Mariya I. Vasileva

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Research Interests	Machine Learning, Deep Learning, Computer Vision Embedding Models, Few-Shot Learning, Explainable AI Generative Models, Self-Supervised Learning, Fashion×Computer Vision

Education

University of Illinois —Urbana-Champaign, IL

Ph.D., Computer Science, August 2020

California Institute of Technology —Pasadena, CA

B.S., Mechanical Engineering, May 2013

B.S., Business Economics and Management, May 2013

Control and Dynamical Systems (Minor), May 2013

Publications

A. Xu, **M. I. Vasileva**, A. Seshadri. *HandsOff: Labeled Dataset Generation with No Additional Human Annotations.* Highlight at CVPR 2023.

R. Sarkar, N. Bodla, **M. I. Vasileva**, A. Beniwal, Y.L. Lin, A. Lu, G. Medioni. *OutfitTransformer: Learning Outfit Representations for Fashion Recommendation.* CVPR 2022 Workshop on Computer Vision for Fashion, Art and Design (CVFAD). WACV 2023.

M. I. Vasileva, B. A. Plummer, V. Petsiuk, K. Saenko, D. Forsyth. *Why do These Match? Explaining the Behavior of Image Similarity Models.* ECCV 2020.

R. Tan, **M. I. Vasileva**, K. Saenko, B. A. Plummer. *Learning Similarity Conditions Without Explicit Supervision.* ICCV 2019.

M. I. Vasileva, B. A. Plummer, K. Dusad, S. Rajpal, R. Kumar, D. Forsyth. *Learning Type-Aware Embeddings for Fashion Compatibility.* ECCV 2018.

M. I. Vasileva, D. Forsyth. *Learning Clothing Compatibility for Automatic Fashion Outfit Composition and Generation by Analogy.* WiML 2017 Workshop.

Patents

V. Shankar, A. Dave, **M. I. Vasileva**, D. Pal, Z. Corneli, J. Rehg, A. Lu, G. Medioni. *Selecting Articles of Clothing for Customers Based on Visual Relevance.* U.S. Patent Application No. 17/706,122. Mar 2022.

M. I. Vasileva, N. Bodla, R. Sarkar, A. Beniwal, A. Lu, G. Medioni. *Voice-Driven Outfit Completion in Physical Stores.* U.S. Patent Application No. 17/540,865. Dec 2021.

A. Malik, A. Lu, A. Beniwal, B. Hardenstein, G. Medioni, J. McAuley, K. Nar, **M. I. Vasileva**, R. Wang, S. Sun, V. Shankar, V. Chaturvedi, W. Zhang. *A multi-modeled approach to address relevance, diversity, physical fit, outfit complementarity, discovery, and trend in fashion recommendation.*
U.S. Patent Application No. 17/218,081. March 2021.

M. I. Vasileva, K. Li, K. Dusad, B. A. Plummer, Y. Shen, S. Rajpal, R. Kumar, D. Forsyth. *Search Engine Use of Neural Network Regressor for Multi-Modal Fashion Recommendations Based on Visual Semantic Embeddings.*
U.S. Patent Application No. 62/823,512. March 2019.

Talks

The Dark Side of Machine Learning Algorithms: How and Why They Can Leverage Bias, and What Can Be Done to Pursue Algorithmic Fairness. KDD 2020

Embedding Models in Fashion Applications. ButterflyiQ 2018

Meta-Learning Algorithms: "Learning to Learn" (*lecture*)
CS 598LAZ: Cutting-Edge Trends in Deep Learning and Recognition, UIUC 2017

Research and Work Experience

Head of Research, Kaiber.ai May 2023 –
Los Angeles, CA

- Working on long-form video understanding and generation, diffusion model architectures, temporal consistency in video

Applied Scientist II, *Responsible AI* at AWS Jun 2022 – May 2023
Amazon, San Francisco, CA

- Worked on building and evaluating models for computer vision applications in the fashion domain, such as visual search and retrieval of relevant clothing items for a user, personalized style modelling, body shape estimation from a single image, fashion item compatibility modelling, and outfit generation
- Drove efforts for data collection, annotation and validation, built frameworks for label disambiguation, human-in-the-loop learning, and explainability

Applied Scientist II, *Amazon Style* Team Nov 2020 – Jun 2022
Amazon, San Francisco, CA

- Worked on building and evaluating models for computer vision applications in the fashion domain, such as visual search and retrieval of relevant clothing items for a user, personalized style modelling, body shape estimation from a single image, fashion item compatibility modelling, and outfit generation
- Drove efforts for data collection, annotation and validation, built frameworks for label disambiguation, human-in-the-loop learning, and explainability

Graduate Research Assistant
Computer Vision Group, UIUC May 2016 to July 2020
Advisor: David A. Forsyth

- Worked on a range of research projects at the intersection of computer vision, machine learning and deep learning: specifically building multimodal embedding

models for visual search and retrieval, representation learning for reasoning about complex relationships between images, generative models for attribute-guided natural image transformations, and explainability in machine learning

- Developed a method for style summarization, probing and exploiting the space of fashion outfits via learned outfit-level embeddings that allow for complex search queries, and produce outfit analogies
- Developed an interpretable explanation system for embedding models that score image similarity which outputs reference-dependent saliency maps paired with attribute explanations per query-reference pair *(ECCV 2020)*
- Developed a method for diverse automatic capsule wardrobes generation via an end-to-end trained multi-task model for jointly learning visual similarity between fashion items, and predicting style attributes
- Developed an approach to learning type-dependent similarity conditions as a latent variable for scalable learning of item similarity and compatibility that results in semantically-meaningful embedding subspaces (*ICCV 2019*)
- Developed an approach to learning an image embedding for fashion items that respects item type, and jointly learns notions of item similarity and compatibility in an end-to-end trained model *(ECCV 2018)*

Machine Learning Engineering Intern Feb 2019 to Aug 2019
KaleidoGlobe, Boston, MA

- Developed tools for various natural language processing and information retrieval tasks, such as data collection, training of text embedding models, document clustering and summarization, entity extraction and coreference resolution, and knowledge graph mining

Machine Learning Research Intern May 2018 to Sep 2018
Butterfly iQ, New York, NY

- Developed generative models for the purpose of data augmentation in unbalanced datasets via attribute-guided generation of medical images

Graduate Research Assistant
Virtual Reality Group, UIUC Feb 2015 to May 2015
Advisor: Steven M. LaValle

- Explored the feasibility of shared environments and virtual social spaces for applications in education such as medical training and foreign language learning
- Prototyped virtual reality social spaces for joint problem solving in language learning; worked on avatar creation, synchronization, and shared interaction with virtual objects

Mechanical Engineer Aug 2013 to Aug 2014
Schlumberger Ltd., Houston, TX

Summer Undergraduate Research Fellow
Robotic Manipulation and Sampling Group Jun 2012 to Sep 2012
NASA Jet Propulsion Laboratory
Advisor: Joel Burdick (Caltech)

– Developed signal processing algorithms for inferring local geometry and contact surface mapping for rigid objects in robot manipulation challenges "in-the-wild" using tactile sensor feedback

Technical Skills

Languages & software: AWS, Pytorch, Tensorflow, scikit-learn, numpy, pandas, spaCy, networkX, python, MATLAB, R, Lua, SQL. **Visualization:** D3.js, Tableau. **CI/CD:** GitLab, Circle CI. **Other:** Linux, bash, vim, Docker.

Affiliations

- Women in Machine Learning
- Women in Computer Vision
- Machine Learning Collective
- Queer in AI
- Caltech Alumni Association

Outreach and Professional Service

- Organizer: Computer Vision for Fashion, Art and Design (CVFAD) workshop cohosted with CVPR 2022.
- General Chair: Women in Machine Learning (WiML) annual workshop cohosted with NeurIPS 2021.
- Organizer: ResistanceAI workshop cohosted with NeurIPS 2020.
- Conference reviewer: *NeurIPS, ICML, CVPR, ICCV, ECCV, WACV, ACM FAccT*
- Organizer: Broadening Participation in Data Mining (BPDM) annual workshop cohosted with KDD 2017 (Halifax, Nova Scotia)
- Organizer, *Deep Learning Reading Group* (UIUC, 2016-17)
- Co-host, WCS@Illinois computer science camp for high-school women (2015, 2017)
- Option mentor in Mechanical Engineering, Business Economics (Caltech, 2012-2013)

Teaching Experience

CS 498DV: Data Visualization	May 2020 to Aug 2020
CS 498DF: Applied Machine Learning	Jan 2016 to May 2016
CS 445: Computational Photography	Aug 2015 to Dec 2015

Fellowships and Awards

- *Mechanical Science and Engineering Excellence Fellowship* (UIUC, 2014)
- *John W. and Herberta M. Miles Endowed Scholarship* (Caltech, 2011-12, 2012-13)
- *Summer Undergraduate Research Fellowship* (Caltech, 2012)
- CS@Illinois Grace Hopper Celebration scholarship (2016, 2017)
- Qualcomm Women's EmpowHERment Summit scholarship (San Diego, CA, 2015)

Course Emphasis

University of Illinois at Urbana-Champaign

Machine Learning: Artificial Intelligence; Machine Learning (D. Roth); Data Science and Analytics; Machine Learning for Signal Processing (P. Smaragdis); Machine Learning Theory (M. Telgarsky); Cutting-Edge Trends in Deep Learning and Recognition (S. Lazebnik); Big Data Optimization (Niao He)

Vision and graphics: Computer Vision, Computational Photography (D. Hoiem); Virtual Reality (S.M. LaValle); Optimization in Computer Vision, Applied Machine Learning (D.A. Forsyth)

Mathematics: Nonlinear Optimization; Combinatorial Mathematics; Graph Theory; Algebraic Combinatorics

CALTECH

Methods of Applied Mathematics; Stochastic Processes and Modeling; Data Analysis; Applied Statistics; Optimal Control; Advanced Robotics: Navigation and Vision

VOLUNTEERING, COMMUNITY SERVICE

- Crisis Text Line 2020 – 2022
- Student volunteer: *NeurIPS, ICML, ICLR, SIGGRAPH* 2016 – 2019
- Ten Thousand Villages International Nonprofit Fair Trade 2011 – 2012
- Caltech Classroom Connection 2010 – 2011