 2016 – July. 2017**
Research assistant with Dr. Rajesh Gopakumar, Director   *Bangalore, India*

Indian Institute of Technology, Kharagpur   **Sep. 2011 – Aug. 2016**
Integrated Masters in physics   *Kharagpur, India*
- **Grade 8.22/10** for five year coursework, **10/10** for Master thesis on conformal bootstrap.
- Awarded **INSPIRE fellowship** from the Indian Department of Science & Technology.
- Selected on the basis of the national rank 4948 (**99%ile**) in Joint Entrance Exam.
- Summer research at Max Planck Institute for Gravitational Physics, Potsdam, Germany.

Experience

Research Engineer, fixed term : Dashtoon | *Generative AI, Stable Diffusion*   **Dec. 2023 - ongoing**
- Created a comic to storyboard generation model by **finetuning SDXL on 95K storyboards** by in-house artists.
- Created a **consistent character generation** pipeline for diffusion models using **SDXL LoRA** using synthetic data generation and face swapping.
- Converted a multi-step human in the loop workflow for controllable image into a **single step automated pipeline** by detecting characters and replacing them with an appropriate LoRA application.

Relevant Coursework & Projects: Link

- Deep learning specialization
- FastAI deep learning
- Advanced algorithms
- Linear algebra
- Statistical Physics I/II
- Numerical methods
- Probability

Programming Achievements

- Codeforces norm **Expert**, **World rank 334 (97%ile)** in round 873, Complete profile.
- AtCoder norm 5 kyu, **World rank 253 (91%ile)** in Heuristic Contest 019 based on Simulated Annealing.

Projects

Conformal Regge theory | *Mathematica, Complex Analysis, Representation theory, Differential equations*
- International collaboration on the study of certain **phase transitions and its relation to string theory**.
- **Proposed a theorem** concerning these transitions, 'perturbative optical theorem'.
- Conducted a detailed analytic study of multivariable differential equations using Mathematica.
- Led to two publications in Journal of High Energy Physics : Paper 1 (71pp), Paper 2 (53 pp).
- Presented the work formally at TIFR, Mumbai and informally at several international conferences at Perimeter Institute, Caltech, Simons foundation.

Numerical bootstrap | *Mathematica, Semidefinite programming*
- Proposed a novel method to study some aspects of quantum field theories using SDPB.
- Collaboration among EPFL, Switzerland, Ecole Polytechnique, France.
- Led to a publication in Journal of High Energy Physics : Paper 1 (62 pp).

Technical Skills

Python, PyTorch, scikit-learn, C++, Mathematica, Vim, Linux, bash

Extracurricular

Olympiad | Qualified for the **Indian National Mathematics Olympiad** in 2011 via Regionals
Kshitij | Steering commitee member   **2012-2015**
- Managing member of the Asia's largest techno-management fest with 60,000 footfall.
- Initiated a campaign to name Android L after Lassi, an Indian sweet. Led to national coverage.

Chess | Member of chess team of University of Porto | **International rating 2120**
Languages | English, Hindi, Marathi, Portuguese (A2)