Aditya Upadhyayula

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Professional Summary

• Cognitive Scientist, Electrical Computer Engineer & Physicist interested in understanding and improving human & machine intelligence, and subsequently improve the impact it has on our daily lives. • Established collaborations with internal & external stake holders leading to 4 first author research articles in advancing computational cognitive science. • Excellent communicator as evidenced by 16 invited and contributed talks given at Colloquia, Domestic & International Conferences.

Education

Johns Hopkins University — Baltimore, MD
PhD. Psychological & Brain Sciences — *Aug. 2016 – May 2021 (expected)*

Johns Hopkins University — Baltimore, MD
M.A. Psychological & Brain Sciences — *Aug. 2018 – May 2018*

North Carolina State University — Raleigh, NC
M.S. Electrical & Computer Engineering — *Jan. 2015 – May 2016*

Birla Institute of Technology & Science, Pilani — Hyderabad, India
M.Sc.(Hons) Physics — *Aug. 2008 – May 2013*

Birla Institute of Technology & Science, Pilani — Hyderabad, India
B.E.(Hons) Electronics & Communications Engineering — *Aug. 2008 – May 2013*

Technical Skills

Programming: **Python**, **R**, **Matlab**, Javascript, HTML/CSS, C/C++
Technologies: **Machine Learning** (**PyTorch**, Tensorflow), **Cognitive Science** (**Eyelink 1000 plus**, **Psychopy**, **Psychtoolbox**, EEGLAB, JsPsych)
Developer Tools: **Git**, **Markdown**, **LaTeX**, Google Cloud Platform, **PyCharm**
Libraries: **Turicreate**, **pandas**, **NumPy**, Matplotlib, **plotly**

Select Research Experience

Graduate Research Assistant — Aug 2016 – Present
Johns Hopkins University — *Baltimore, MD*

- Expertise in Computational Cognitive Science, Eye tracking, ML/AI algorithms & Psychophysics tools.
- Conceptualized & Developed computational models using Bayesian frameworks that track moving objects like humans. Used these models to infer attentional & capacity limits in human working memory.
- Demonstrated for the first time that human attentional limits in tracking emerge directly from the inherent computational mechanisms
- Conceived & Designed experiments to understand the underlying mechanisms behind how we process & perceive time.
- Discovered that our experience of time in boring vs. interesting events is the same. However, the way we remember these events is different.
- Succesfully envisioned & implemented linguistic computational tools (Earley Parsers & Neural language models) to understand visual comprehension in comics. This led to an active international collaboration, and is the first of its kind to use computational psycholinguistic tools to study how we comprehend comics.
- Excellent team work & communication skills as evidenced by 4 first author research articles & 16 invited & contributed talks at domestic and international conferences.

Graduate Research Assistant — Jan. 2015 – May 2016
North Carolina State University — *Raleigh, NC*

- Expertise in signal & image processing, computer vision, EEG analysis
- Theorized & built an algorithm to remove respiratory artefacts in MRI scans by manipulating sampling strategies & self-gated techniques

- Developed a pre-processing pipeline for (Electroencephalography) EEG to analyze & assess frontal asymmetries in patients with Major Depressive Disorder

Graduate Research Assistant June 2013 – Dec 2014

Indian Institute of Science *Bengaluru, India*

- Experience in signal processing, indoor localization & experiment design in Neuroscience of eye-hand coordination
- Contributed to the development of software & hardware for an indoor positioning system that could provide location using Inertial Measurement Unit embedded in the shoe
- Investigated the efficacy of gyroscopes and inbuilt IMUs in the mobile phones to provide a reliable estimates for location in the absence of GPS.
- Programmed a robotic arm & designed human experiments to study the visuo-motor coordination

Select Academic Projects

Fake Image Detection & Art Generation using GANs | *Python, PyTorch, GANs* Aug 2019 – Present

- Implemented & analyzed GANs conditioned on the text embeddings to generate Artwork
- Evaluated performance of AutoGAN and DCGAN to reconstruct and subsequently train to detect fake images

Analyzed exploration bias in Reinforcement Learning | *Python, PyTorch, DQN, DDQN* Oct – Dec 2020

- Investigated the exploration bias in Q learning by contrasting against Deep Q Networks vs Double Deep Q Networks
- Successfully demonstrated the performance improvement using DDQN in Atari games such as Pong.

Do Neural Language Models parse according to a syntax? | *Python, PyTorch, RNNs, LSTMs* Oct – Dec 2019

- Implemented and demonstrated that neural language models might be parsing linguistic information according to a syntax.

Select Publications & Articles

- Upadhyayula. S.A.., Flombaum. J.I. (2020). "A model that adopts human fixations explains individual differences in multiple object tracking." Cognition (2020) : 104418.g [link]
- Upadhyayula S.A.., Ian B. Phillips Flombaum. J.I. (In prep). Subjective expansion of Time happens in our immediate memory, but not perceptual experience [See the video]
- Upadhyayula S.A.., Ian B. Phillips Flombaum. J.I. (In prep). Before, Now After. A review on temporal properties of perception
- Upadhyayula S.A.., Ian B. Phillips Flombaum. J.I. (In prep). Space and time dissociate in the construction of a Visual Moment [Watch the talk]

Teaching

- Instructor - Cognitive Neuroscience, Johns Hopkins University | *Taught lectures & held office hours for 200 students, Avg Rating: 3.84/4*
- Instructor - Research Methods, Johns Hopkins University | *Taught how to design, program and analyze data in R to a class of 20 students. Avg. Rating 3.9/4*
- Instructor - Design Experimental Analysis, Johns Hopkins University | | *Taught how to design, program and analyze data in R to a class of 20 students. Avg. Rating 3.66/4*
- Teaching Assistant - Sensation Perception, Johns Hopkins University | *Held office hours, evaluated exams, and gave two guest lectures on audition & somato-sensation to a group of 70 students*
- Teaching Assistant - Introduction to Cognitive Psychology, Johns Hopkins University | *Held office hours, evaluated exams and recitals*
- Teaching Assistant - Introduction to Psychology, Johns Hopkins University | *Held office hours, evaluated exams & recitals*