Jurijs (Yuri) Nazarovs

As a senior expert in Computer Vision, specializing in Multimodality Understanding and Vision-Language models, I lead AI research and development across computer vision and foundation models. I support and guide my team members, fostering a collaborative environment. I also acquired an extensive experience in Generative AI during my PhD.

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INDUSTRY EXPERIENCE

Amazon, Applied Scientist   since August 2024
◇ **Multi-modal on-device system**: Designed and implemented an end-to-end AI assistant leveraging VLMs and LLMs, covering data collection and generation, system design, fine-tuning, and system-wide evaluation using both standard embedding-based metrics and novel LLM-based metrics; fine-tuned VLMs for grounding activity recognition in videos to generate perception data, and developed LLMs as the "brain" of a two-stage system prioritizing recall.

Ambient.ai, Senior Applied Research Scientist   April 2023 - August 2024
◇ **Multimodality**: led a natural language video search project, focusing on deploying the ImageTagging model on devices, utilizing quantization with fine-tuning for enhanced performance. To manage hardware limitations for frame rate, developed a novel dynamic weighted frames sampling method to focus on frames of interest.
◇ Implemented a **zero-shot** object detection and segmentation pipeline using advanced Vision Language Models, Grounding DINO and SAM, optimized through deployment of an Efficient Vit.
◇ Directed a project on **Incremental Learning** for Object Detection models, utilizing distillation and creating an automated labeling pipeline that leveraged the Grounding DINO model, reducing data annotation costs in two times.

Amazon Alexa AI, Applied Scientist   May 2022 - September 2022
Developed a novel adversarial training method to enhance the robustness of a Vision Language Model-based Question Answering system (VQA) to linguistic variations and image manipulations, utilizing multimodality UNITER-like architecture. **Paper**.

Microsoft Research (MSR), Researcher   May 2021 - August 2021
Designed and implemented (PyTorch) a novel Bayesian Neural Networks as cutting-edge temporal probabilistic deep learning techniques for the defense cyber domain to handle sparse, imbalanced in classes and limited in size data sets. Method is used as alarming system for human in-the-loop to detect possible ransomware. A first-author publication and secured a patent.

EDUCATION

University of Wisconsin - Madison, Madison, WI. PhD, Statistics
University of Wisconsin - Madison, Madison, WI. MS, Computer Science
Duke University, Durham, NC. MA, Economics

SKILLS

Computer Vision, Foundation models, Generative models, Deep/Machine Learning, Multimodality, LLM, VLM, Trajectory Prediction, Perception, Probabilistic Models, VAE, BNN, GAN, Python (PyTorch, TensorFlow), R, Bash, Linux, AWS

PUBLICATIONS

Image2Gif: Generating Continuous Realistic Animations with Warping NODEs, **CVPR 2022** (AI4CC workshop). Introduced a novel Deep learning Module, Warping Neural ODE, as a Video Frame Interpolation (VFI) mechanism, to generate GIF between two conceptually far apart frames. Method allows to generate unlimited number of FPS, making smooth VFI.

Understanding Uncertainty Maps in Vision with Statistical Testing, **CVPR 2022** (25% acceptance rate). Introduced a stable diffusion like model, Warping Neural ODE combining with Random Fields theory, to derive significant regions of the Uncertainty Maps obtained from probabilistic DNN (BNN/VAE) in image generation and perception settings, like segmentation.

Mixed Effects Neural ODE: A variational approximation for analyzing the dynamics of panel data, **UAI 2021** (26% acceptance rate). Introduced the temporal generative model, Mixed-Effect Neural ODE, which allows to model uncertainty like SDE, but use ODE solvers in combination with DNN, for trajectory prediction of physical processes, humanoids and reconstruction of 3D brain scans of Alzheimer's disease progression.

Functional NODE - sampling of trajectories. Introduced a new Functional NODE framework which allows to sample trajectories in a VAE-like procedure, e.g. human/skeleton actions, physical processes, and other and perform statistical inference.

Radial Spike and Slab Bayesian Neural Networks for Sparse Data in Ransomware Attacks, U.S. Patent.

Ordinal Quadruplet: Retrieval of Missing Labels in Ordinal Time Series, U.S. Patent.