Mariya I. Vasileva

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LinkedIn

Research Interests

Machine Learning, Computer Vision, Deep Learning, Generative Models
Vision and Language, Multimodal Understanding & Generation, Video Intelligence
Model Posttraining, Synthetic Data, Multimodal Trust & Safety, Scaled Evaluations

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.

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.

Patents

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 No. US-12131365-B2. Issued Oct 29, 2024.
University of Illinois at Urbana-Champaign.

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. Amazon.

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. Amazon.

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. Mar 2021. Amazon.

Research and Work Experience

Senior Research Scientist, Meta Superintelligence Labs (MSL) Mar 2025 –
New York, NY

- Designed and implemented rigorous, large-scale evaluation frameworks for AI trust, safety, and alignment with a focus on systematic benchmarking, quantitative risk assessment, and scalable oversight of multimodal foundation and frontier models across high-impact domains
- Built and operationalized comprehensive benchmark suites for visual and multimodal safety, encompassing image and video analysis, captioning and summarization, grounding, retrieval, and generation tasks; benchmarks focused on youth protections, complex bias evaluation, cross-lingual visual understanding, and multimodal content integrity analysis – thus facilitating rigorous performance characterization of model safety and alignment under realistic deployment conditions
- Developed scalable synthetic data generation pipelines to discover and mitigate context-dependent bias in multimodal models in pre- and post-training stages, advancing research on bias generalization, safety adaptation, and eval robustness
- Designed and implemented core components of end-to-end scalable evaluation ecosystems spanning policy operationalization, large-scale vision data sourcing and annotation workflows, LLM/VLLM-as-a-judge framework development and calibration against human baselines, and risk metric design and instrumentation, enabling continuous oversight of model behavior in close collaboration with cross-functional partners. **These evaluation frameworks now underpin all MSL pre-release model and product testing.**
- Co-led the development of Youth Safety benchmarks as part of a company-wide effort to deliver a PG-13 experience for under-18 users on an accelerated timeline; translated evolving safety policy requirements into measurable evaluation standards through targeted data collection and benchmark development in close partnership with product, infra, legal, and policy teams (more here and here)

Head of AI, Outfit AI Apr 2024 – Oct 2024
San Francisco, CA

- Implemented generative models for computer vision problems in the fashion domain, such as virtual try-on, 2D-to-3D garment and body modelling, pose and style transfer
- Developed a controllable 2D human avatar generation pipeline leveraging ControlNet and Low-Rank Adaptation (LoRA) fine-tuning for pose- and part-based segmentation mask conditioned synthesis and garment transfer

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

- Headed a research team developing cutting-edge techniques and models in the generative AI space, such as text-to-image, text-to-video, and image-to-video diffusion models
- Productionized an image-to-video diffusion model consisting of a text-to-image base generator finetuned on a combined dataset of images and video clips, and a motion modelling module trained to represent plausible and temporally-consistent motion (open-source code here)
- Developed an efficient memory-augmented diffusion-based video editing approach competitive with then-SOTA on metrics assessing perceptual quality, structural and temporal consistency, with a 5x speedup in VRAM use and 2x speedup in inference time

- Developed a large-scale video recommendation and ranking system integrating dense frame extraction, multimodal visual–semantic embeddings, candidate feed generation, and efficient similarity search over a vector database for ranking and retrieval optimization
- Developed a research roadmap of open problems at multiple levels of complexity, risk, ambiguity, and resource demand with the goal of maximizing product impact and creating a competitive advantage

Senior Applied Scientist, AWS Responsible AI Jun 2022 – May 2023
Pasadena, CA

- Researched and developed Responsible AI (RAI) methodologies such as bias detection and evaluation, ethical data sourcing and annotation, application-specific fairness metrics, defenses against membership inference attacks, and tooling for model interpretability and explainability
- Applied RAI frameworks to designing and auditing a variety of machine learning and computer vision models in sensitive use cases, such as face recognition, face landmark detection, face attribute prediction, content moderation, gaze prediction, face liveness detection, multimodal reasoning, open-vocabulary object detection and classification, and text-to-image generation
- Prepared model service cards outlining model design, intended use cases and limitations, fairness and bias assessment, and robustness analysis for a number of services offered by Amazon Rekognition: Compare and Search Faces, Detect and Analyze Faces, Detect Face Liveness, Find Labels, and Moderate Content
- Consulted on model guardrails for two of Amazon Bedrock's Titan foundation models (FMs): Titan Multimodal Embeddings (used for large-scale visual search and retrieval, recommendation and personalization), and Titan Image (text-to-image generation with inpainting and outpainting capabilities)
- Translated complex research concepts into digestible insights for stakeholders across the organization: from scientists and engineers working on customer-facing product, to legal experts, to executives; participated in setting OKRs and designing project roadmaps
- Integrated RAI practices across AWS's AI services lifecycle to promote safe interactions between users and AI applications, and heavily influenced the focus of internal AI development ideologies with results-driven findings on model safety and fairness performance
- Developed a framework based on Generative Adversarial Networks (GANs) inversion for producing an unlimited number of synthetic images and their corresponding pixel-wise labels after being trained on less than 50 preexisting labeled images, and demonstrated SOTA performance on several downstream tasks, like semantic segmentation, keypoint detection, and depth estimation compared to prior dataset generation approaches and transfer learning baselines (*highlight at CVPR 2023*)

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

- Served as one of the first applied scientists on a new initiative for building a physical store with large inventory and a machine-learning-and-computer-vision powered intelligent item recommendation system, which surfaces items to the user in real time based on historic interaction data, collaborative filtering techniques, and visual relevance

- Built, evaluated and productionized 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 and pose estimation from a single 2D image, virtual try-on, and fashion item compatibility modelling
- Built a pipeline for iterative human-in-the-loop data collection, annotation and validation, as well as frameworks for label disambiguation and explainability, to gather a high-quality dataset of fashion images, corresponding attribute annotations, and expert-provided labels on personal style and fit
- Developed a method for solving two critical tasks for a fashion recommendation system: compatibility prediction (ie, the task of determining whether a set of fashion items in an outfit go well together), and large-scale complementary item retrieval (ie, the task of completing a partial outfit by finding a compatible item from a large database) via a visual transformer model (*WACV 2023*)

Graduate Research Assistant
Computer Vision Group, UIUC May 2016 – Jul 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, reasoning about complex relationships between images, generative models for controllable semantic image editing in an attribute-guided manner, and model explainability
- Developed a contrastive learning approach for producing an image embedding for fashion items that respects clothing item type, and jointly learns notions of item similarity and compatibility in an end-to-end trained model
- Introduced the most-cited dataset of fashion images for compatibility learning: Polyvore Outfits (*ECCV 2018*)
- 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 interpretable explanation system for embedding models that score image similarity between a pair of input images – unlike standard single-image classifiers – and output reference-dependent saliency maps paired with natural language 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 a method for style summarization, probing and exploiting the space of fashion outfits (modelled as "bags" of fashion items) that allows for complex search queries and produces visual outfit analogies, by learning outfit-level embeddings with the help of a contrastive model and an embedding topic model

Machine Learning Engineering Intern Feb 2019 – 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 – Sep 2018
Butterfly iQ, New York, NY

- Developed an attribute-conditioned Generative Adversarial Network (GAN) model for the purpose of data augmentation and distributional gap filling in unbalanced medical image datasets

Graduate Research Assistant
Virtual Reality Group, UIUC Feb 2015 – 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 – Aug 2014
Schlumberger Ltd., Houston, TX

Summer Undergraduate Research Fellow
Robotic Manipulation and Sampling Group Jun 2012 – 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

ML/CV: PyTorch, Python, TorchVision, Diffusers, Transformers, ControlNet, LoRA, ffmpeg, OpenCV, scikit-learn, numpy, pandas, R. **Infra & MLOps:** AWS, Hydra, Hugging Face, FBLearner Flow, ModelScope, Docker, Sieve, Cog, Weights and Biases. **CI/CD:** Git, GitHub, GitLab, CircleCI. **Project mgmt:** Notion, Quip, Asana, Jira, Height, Figma, Trello, Airtable. **Data:** S3, Pinecone, MongoDB, MySQL. **Other:** Linux, bash, vim.

Conference Workshops

16th Women in Machine Learning Workshop (WiML) cohosted with NeurIPS 2021: **General Chair**. I managed the end-to-end organization of the workshop, and oversaw the program preparation, the paper submission and review process, and all communications with the main conference organizers, mentors, advisors, invited speakers, and student authors.

7th Workshop on Computer Vision for Fashion, Art, and Design (CVFAD 2024) cohosted with CVPR 2024: Organizer

6th Workshop on Computer Vision for Fashion, Art, and Design (CVFAD 2023) cohosted with CVPR 2023: Organizer

5th Workshop on Computer Vision for Fashion, Art, and Design (CVFAD 2022) cohosted with CVPR 2022: Organizer

ResistanceAI Workshop cohosted with NeurIPS 2020: Organizer

Broadening Participation in Data Mining Workshop (BPDM) cohosted with KDD 2017: Organizer

Media

- Instagram Teen Accounts Will Be Guided by PG-13 Ratings
- Empowering Parents, Protecting Teens: Meta's Approach to AI Safety
- Helping Teens See Age-Appropriate Content
- Llama Protections: An Open Approach to Protections in the Era of Generative AI
- Introducing AWS AI Service Cards: A New Resource to Enhance Transparency and Advance Responsible AI
- Amazon Reimagines In-Store Shopping with Amazon Style

Affiliations

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

Outreach and Professional Service

- Conference reviewer: *CVPR, ICCV, ECCV, NeurIPS, ICML, WACV, FAccT*
- Student volunteer: *NeurIPS, ICML, ICLR, SIGGRAPH* (2016 – 2019)
- Organizer, *Deep Learning Reading Group* (UIUC, 2016-17)

Teaching Experience

CS 598LAZ: Cutting-Edge Trends in Deep Learning and Recognition — May 2017
CS 498DV: Data Visualization — May 2020 – Aug 2020
CS 498DF: Applied Machine Learning — Jan 2016 – May 2016
CS 445: Computational Photography — Aug 2015 – Dec 2015

References

David A. Forsyth
Fulton Watson Copp Chair in Computer Science,
Professor of Computer Science, email: daf@illinois.edu
University of Illinois at Urbana-Champaign

Pietro Perona
Allen E. Puckett Professor of Electrical Engineering,
Director, Information Science and Technology, email: perona@caltech.edu
California Institute of Technology

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Peter Hallinan
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Amazon AWS

Alexander Schwing
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and Computer Engineering, email: aschwing@illinois.edu
University of Illinois at Urbana-Champaign

Derek Hoiem
Professor of Computer Science, email: dhoiem@illinois.edu
University of Illinois at Urbana-Champaign