Alexandros Benetatos

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multimodal learning | computer vision |
robotics teams coach

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Education

■ **Electrical and Computer Engineer | Integrated BSc/MSc 5 years | GPA: 8.83/10 | Major GPA: 9/10 | top 9% of my class**   **2016 – 2022**
National Technical University of Athens | Major in Computer Science

■ **Ionidios School of Piraeus High School | GPA: 19.6/20**   **2013 - 2016**

- Member of the National Physics Team for the 47th International Physics Olympiad at Zurich, Switzerland in 2016.
- Competed for the World Robotics Olympiad (WRO) for 3 consecutive years and qualified for the finals in Doha in 2015.
- Designed and constructed a mini compressed-air-powered car for the F1 in Schools Competition using SolidWorks.

Publications

■ **Stellar: Systematic Evaluation of Human-Centric Personalized Text-to-Image Methods** (pdf, website)   **2024**
ArXiv

A systematic study on personalized text-to-image generation where an input image of an individual is used to ground the generation process along with text describing the desired visual context. Our first contribution is to fill the literature gap by curating high-quality appropriate ground-truth data for this task that contains personalized prompts coupled with images of individuals, is orders of magnitude larger than existing relevant datasets, and includes rich semantic ground-truth annotations. To further promote cross-systems fine-grained comparisons, we introduce an ensemble of specialized metrics that highlight and disentangle fundamental properties of the systems. Our new metrics correlate much stronger with human judgment compared to currently used (generic) text-to-image metrics on this task. Finally, drawing inspiration from the recent works of Elite and SDXL we produce a highly efficient text2image model, that does not require pre-subject test-time finetuning and sets quantitatively and in human trials a new SoTA by a wide margin.

■ **Generating Salient Scene Graphs with Weak Language Supervision** (pdf, video)   **2023**
EUSIPCO-2023

SGG models struggle to identify important and descriptive relations in images flooding the graph with triplets like <window - on - building>. This is not due to training problems but rather the lack of saliency in fully supervised SGG datasets. Considering that annotators describing an image naturally omit background relations and encode image saliency we (i) introduce a generalized method for training SGG models with weak supervision using image captions, (ii) introduce two variations of the Recall@N metric which can quantify the saliency of SGG models and (iii) perform quantitative and qualitative comparisons with related literature in VG200, where we achieve up to 35% improvement compared to re-implementation of the SOTA.

A. Benetatos, M. Diomataris, V. Pitsikalis and P. Maragos, "Generating Salient Scene Graphs with Weak Language Supervision," 2023 31st European Signal Processing Conference (EUSIPCO), Helsinki, Finland, 2023

■ **Assessing Vision Quality in Retinal Prosthesis Implantees through Deep Learning: Current Progress and Improvements by Optimizing Hardware Design Parameters and Rehabilitation** (pdf, video)   **2021**
EMBC-2021

We simulate prosthetic vision and evaluate it on image classification tasks, varying critical hardware parameters: total number and size of electrodes. We also simulate rehabilitation by re-training our models on prosthetic vision images.

A. Benetatos, N. Melanitis and K. S. Nikita, "Assessing Vision Quality in Retinal Prosthesis Implantees through Deep Learning: Current Progress and Improvements by Optimizing Hardware Design Parameters and Rehabilitation," 2021 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC), 2021

Research Experience

■ **Research Scientist @ Steelperlot** | supervised by Panos Achlioptas   **2023 – now**

Developed and systematically evaluated personalized text-to-image generation models. See the publication "Stellar: Systematic Evaluation of Human-Centric Personalized Text-to-Image Methods" for details

- ■ **Diploma Thesis - Salient Scene Graph Generation using Weak Supervision on Image Captions**   **2021 – 2022**
  co-supervised by Prof. Petros Maragos and Deeplab

  See the publication "Generating Salient Scene Graphs with Weak Language Supervision" for details

- ■ **Member of "Prometheus Eco Racing", a Research Team Building Efficient Electric Vehicles**   **2017 – 2020**
  National Technical University of Athens

  - ▪ Monitoring of driver's vital senses, concentration, and warning in the occasion of unusual vital senses using machine learning. This project won 1st place in the Safety Award category at the European Shell Eco-Marathon – 2018
  - ▪ Simulation using Simulink to determine a racing strategy that achieved the best fuel consumption on the race track.
  - ▪ Team's website development for 2017-2018 using PHP, HTML5, CSS3, and JS as well as the current website.
  - ▪ PR and FR head while developing a new logo (rebranding), held COVID campaigns, community events, and others.

- ■ **Electrical and Computer Engineer - Notable projects**   **2016 – 2022**
  National Technical University of Athens

  - ▪ Face and hand tracking using optical flow estimation with the Lucas-Kanade method
  - ▪ Action recognition in videos using the bag-of-visual-words method for feature extraction and SVM for classification
  - ▪ CNN-based model that estimates the emotional effect of a song given its audio spectrogram
  - ▪ Spell-correcting Automation for the Greek language (using weighted finite state transducers)
  - ▪ Obstacle (wall) tracking for a differential robot with sonar sensors using Python in ROS
  - ▪ Optimal controller design for stabilizing a simulated inverse pendulum mounted on a cart
  - ▪ Developed an Arduino library for the MPU9250 MARG sensor using C++
  - ▪ Adaptive controller for a 2-phase motor model including uncertainty and unknown torque load

Achievements and Awards in Science/Robotics

- ■ **Coach of the FIRST Tech Challenge Robotics Competition Team "The Inventors FTC"**   **2021 – now**
  Robotics and Innovation Academy of Vari Voula Vouliagmeni | 15-member team

  - ▪ _Captain of Winning Alliance_ Award and _1st place_ for the _Think Awards_ at the Regional Championship Tournament of Cyprus, for the FIRST Tech Challenge Robotics World Championship – April 2022

- ■ **Coach of the FIRST LEGO League Robotics Competition Team "Next Generation Kids"**   **2017 – 2020**
  2nd elementary school of Kalyvia | 10-member team

  - ▪ Technical Award on the "Creative Category" of the International Robotics Olympiad (IRO) – April 2022
  - ▪ _8th place_ in _robot performance_ and _Judges award_ for the best "all around" team in the competition, between the 108 best teams from around the world in the FIRST Championship of FIRST LEGO League (FLL) in Houston, Texas. That is the first prize that a Hellenic team has ever won in an International Robotics FLL competition – April 2019
  - ▪ _2nd Panhellenic place_ at the National Finals of FLL, giving as the ticket to the World FIRST Championship, and proposed to represent Greece as the candidacy for the Global Innovation Award by FIRST – March 2019
  - ▪ _3rd Panhellenic place_ at the National Finals of FLL, giving as the ticket for the Estonian Open International, and _1st Programming Award_ – March 2018

- ■ _4th Panhellenic place_ **at the last phase of the National Physics Competition and, as a result, member of the National Physics Team participating in the 47th International Physics Olympiad**   **May 2016**
  Athens, Greece | Zurich, Switzerland

- ■ _2nd National place_ **on the 7th Panhellenic Robotics Competition WRO Hellas and, as a result, member of the National Robotics team participating in the 12th World Robot Olympiad**   **October 2015**
  Athens, Greece | Doha, Qatar

- ■ _1st place_ **at the competition part of the 1st Student Festival of Robotics**   **December 2014**
  Experimental Junior High School of Macedonia University, Greece

Special Knowledge

- ■ Coding [proficient or expert]: Python, C, C++, Java, MATLAB, Simulink, HTML5, CSS3, JS, PHP, SQL, WordPress
- ■ CAD programs [proficient]: SolidWorks, Autodesk Inventor, OnShape
- ■ Classical Piano Diploma (Haydn Concerto, Beethoven Tempest), Classical Guitar Degree, Music Harmony Degree
- ■ Fluent in Greek (native language), Certificate of Competency in English (University of Michigan)