

Jurijs (Yuri) Nazarovs

Led cutting-edge research with hands on experience on building Deep Neural Networks in a variety of fields, including foundation models, generative temporal-spatial models, computer vision, vision language models.

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INDUSTRY EXPERIENCE

Ambient.ai, Applied Research Scientist since April 2023

Multimodality: led an MP side of natural language video search project, focusing on deploying the ImageTagging VL model on devices, utilizing quantization and batching. To manage hardware limitations, introduced a novel dynamic weighted frames sampling method to focus on frames of interest. Developed a pipeline for the quick integration of new classes into the ImageTagging model through language descriptions, coupled with fine-tuning for enhanced performance. Implemented a zero-shot object detection and segmentation pipeline using advanced VLMs like Grounding DINO and SAM, optimized through deployment of an Efficient Vit. Directed a project on Incremental Learning for Object Detection models, creating an automated labeling pipeline that leveraged the Grounding DINO model, halving labeling costs. Introduced an innovative method for abnormal crowd behavior detection using Optical Flow and tackled data scarcity in the field with a novel data generation strategy.

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.

NEC Labs America, Researcher May 2020 - August 2020

Developed and implemented (Tensorflow) a novel triplet-based loss function and as a zero-shot framework for ordinal time series classification problems, resulting in a robust solution against missing labels.

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.

Expanded encyclopaedias of DNA elements in the human and mouse genomes, Nature.