Edson Araujo

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Education

- **Goethe University of Frankfurt** — Frankfurt, Germany
  PhD in Computer Science — *Sep 2024 – Current*
- **Rheinische Friedrich-Wilhelms-Universität Bonn (UniBonn)** — Bonn, Germany
  PhD in Computer Science — *Oct 2023 – Sep 2024 (transferred)*
- **Universidade Federal de Minas Gerais (UFMG)** — Belo Horizonte, MG, Brazil
  Master of Science in Computer Science (Grade: 94/100*)* — *Mar 2020 – Feb 2023*
- **Universidade Federal de Minas Gerais (UFMG)** — Belo Horizonte, MG, Brazil
  Bachelor of Computer Science — *Feb 2014 – Dec 2019*

Research Interests

Computer Vision, Self-Supervised Learning, Multi-Modal Learning

Industry Experience

- **Covision Lab** — Bressanone, BZ, Italy
  Computer Vision & Machine Learning Engineer — *June 2022 - May 2023*
  - **Unsupervised Annomaly Detection**: Working on automating and industrializing processes leveraging state-of-the-art Computer Vision and Machine Learning approaches. More specifically, developing new models for defect detection on several types of products in a quality control application.
  - **One-click Training**: Working on integrating a complete end-to-end pipeline for deploying new models in production for defect detection clients.

Research Experience

- **CVML Group, Tübingen AI Center & MIT-IBM Watson Lab** — Bonn, Germany
  Researcher — *Oct 2023 – Current*
  - **Audio-Visual Large Language Models**: Exploring the different behaviors of AVLLMs trained on multimodal data while performing single-modality tasks.
  - **Audio-Visual Representation**: Extending the Contrastive Audio-Visual Masked Auto-Encoder (CAV-MAE) framework, focusing on finer-grained correspondences in audio and visual data by leveraging time synchronization. Integrating contrastive learning and masked data modeling to enhance joint and coordinated audio-visual representations. [1]
- **Laboratory of Computer Vision and Robotics, UFMG** — Belo Horizonte, MG, Brazil
  Graduate Research Assistant — *Mar 2020 – Feb 2023*
  - **Video Summarization**: Investigated the interplay between human perception of sounds and video segments importance. Exploring self-supervised multi-modal models with psychoacoustic features to estimate video summaries from audio-visual scenes.
  - **Semantic Hyperlapse**: Part of the team responsible for conceptualizing and implementing features for a Semantic Hyperlapse method based on a reinforcement learning formulation, using textual information to accelerate instructional videos. [3, 4]
  - **Automatic Diagnosis in Ultrasonography**: Working towards automatic identification of Rheumatic Heart Disease (RHD) in echocardiographic exams. Worked also on the automatic detection of echocardiographic predictors of mortality in patients hospitalized with COVID-19. Exploring attention-based networks in a multi-task learning setup. [2]

  Advisor: Prof. Erickson Nascimento
- **Berkeley Artificial Intelligence Research Lab, UC Berkeley** — Berkeley, CA, USA
  Visiting Undergraduate Researcher — *Dec 2018 – Mar 2019*

- **Auditory Annoyance impact on Driving Style**: Devised several experiments and analysis towards evaluating the effect of acoustic annoyance on drivers in a real-world driving study. [6]

  Advisors: Prof. Ruzena Bajcsy, Prof. Erickson Nascimento

- **Laboratory of Computer Vision and Robotics, UFMG** — Belo Horizonte, MG, Brazil
  Undergraduate Researcher — *Aug 2016 – Dec 2019*
  - **Semantic Hyperlapse**: Actively participated in the conception of and implemented features for a Semantic Hyperlapse method using textual information to infer interests from users' social networks to semantically align them with extracted visual features from the input video. [5, 7]
  - **Limitations of CNN-based Binary Local Descriptors**: Used Keras and Theano frameworks to model and train a convolutional neural network in order to achieve a precise binary description of images. Our work resulted in an in-depth analysis on the limitations of the use of convolutional neural networks on the problem of binary tests selection. [8]

  Advisor: Prof. Erickson Nascimento

- **WISEMAP Networking Lab, UFMG** — Belo Horizonte, MG, Brazil
  Undergraduate Researcher — *Mar 2015 – Jun 2016*
  - **Multihop Address Assignment for Any-to-Any Routing with 6LoWPAN**: Responsible for part of the implementation and conception, using concepts from distributed systems programming, of a platform-independent routing protocol called Matrix. [9]

  Advisor: Prof. Olga Goussevskaia

- **Department of Mathematics, UFMG** — Belo Horizonte, MG, Brazil
  Undergraduate Researcher — *Sep 2014 – Jan 2015*
  - **Maximum Agreement Subtree**: Developed a tool to solve and further help understand the limitations of the 'maximum agreement subtree' problem. More specifically, we were concerned with the lower bound for the size of the largest subset of leaves in a common subtree between two trees.

  Advisor: Prof. Bhalchandra Thatte

Publications *

1. **Edson Araujo**, Andrew Rouditchenko, Yuan Gong, Saurabhchand Bhati, Samuel Thomas, Brian Kingsbury, Leonid Karlinsky, Rogerio Feris, James R. Glass, and Hilde Kuehne. Cav-mae sync: Improving contrastive audio-visual mask autoencoders via fine-grained alignment. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2025

2. João Martins†, **Edson Araujo**†, Antônio Ribeiro, Wagner Meira, Craig Sable, Andrea Beaton, Bruno Nascimento, Gisele Pappa, and Erickson Nascimento. A multi-task learning approach to classify rheumatic heart disease on echocardiographic imaging. In *Artificial Intelligence In Medicine*, *Under review.* 2021

3. Washington Ramos, Michel Silva, **Edson Araujo**, Victor Moura, Keller Oliveira, Leandro Marcolino, and Erickson Nascimento. Text-driven video acceleration: A weakly-supervised reinforcement learning method. In *Transactions on Pattern Anaysis and Machine Intelligence*, March 2022

4. Washington Ramos, Michel Silva, **Edson Araujo**, Leandro Soriano Marcolino, and Erickson Nascimento. Straight to the point: Fast-forwarding videos via reinforcement learning using textual data. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, June 2020

5. W. L. S. Ramos, M. M. Silva, **E. R. Araujo**, A. C. Neves, and E. R. Nascimento. Personalizing fast-forward videos based on visual and textual features from social network. In *2020 IEEE Winter Conference on Applications of Computer Vision (WACV)*, 2020

6. **E. Araujo**†, M. Gregor†, I. Huang†, E. R. Nascimento, and R. Bajcsy. On modeling the effects of auditory annoyance on driving style and passenger comfort. In *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2019

*In Reverse Chronological Order.

† Equal contribution.

7. M. Silva, W. Ramos, A. Neves, **E. Araujo**, M. Campos, and E. R. Nascimento. Fast-forward methods for egocentric videos: A review. In *2019 32nd SIBGRAPI Conference on Graphics, Patterns and Images Tutorials (SIBGRAPI-T)*, 2019

8. Bernardo Janko Gonçalves Biesseck., **Edson Araujo**, and Erickson R. Nascimento. Exploring the limitations of the convolutional neural networks on binary tests selection for local features. In *Proceedings of the 14th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications - Volume 4 (VISAPP)*, 2019

9. Bruna Peres, Bruno Pereira Souza, Otavio Augusto, **Edson Araujo**, Olga Goussevskaia, Marcos Augusto Vieira, Luiz Filipe Vieira, and Antonio Alfredo Loureiro. Matrix: Multihop address allocation and dynamic any-to-any routing for 6lowpan. In *Proceedings of the 19th ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (MSWiM '16)*, 2016