Antonios Tragoudaras

https://antragoudaras.github.io/ | antragoudaras | Antonios-Tony-Tragoudaras | Antonios-Tragoudaras

Education

University of Amsterdam (UvA) *Amsterdam, Netherlands*

MSc in Artificial Intelligence (Informatics Institute) Aug. 2023 - Present

GPA: 8.25/10 - In track to graduate with cum-laude (highest distinction).

Thesis: Physically possible Video Generation with Compositional World Models, as part of the ELLIS MSc Honors Student program.

King Abdullah University of Science and Technology (KAUST) *Jeddah, Saudi Arabia*

Ph.D. Student in Electrical and Computer Engineering Aug. 2022 - Aug. 2023 (Deliberately Dropped out)

GPA: N/A, 24 Credits - Doctoral Dissertation Research.

University of Thessaly *Volos, Greece*

BEng in Electrical & Computer Engineering (5-years studies; 300ECTS) Sep. 2016 - Nov. 2021

GPA: 7.88/10, Thesis Grade: 10/10, Supervisor: Prof. George Stamoulis.

Research Experience

Physics Based Dynamics *University of Amsterdam (UvA)*

Master thesis research project - ELLIS MSc Honors Student. Main Advisor: Professor Efstratios Gavves, ELLIS co-advisor: Francesco Locatello Jan. 2025-Present

Description/Goals:

- Develop a framework to enhance physical plausibility in Video Generative Models (VGMs) by integrating physics engines for synthetic data generation.
- Leveraging insights from previous research experience, to adress fundamental challenges in VGMs regarding physical consistency and parameter estimation.
- Building upon DreMa, a compositional world model, to learn efficient object-centric representations from limited viewpoints to generated physics-based video simulations.
- Design *Physically-controllable VGMs* by conditioning generative models on compositional world model outputs or intermediate representations, achieving more realistic video generation with proper physical dynamics. Evaluated results using benchmark developed during prior work on Learning Physics from Videos project.

Learning Physics from Videos *University of Amsterdam (UvA)*

Research Project led by Associate Professor Efstratios Gavves - Benchmark for evaluating contemporary video generation models (VGMs), like SORA, in understanding real-world phenomena. Jul.2024- Feb. 2025

Duties/Tasks:

- Real world dataset: capturing simple physical phenomena (falling ball, projectile motion, holonomic/non-holonomic pendulums) under controlled laboratory conditions, with varying initial conditions per experiment.
- Literature review examining recent developments in Video Generative Models (VGMs), with particular emphasis on assessing the physical reasoning and plausibility of contemporary methods such as COSMOS, which claims to be real-world simulators. The study also explores innovative hybrid approaches, including the integration of flow matching techniques with diffusion-based architectures as demonstrated in Pyramid Flow.
- Video Generation: Conditioned the sampling process of VGMs on initial frame(s) both in real-world videos and in-the-wild data. Combined different prompting approaches, while utilized textual prompt enhancers.
- Trajectory Extraction Pipeline: A key aspect is the pipeline to extract relevant physical information from both real and generated videos. This involves calculating 3D trajectory of the object over time/frames, using zero-shot self supervised methods, building upon DEVA.
- Going beyond mere pixel-to-pixel evaluation to derive more interpretable metrics and develop a benchmark to faithfully assess the physical reasoning and consistency of VGMs.

Key Findings:

- Current video generative models often fail to accurately represent physical laws, generating implausible behaviors despite visually realistic outputs.
- This work serves as a stepping stone in understanding and addressing the domain gap between visual aesthetics and accurate physical simulation in generated videos.

Visual Perception for Autonomous Vehicles - Brightskies Inc. *External Collaboration*

Remote Collaboration, monitored by Mahmoud Serour (Autonomous Driving Team Lead) and Mohamed Ezzat (Perception Engineer). Collaboration Initiated by Research Scientist Hakim Ghazzai (AI Team Lead of our research group). Mar.2023-Jun.2023

Duties/Tasks:

- Combining methods for better Representation Learning and Early Fusion of the sensor data modalities used in autonomous cars, targeting to acquire better accuracy in downstream Computer Vision tasks.
- Multi-Task Learning Hydra network with multiple heads, each corresponding to a different downstream task, to achieve real-time performance on computationally constrained systems.

Neural Architecture Search, Meta-Heuristic Optimization, Transformers for brain signal decoding *King Abdullah University of Science and Technology (KAUST)*

Ph.D. Student, supervised by Postdoc Fellow Charalampos Antoniadis Sep. 2022 - Feb.2023

Journal Publications:

- Enhancing DNN models for EEG/ECoG BCI with a Novel Data-Driven Offline Optimization Method (IEEE Access)

Paper Publications:

- Data-Driven Offline Optimization of Deep CNN Models for EEG and ECoG Decoding (ISCAS'23)

AutoML, Efficient Deep Learning Techniques, and Voice Activity Detection *VSPR - KAUST*

Visiting Student Research Intern, mentored by Postdoc Fellow Charalampos Antoniadis Feb. 2022 - Jul. 2022

Paper Publications:

- TinyML for EEG Decoding on Microcontrollers (ISCAS'23)
- Audio-visual Speaker Diarization: Improved Voice Activity Detection with CNN based Feature Extraction (MWSCAS'22)

Accelerating Inference of Deep Neural Networks on FPGAs *University of Thessaly*

Undergraduate Researcher, mentored by Prof. George Stamoulis and Postdoc Fellow George Floros Jul. 2021 - Jan. 2022

Journal Publication:

- Design Space Exploration of a Sparse MobileNetV2 Using High-Level Synthesis and Sparse Matrix Techniques on FPGAs (MDPI Sensors'22)

Publications

Full list is available at Google Scholar

[1] **Antonios Tragoudaras**, Charalampos Antoniadis, Yehia Masoud. "Enhancing DNN models for EEG/ECoG BCI with a Novel Data-Driven Offline Optimization Method," in *IEEE Access, vol. 11, pp. 35888-35900, 2023*, doi: 10.1109/ACCESS.2023.3265040

[2] **Antonios Tragoudaras**, Charalampos Antoniadis, Yehia Masoud. "TinyML for EEG Decoding on Microcontrollers," in *2023 IEEE 56th International Symposium on Circuits and Systems (ISCAS)]*

[3] **Antonios Tragoudaras**, Pavlos Stoikos, Konstantinos Fanaras, Athanasios Tziouvaras, George Floros, Georgios Dimitriou, Kostas Kolomvatsos, Georgios Stamoulis. "Design Space Exploration of a Sparse MobileNetV2 Using High-Level Synthesis and Sparse Matrix Techniques on FPGAs," in *MDPI Sensors 22, no. 12: 4318]*, doi:10.3390/s22124318

[4] Konstantinos Fanaras, **Antonios Tragoudaras**, Charalampos Antoniadis, Yehia Masoud. "Audio-visual Speaker Diarization: Improved Voice Activity Detection with CNN based Feature Extraction," in *2022 IEEE 65th International Midwest Symposium on Circuits and Systems (MWSCAS), Fukuoka, Japan, 2022, pp. 1-4*, doi: 10.1109/MWSCAS54063.2022.9859533

Awards and Honors

Dec. 2024 - Present — ELLIS MSc Honours Program: Award and funding for excellent MSc students to conduct their thesis under their joint supervision of UvA ELLIS unit at an ELLIS partner institution outside of the Netherlands. *UvA IvI*

Aug. 2022- Aug. 2023 — **KAUST Graduate Fellowship**: Full tuition support, living allowance, housing, and medical coverage. *KAUST*

Teaching Experrience

Graduate Teaching Assistant at UvA's MSc AI Program *UvA, Amsterdam, Netherlands*

Assisted in teaching graduate-level (first-year) courses by making sure students understood the material, answering their questions, creating assignments, giving feedback, and grading exams. Aug. 2024 - Present

Courses:

- Computer Vision 1 (MSc AI) (Aug. 2024 - Oct.2024)
- Deep Learning 1 (MSc AI) (Oct. 2024- Dec.2024)
- Fairness, Accountability, Confidentiality & Transparency in AI (MSc AI) (Jan. 2025 - Feb. 2025)
- Information Retrieval 1 (MSc AI) (Feb.2025 - Mar. 2025)