Ameya Patil

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Research Interests

My research interests lie in building interactive data visualization and analysis systems. Additionally, I am also interested in visualization perception research, specifically with regard to uncertainty visualization. My passion and awareness about environmental issues drive me towards applications of my research interests in socio-environmental data science contexts and spreading literacy through data visualizations.

Education

University of Washington, Seattle (UW) — WA, USA
Ph.D. in Computer Science, Advised by **Dr. Leilani Battle**, GPA: 4.00/4.00 — Sept 2021 - Present
- **Relevant Coursework:** Computing for Conservation

University of Maryland, College Park (UMD) — MD, USA
Ph.D. in Computer Science, Advised by **Dr. Leilani Battle**, GPA: 4.00/4.00 — Jan 2021 - May 2021
- **Relevant Coursework:** Game Design

University of Maryland, College Park (UMD) — MD, USA
M.S. in Computer Science, GPA: 3.84/4.00 — Aug 2018 - Dec 2020
- **Relevant Coursework:** Machine Learning, Geometric Computer Vision, Advanced Computer Graphics, Physically Based Modelling, Simulation & Animation, Interactive Data Analytics, Computational Geometry, Interactive Technologies in HCI, Database System Architecture and Implementation

Birla Institute of Technology and Science - Pilani (BITS) — Goa, India
B.E. (Honors) in Computer Science, GPA: 8.24/10.00 — Aug 2012 - May 2016
- **Electives:** Data Mining, Data Storage Technologies and Networks, Creative Multimedia

Publications

1. A. Patil, M. Smith, H. Kershaw, M. El Gharamti, "Interactive Visualization of Ensemble Data Assimilation Forecasts for Freshwater Floods", IEEE VIS Viz4Climate + Sustainability Workshop Demo, 2024. *pdf*

2. A. Patil, Z. Rand, T. Branch, L. Battle, "WhaleVis: Visualizing the History of Commercial Whaling", IEEE VIS Short Papers, 2023. DOI: 10.1109/VIS54172.2023.00028. *arxiv:2308.04552*

3. A. Patil, Z. Rand, T. Branch, L. Battle, "WhaleVis: A New Visualization Tool for the IWC Catch Database", International Whaling Commission SC/69A/GDR/04, 2023. *archive.iwc.int/SC/69A/GDR/04*

4. A. Patil, G. Richer, C. Jermaine, D. Moritz, J.-D. Fekete, "Studying Early Decision Making for Progressive Bar Charts", IEEE Transactions on Visualization and Computer Graphics, 2023. DOI: 10.1109/TVCG.2022.3209426. HAL: *https://hal.science/hal-03738461/*

5. A. Aguinaldo, P.-Y. Chiang, A. Gain, A. Patil, K. Pearson and S. Feizi, "Compressing GANs using Knowledge Distillation", CoRR, vol. abs/1902.00159, 2019. *arXiv:1902.00159*

Experience

National Center for Atmospheric Research — Boulder CO, USA
Data Visualization Intern, advised by **Marlee Smith**, **Dr. Helen Kershaw** and **Dr. Moha El Gharamti** — Summer 2023

- Designed HydroVis - an interactive analysis dashboard for the WRF-Hydro hydrological forecasting model
- Implemented the dashboard backend using Python-Flask and XArray, and the renderer using D3.js
- Integrated the dashboard with NCAR's Data Assimilation Research Testbed (DART) tool

AVIZ, Inria — Saclay, Paris, France
Research Intern, advised by **Dr. Jean-Daniel Fekete** — Summer 2021

- Worked on understanding the efficacy of confidence intervals for decision making using progressive bar charts
- Proposed and studied the efficacy of two new visualization designs for progressive bar charts
- Studied the performance of humans vs automated statistical test for the task of answering questions based on progressive visualizations
- Published work in TVCG 2023 and presented the same at IEEE InfoVIS 2022, Oklahoma City, USA

Fraunhofer CESE — College Park MD, USA
Research Assistant Intern, advised by **Dr. Marcel Schäfer** — Summer 2019

- Worked as Java developer on the PocketSecurity project which collects data to perform user behaviour analysis
- Identified and implemented critical data probes to be collected for better analysis and improved existing probes

NVIDIA — Pune MH, India
System Software Engineer - C/C++ — July 2016 - July 2018

- Worked as developer for Shadowplay - a gameplay sharing app to recrod, screenshot, broadcast and coplay video games
- Worked on multi-threaded and multi-processes features, GPU driver code and render pipeline
- Enhanced and monitored the automated software testing suite and guided an intern for the same

NVIDIA — Pune MH, India
Intern — July 2015 - Dec 2015

- Device Filter Drivers - C/C++: Implemented end-to-end user input redirection from input devices to a specific application using filter drivers and device notifications
- Z-buffer - Python: Implemented aesthetic visual effects such as zoom burst using the depth data of images

Talks

- Presented thesis proposal — Seattle, WA, USA
  University of Washington, Seattle - DUB Doctoral Colloquium — May 2024
- Presented "WhaleVis: Visualizing the History of Commercial Whaling" - video — Naarm, Australia
  IEEE InfoVIS — Oct 2023
- Presented "HydroVis: Decision Support System for Ensemble Data Assimilation Forecasts of Freshwater Floods" - video — Boulder, CO, USA
  National Center for Atmospheric Research (NCAR) — Aug 2023
- Presented "Studying Early Decision Making for Progressive Bar Charts" - video — Oklahoma City, OK, USA
  IEEE InfoVIS — Oct 2022

Teaching

- **Head Teaching Assistant** at University of Maryland, College Park — Fall 2018, Fall 2019, Fall 2020
  Computer Systems Architecture (CMSC411)
- **Teaching Assistant** at University of Maryland, College Park — Spring 2019, Spring 2020
  Introduction to Data Visualization (CMSC498O)
- **Teaching Assistant** at University of Maryland, College Park — Spring 2021
  Advanced Data Structures (CMSC420)

Projects

- **Visualizing the History of Commercial Whaling** — Sept 2022 - Apr 2023
  Research project in collaboration with the Center for Quantitative Science and School of Aquatic and Fishery Sciences at the University of Washington, Seattle

  Developed an interactive dashboard to visualize the whale hunting database maintained by the International Whaling Commission (IWC). The data is modelled as a network graph where the nodes represent the hunt locations and the edges represent the hunting search effort. This facilitates correctly estimating spatial distribution of whale populations. Work published in TVCG 2024 and presented at the IWC, Scientific Committee Meeting, April 2023 at Bled, Slovenia and at IEEE InfoVIS, Narrm, Australia.

- **Physically Based Clustering Visualization** — Oct 2019 - Dec 2019
  Course project for CMSC828X - Physically Based Modeling Simulation and Animation

  Implemented a data analysis/visualization tool with interactions modelled on real-life physical forces using the D3-Force API. The specific use case targeted was evaluating word embeddings created by different methods, where words closer in the vector space belonged to the same cluster.

- **Adding shadows to a scene using CNN** — April 2019 - May 2019
  Course project for CMSC740 - Advanced Computer Graphics

  Trained a network to generate shadows in a scene, given the scene without shadows, the depth map and the light source position map. Used the pix2pix model for the task.

- **GoRoutines vs OpenMP** — Oct 2018 - Dec 2018
  Course project for CMSC714 - High Performance Computing

  Comparatively evaluated the parallelization constructs of Go language and OpenMP using various task distribution schemes among threads. 2D image convolution operation was used for the study.

- **Data Sonification** — Jan 2016 - Apr 2016
  Independent study project

  Investigated and implemented possible correlations between digital images and digital sounds for image encoding. Characterized aural encoding channels similar to visual encoding channels.

- **LEAP Motion App Development** — Mar 2015 - Apr 2015
  Course project for BITSF398 - Creative Multimedia

  Programmed the LEAP Motion sensor to create a hand gesture based virtual music instrument dashboard. Used JAVA Swing for the UI and MIDI files for the audio.

Skills

- **Programming Languages:** C, C++, Java, Python, Javascript
- **Libraries/Frameworks:** D3.js, OpenCV, MPI, OpenMP
- **Miscellaneous:** DSLR Photography, Adobe Lightroom

Languages

- **Marathi:** Native
- **Hindi:** Fluent
- **English:** Fluent

Scholarships and Awards

- Birla Institute of Technology and Science - Pilani Merit Scholarship 2012
- Maharashtra State Board of Secondary and Higher Secondary Education Scholarship 2012

Extracurricular Activities

- **University of Washington, Seattle K-12** 2022
  Participated in the UW, Seattle K-12 outreach program by presenting my research work to high school students
- **Volunteer at Ekta Nagar Residents Welfare Association** 2017 - 2018
  Aided in the organisation of community activities and administrative affairs of my residential society
- **Organising Committee Member at Quark (BITS - Pilani Goa Technical Festival)** 2015
  Directed the photo and video coverage of the technical festival spanned over 3 days
- **Videography intern at Zone Startups India** June 2015
  Created an advertisement video, and clicked portfolio photographs for Zone Startups India
- **Member at The Department of Photography, BITS-Pilani Goa** 2012 - 2015
  Performed photo and video coverage of campus events over 3 years and mentored new inductees