Camelia D. Brumar

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Education

May 2020 - Present
Ph.D. Computer Science, GPA: 3.975, *Tufts University*, Advisor: Dr. Remco Chang.
Relevant Coursework: Reinforcement Learning, Data Visualization Seminar, Statistical Pattern Recognition, Directed Study on Graph Neural Networks and Graph Embeddings, Introduction To Machine Learning, Web Engineering.

Graduation date: May 2020
B.S. Mathematics, GPA: 3.684, *University of Maryland, College Park (UMD)*, Advisor: Dr. Amitabh Varshney.
Relevant Corsework: Data Visualization, Data Analytics and Statistical Learning, Computer Graphics, Object-Oriented Programming, Geometry for Computer Applications, Probability Theory I, Numerical Analysis of Differential Equations, Abstract Algebra, Affine and Euclidean Geometry, Projective Geometry.

Publications

2023 **RekomGNN: Visualizing, Contextualizing and Evaluating Graph Neural Networks Recommendations**, *VDS 2023*, Under Submission.
Camelia D. Brumar, Gabriel Appleby, Teddy Matinde, Lara Thompson, Anamaria Crisan.

2023 **Beyond Point Solutions: Formalizing Problem and Design Spaces for Visualization**, Coming soon.
Gabriel Appleby, Camelia D. Brumar (co-first author), Ashley Suh, Brian Montabault, Jen Rogers, Remco Chang.

2023 **PIXAL: Visualizing Explainable Anomalies through Predicate Induction**, Resubmitting to TVCG.
Brian Montabault, Camelia D. Brumar, Michael Behrisch, Remco Chang.

2023 **DimBridge: Bridging Projection and Data Spaces with Predicate Logic**, Resubmitting to TVCG.
Brian Montabault, Gabriel Appleby, Jen Rogers, Camelia D. Brumar, Mingwei Li, Matthew Berger, Remco Chang.

2023 **Characterizing the Users, Challenges, and Visualization Needs of Knowledge Graphs in Practice**, IEEE Vis'23.
Harry Li, Gabriel Appleby, Camelia Daniela Brumar, Remco Chang, Ashley Suh.

2022 **A Novel Approach for retrospectively Estimating the Efficiency of PGT-A Testing**, *Fertility and Sterility, Volume 118, Issue 4*.
Justina Hyunjii Cho, Fernanda Murillo Armijo, Michael Fanton, Camelia D Brumar, Kathleen Miller, David Hoffman, Kevin E Loewke

2022 **Large-scale simulation of pregnancy rate improvements using an AI model for embryo ranking**, *Human Reproduction, Volume 37*.
JH Cho, A Ehlers, C Brumar, P Maeder-York, O Barash, J Malmsten, Z Nikica, D Sakkas, M Levy, K Miller, MD VerMilyea, K Loewke

2022 **P-171 Sensitivity analysis of an embryo grading artificial intelligence model to different focal planes**, *Human Reproduction, Volume 37, Issue 1*.
JH Cho, Camelia D. Brumar, P Maeder-York, O Barash, J Malmsten, N Zaninovic, D Sakkas, K Miller, M Levy, MD VerMilyea, K Loewke.

2022 **P-173 Large-scale simulation of pregnancy rate improvements using an AI model for embryo ranking**, *Human Reproduction, Volume 37, Issue 1*.
JH Cho, A Ehlers, Camelia D. Brumar, P Maeder-York, O Barash, J Malmsten, Z Nikica, D Sakkas, M Levy, K Miller, MD VerMilyea, K Loewke.

2021 **Characterization of an artificial intelligence model for ranking static images of blastocyst stage embryos**, *Fertility and Sterility - ASMR*.
Kevin Loewke, Justina Hyunjii Cho, Camelia D. Brumar, Paxton Maeder-York, Oleksii Barashb, Jonas E. Malmstenc, Nikica Zaninovicc, Denny Sakkasd, Kathleen A. Millere, Michael Levyf, Matthew David VerMilyeag.

2020 **A Log-Rectilinear Transformation for Foveated 360-degree Video Streaming**, *IEEE VR - TVCG 2021*, Honorable Mention.
David Li, Ruofei Du, Adharsh Babu, Camelia D. Brumar, Amitabh Varshney.

2019 **Application of Approximate Matrix Multiplication to Neural Networks and Distributed SLAM**, *IEEE HPEC 2019*, Co-first author.
Brian Plancher, Camelia D. Brumar, Iulian Brumar, Lillian Pentecost, Saketh Rama, David Brooks.

Work Experience & Research

May 2020 - Present **Graduate Research Assistant**, *Visual Analytics Lab*, Tufts University, Supervisor: Dr. Remco Chang.

- Interactive Visual Analytics and Graph Neural Networks for Climate Change. Leading a team of graduate and undergraduate interns to research how to model a knowledge graph that contains plant genotype and phenotype data. The goal is to recommend genetic changes that can be made to specific plants to avoid them succumbing to the negative effects of certain climate changes. Currently implementing multiple GNN architectures and prototyping a visualization system to visualize and contextualize the recommendations.
- Interactive Data Visualization for Anomaly Detection. Co-authoring a paper based on the creation of a visual analytic system for explainable anomaly detection. Designed the visualization which is able to display a multi-dimensional data set and detect where the anomalies most probably occurred by using a parallel coordinates visualization integrated with a violin plot for each dimension.
- Data Journaling and Machine Learning. Research assistant on NSF collaborative research. Managing two research assistants/interns through the research and design process of integrating data journaling platform that allows users to run machine learning experiments interactively. [*Grant Info here.*]
- Website Gamification. Research assistant for The Walmart Foundation, designing an experiment on gamifying a shopping website.

May 2022 - August 2022 **Ph.D. Research Intern**, *Tableau Research/Salesforce*, Seattle, WA - Remote, Mentor: Dr. Ana Crisan, Lead Research Scientist.

- Graph Neural Networks for Recommendation Systems. Modeled the internal Tableau Data Catalog Graph as a homogeneous and as a heterogeneous/knowledge graph. Implemented multiple Graph Neural Network (GNN) architectures for both versions of the data using PyTorch Geometric. Implemented and trained a Link Predictor/Recommender on top of the GNN implementation to make recommendations to users of different types of assets present in Tableau Online/Cloud, such as workbooks, databases, visualizations, etc.
- Data Visualization for Recommendation Systems. Working on creating visualization system to visualize and interpret the recommendations outputted by the GNN architecture. Planning on submitting this work to Eurovis/KDD.
- Exploratory Data Analysis of the Tableau Data Catalog Knowledge Graph. Queried the Tableau Data Catalog with GraphQL and explored it using tools such as Gephi, Pandas, scikit-learn, and more.
- Built collaborations across different departments. Collaborated with professionals from multiple departments within Salesforce, including the Tableau Research Team, the Machine Learning Team, the Data Catalog Team, the Salesforce Analytics Team, and other program and project managers.

September 2021 - May 2022 **Data Science Part-time Contractor**, *Alife Health*, San Francisco, CA - Remote.

- Paper and Abstract Publications. Co-authored a full paper and a couple of abstracts together with the Data Science Team, Product teams, and doctors from different clinics the company is partnering with. The paper work has been published in the top-tier Fertility and Sterility conference.
- Neural Style Transfer for Data Augmentation. Used Neural Transfer and Fast Neural Transfer for Training Data Augmentation for the Embryo Grading product.
- Image Processing. Employed pillow library to process images.
- AWS EC2 Instances. Used AWS for training of ML models, large image processing and other experiments.

June 2021 - August 2021 **Data Science Intern**, *Alife Health*, San Francisco, CA - Remote Internship.

- Interpretable and Explainable AI. Worked on explainability, interpretability of deep neural networks using methods such as Integrated Gradients, Occlusion Sensitivity, Guided Backprop, SmoothGrad, etc., and proved that the models are predicting pregnancy based on relevant features of the embryo images.
- Data Visualization. Created data visualizations based on parallel coordinates and violin plots in order to analyze potential biases in the dataset used for Embryo Grading. This allowed us to prove that the dataset is balanced and not biased.

March 2020 - May 2020 **UI/UX Intern**, *Hyka Therapeutics*, Remote Internship.

- App Design Research. Researched interface designs of the section of Hyka's health application that is dealing with the motivation and encouragement for people that experience any type of mental distress.

October 2019 - May 2020 **Undergraduate Research Assistant**, *Graphics and Visual Informatics Laboratory at UMD*, College Park, MD, Supervisor: Dr. Amitabh Varshney.

- VR/AR Worked on the paper "*A Log-Rectilinear Transformation for Foveated 360-degree Video Streaming*", which was submitted and accepted to IEEE VR 2020 conference.
- Animations from Single Images. Worked on developing a user interface for creating animations starting from an individual image (photograph or painting). Reproduced results observed in the paper "*SinGAN: Learning a Generative Model from a Single Natural Image*".

May 2019 - August 2019 **Software Engineering Intern**, *Bose Corporation*, Framingham, MA, Supervisor: Matthew Jannace.

- Android App Prototyping. Developed a demo Android App and a Python Dockerized microservice in the Bose cloud. Prototyped a new Dynamic App UI experience by fetching dynamic resources and configuration from the cloud to display them in a mobile app.
- UI testing automation. Worked with the automation team on a research project about how to port the code that automates the UI tests for Bose Music App from Python to Kotlin.

March 2019 - July 2019 **Undergraduate Research Assistant**, *Worcester Polytechnic Institute*, Worcester, MA, Supervisor: Dr. Zhongqiang Zhang.

- Approximation Methods with SVD. Worked on Rational Krylov subspace approximation methods applied to partial differential equations. Implemented the Randomized SVD for Image Processing and worked on implementing the exponential integrator method for the heat equation in 1D and 2D, using the functional matrix approach to evaluate the exponential matrix.

Projects

Fall 2020 **PIXAL**, *Collaboration Research project at VALT*.

Visualizing and detecting anomalies for Machine Learning, where I am contributing by designing and building a visualization tool in d3.js to observe the results from our anomaly detection algorithm.

Summer 2020 **Dota 2 Counters Data Visualization Project**, *Major League Hacking Hackathon*.

Built a force directed graph visualization tool using d3.js. This project was a 3rd place winner at the Data Day Grind hackathon organized by Major League Hacking.

Spring 2020 **Animation from a single image using SinGAN**, *Collaboration Research Project at UMD*.
Contributed to a system which allows users to intuitively create short animated videos from single images. By using generative adversarial networks (GANs), our system allows users to add three distinct types of animations to their photographs using a simple web-based interface.

Fall 2019 **Foveated 360-degree Video Streaming**, *Collaboration Research Project at UMD*.
Contributed strategically with matrix decomposition methods such as the singular value decomposition (SVD) and other approaches to communicate data in a VR scenario, more specifically the pipeline of 360-degree Video Streaming.

Summer 2017 & 2018 **Know Yourself Android App**, *Personal Project*.
Developed a stress-prediction wearable application based on Random Forests with the goal of predicting the well being of its user as correlated with the day of the week, hour of the day, number of hours slept and as related to the weather (temperature, pressure, humidity, etc.) and other variables.

Spring 2019 **The Cite Site**, *CS 480X Data Visualization*.
Built a treemap visualization in d3.js that aims to provide an informative and exploratory way of presenting information about Wikipedia articles, links and citations.

Fall 2019 **Alexa NGO Donator**, *HackUPC Winter Hackathon*.
Developed an app for the Amazon Alexa which automatically makes donations to an NGO via Paypal conditioned on human behavior.

Awards & Membership

Summer 2020 **Major League Hacking Prize**, *Data Day Grind Hackathon*.
Awarded the Third Prize Overall (200+ participants, 50+ projects).

Fall 2019 - Spring 2020 **Dean's List**, *University of Maryland, College Park*.

Fall 2018 - Spring 2019 **Dean's List**, *Worcester Polytechnic Institute*.

Skills

Programming.
Python • PyTorch • PyTorch Geometric • Captum • JavaScript • scikit-learn • pandas • Captum • HTML • git

Familiar.
d3.js • Java • Android • Bash • tmux • AWS EC2 Instances and Sagemaker

Mentoring and Team Management

October 2020 - Present **Zeyu (August) Chang**, *Tufts 2022*, VALT Graduate Research Assistant. Alife Health Data Science Intern, Recommended Zeyu for an Internship at Alife Health.

June 2021 - September 2021 **Binh (Irene) Chang**, *Tufts 2022*, VALT Undergraduate Research Assistant. Alife Health Data Science Intern, Recommended Binh for an Internship at Alife Health.

October 2020 - May 2021 **Anna W. Yuen**, *Tufts 2021*, Former VALT Undergraduate Research Assistant, Data Science Intern at U.S DOT Volpe National Transportation Systems Center.

May 2020 - September 2020 **Kate Hanson**, *Tufts 2021*, VALT Undergraduate Research Assistant.

Teaching

Spring 2021 **COMP 152-02 Visual Analytics**, *Tufts University*.
Assisted a lab by teaching d3.js.

Service & Activities

May 2023 - Present **Data Visualization Summer School**, *Co-organizer together with Jane Adams and Prof Enrico Bertini (Northeastern University), and Prof Arvind Satyanarayan (MIT).*

May 2020 - Present **Visual Analytics Lab at Tufts**, *Graduate and undergraduate intern mentor.*

April 2022 - Present **Graduate Student Association at Tufts**, *Board Member.*

September 2022 - December 2022 **Tufts Climbing Team**, *Transitional Team Member.*

August 2021 **IEEE Vis 2021 Conference**, *Tech and Moderator Student Volunteer.*

September 2020 - December 2020 **Harvard Innovation Labs**, *Member of The Venture Program.*

August 2020 - August 2021 **Association for Computing Machinery**, *Student Member.*

August 2020 **SIGGRAPH 2020 Conference**, *Student Volunteer.*

Languages

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Romanian (native), Spanish (native), Catalan (native), and English (fluent).