ANDREA BRITTO MATTOS LIMA

• M.SC. IN COMPUTER SCIENCE • • SENIOR RESEARCH SOFTWARE ENGINEER •

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PROFILE

I received my B.Sc. and M.Sc. degrees in Computer Science from Institute of Mathematics and Statistics at University of Sao Paulo (IME-USP). I am currently a Senior Research Software Engineer at Microsoft Research, working in projects that involve Computer Vision research at various domains. My areas of interest include Computer Vision, Machine Learning, and Computer Graphics.

EXPERIENCE

Senior Research Software Engineer at Microsoft Research October/2021 - present

Presently, I'm working at the Special Projects group at Microsoft Research Lab in Redmond, USA, while being based in Sao Paulo, Brazil. I am dedicated to research in computer vision and computer graphics, generating intellectual property for the company and overseeing external collaborations. My main projects are listed below.

- 3D Telemedicine: Aims to enhance healthcare accessibility for rural and underserved communities, by leveraging Holoportation™ technology and affordable Azure Kinect sensors. The system captures and streams live 3D content of patients to remote clinicians in real-time, elevating quality and patient satisfaction compared to 2D telemedicine.
- Paralinguistic Prompting: Focuses on enhancing the capabilities of large language models (LLMs) by addressing their limitations in understanding nonverbal cues and contextual nuances. I worked on machine learning models for recognition of facial expressions - that contribute to meaning and intentions in human interactions.

EDUCATION

Master's degree in Computer Science

Mar/2009 - May/2011

University of Sao Paulo (USP) – Sao Paulo, Brazil.

- Thesis title: 3D facial animation based on structural registration.
- Advisor: Roberto Marcondes Cesar Jr.
- Member of the Computer Vision Research Group at IME-USP.
- Collaborator of VISGRAF Lab IMPA/RJ.

Bachelor's degree in Computer Science

Mar/2005 - Dec/2008

University of Sao Paulo (USP) – Sao Paulo, Brazil.

EXPERIENCE

Research Software Engineer at IBM Research Brazil May/2013 - October/2021

I worked on projects that involved applied research in Computer Vision, often having collaboration with researchers from other global labs and external clients. I was in charge of creating algorithms, developing prototypes, and producing papers and patents. I was also dedicated to Diversity & Inclusion initiatives. My main projects developed during the period are listed below.

- Seismic Interpretation: Created 3D geometry-based post-processing method for Horizon Picking with sematic segmentation networks (client Gazprom Neft) and built experimental framework for evaluating texture descriptors for Seismic Facies Analysis (client Galp Energia).
- Digital Agriculture: Enhanced crop identification through the evaluation of Convolutional LSTM models' generalization capabilities. Additionally, applied CNNs for the classification of citrus trees using UAV images captured in dense orchards for client 3DGeo.
- Audio-visual Speech Recognition: Leveraged Generative Adversarial Networks (GANs) to enhance viseme recognition by incorporating multi-view synthetic data.
- Accessibility: Developed a prototype tailored for individuals with visual impairment and an educational platform designed for those with cognitive disabilities, in collaboration with APAE-SP.
- Tech for Justice: Conducted a user study to examine potential variations in the career decision-making process across genders and fields (STEM vs. non-STEM). Explored the application of Machine Learning to support underrepresented groups in two distinct tasks: securing micro-credit and accessing qualified job postings.

Research and Development Analyst at IBOPE Media Mar/2011 - May/2013

In the Innovation Department, I focused on implementing algorithms that supported new technologies within the company, in the areas of Computer Vision and Natural Language Processing. Simultaneously, I took the role of coordinating new product development using agile methodology (Scrum).

My main contribution was leading a pivotal project for the optical recognition of hand-filled questionnaires (Target Group Index), aiming to digitize survey responses. Conducted quarterly, the TGI research yielded approximately 500,000 pages of manually typed responses from thousands of participants. I played a central role implementing image classifiers and coordinating various departments, and the resulting product significantly minimized human effort, enhanced efficiency, and produced cost savings for more than a decade.

MAIN TECHNICAL SKILLS

- Computer Vision, Machine Learning.
- C/C++, Python.

LANGUAGES

English: fluent.Spanish: advanced.

Portuguese: fluent (mother language).

AWARDS & GRANTS

- Best paper nomination on IEEE International Symposium on Multimedia (ISM), 2019.
- Best paper award on XV Workshop on Computational Vision (WVC), 2019.
- IBM Fifth Plateau Invention Achievement Award, 2019.

- IBM Fourth Plateau Invention Achievement Award, 2019.
- IBM Third Plateau Invention Achievement Award, 2019.
- IBM Research Accomplishment Award: "Research Contributions to Accessibility and Education", 2018.
- IBM Research Accomplishment Award: "Cognitive Computing for Seismic Interpretation", 2017.
- Honorable mention at IHC Conference (track HCl in practice), 2017.
- IBM Second Plateau Invention Achievement Award, 2017.
- Best paper nomination at The Web for All Conference (W4A), 2016.
- IBM First Plateau Invention Achievement Award, 2016.
- Best paper award on The Paciello Group Web Accessibility Challenge (W4A), 2014.
- IBM Research Division Award: "Mobile based crowdsourcing platform for consumer and citizen engagement and insight, 2014".
- FAPESP scholarship grant (May/2009 March/2011).

PUBLICATIONS

- [1] Steven Lo, Anna Rose, Spencer Fowers, Kwame Darko, Andrea Britto Mattos, Thiago Spina, et al. "Ghana 3D Telemedicine International MDT: A Proof-of-concept study", In Journal of Plastic, Reconstructive & Aesthetic Surgery, 2023.
- [2] Steven Lo, Spencer Fowers, Kwame Darko, Thiago Spina, Catriona Graham, Andrea Britto Mattos, et al. "Participatory Development of a 3D Telemedicine system during Covid: the future of remote consultations", In Journal of Plastic, Reconstructive & Aesthetic Surgery, 2022.
- [3] Amber Hoak, David Tittsworth, Kate Lytvynets, and Andrea Britto Mattos. "Futurizing the Web: Unleashing Creative Possibilities with Browser-Based ML", In Grace Hopper Celebration, 2022.
- [4] Danilo Calhes, Felipe K. Kobayashi, Andrea Britto Mattos, Maysa M. G. Macedo and Dario A. B Oliveira. "Simplifying Horizon Picking Using Single-Class Semantic Segmentation Networks", In 34th Sibgrapi – Conference on Graphics, Patterns and Images, 2021.
- [5] Heloisa Candello, Andrea Britto Mattos, Claudio Pinhanez, Rogerio de Paula, and Marcelo Grave. "Microbanking: Bringing Credit to Underrepresented Communities by Enhancing Local Financial Practices With Al", In Reframing Diversity in Al: Representation, Inclusion and Power (AAAI 2021 Workshop).
- [6] Maysa M G Macedo, Marisa Vasconcelos, Andrea Britto Mattos, and Rogerio Abreu de Paula. "Connecting Underrepresented Minorities and Qualified Job Positions Using Online Data", In Reframing Diversity in AI: Representation, Inclusion and Power (AAAI 2021 Workshop).
- [7] Andrea Britto Mattos, Daniel Civitarese, Daniela Szwarcman, Matheus Oliveira, Semen Zaytsev, Daniil G. Semin, and Dário A. B. Oliveira. "Enabling Robust Horizon Picking From Small Training Sets", In IEEE Transactions on Geoscience and Remote Sensing, 2020.
- [8] Maysa Malfiza Garcia de Macedo, Andrea Britto Mattos, and Dário Augusto Borges Oliveira. "Generalization of Convolutional LSTM Models for Crop Area Estimation", In IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing 2020.
- [9] Felipe Kawashita Kobayashi, Andrea Britto Mattos, Bruno Holtz Gemignani, and Maysa M G Macedo. "Experimental Analysis of Citrus Tree Classification from UAV Images", In IEEE International Symposium on Multimedia (ISM), 2019.
- [10] Felipe Kawashita Kobayashi, Andrea Britto Mattos, Maysa M G Macedo, and Bruno Holtz Gemignani. "Citrus Tree Classification from UAV Images: Analysis and Experimental Results", In XV Workshop on Computational Vision (WVC), 2019.
- [11] Dario Augusto Borges Oliveira, Andrea Britto Mattos, and Edmilson da Silva Morais. "*Improving Viseme Recognition with GAN-based Muti-view Mapping*", In Proceedings of the IEEE Conference on Automatic Face and Gesture Recognition (FG), 2019.
- [12] Andrea Britto Mattos, Dario Augusto Borges Oliveira, and Edmilson da Silva Morais. "*Improving Viseme Recognition with Synthetic Data using CNNs and GAN-based Muti-view Mapping*", In 13th Women in Machine Learning Workshop (WiML), 2018.
- [13] Maciel Zortea, Maysa M. G. Macedo, Andrea Britto Mattos, Bernardo C. Ruga, Bruno H. Gemignani. "Automatic citrus tree detection from UAV images based on convolutional neural networks", In 31th Sibgrap/WIA Conference on Graphics, Patterns and Images, 2018.

- [14] Andrea Britto Mattos, Dario Augusto Borges Oliveira, and Edmilson da Silva Morais. "*Towards View-independent Viseme Recognition based on CNNs and Synthetic Data*", In Proceedings of the IEEE International Conference on Image Processing (ICIP), 2018.
- [15] Maysa Macedo, Andrea Britto Mattos, and Marisa Vaconcelos. "*Identificando Influências na Escolha de uma Graduação em Exatas: um Estudo Qualitativo e Comparativo de Gênero*", In 12th Women in Information Technology (WIT-CSBC), 2018.
- [16] Andrea Britto Mattos, Dario Augusto Borges Oliveira, and Edmilson da Silva Morais. "*Improving CNN-based Viseme Recognition Using Synthetic Data*", In Proceedings of the IEEE International Conference on Multimedia and Expo (ICME), 2018.
- [17] Dario Augusto Borges Oliveira, Andrea Britto Mattos, and Edmilson da Silva Morais. "*Improving Viseme Recognition using GAN-based Frontal View Mapping*", In Analysis and Modeling of Faces and Gestures (AMFG@CVPR), 2018.
- [18] Andrea Britto Mattos and Dario Augusto Borges Oliveira. "*Multi-view Mouth Renderization for Assisting Lip-reading*", In Proceedings of the 15th Web for All Conference, 2018.
- [19] Emilio Vital Brazil, Rodrigo da Silva Ferreira, Andrea Britto Mattos, Reinaldo M. Da Gama e Silva, Renato Cerqueira, Marco Ferraz, and Sergio Cersosimo. "Assessment of Texture Descriptors for Seismic Image Retrieval and Salt Dome Detection", In Proceedings of the 8th International Geological and Geophysical Conference and Exhibition (EAGE), 2018.
- [20] Andrea Britto Mattos, Rodrigo da Silva Ferreira, Reinaldo M. da Gama e Silva, Mateus Riva, and Emilio Vital Brazil. "Assessing Texture Descriptors for Seismic Image Retrieval", In 30th Sibgrapi Conference on Graphics, Patterns and Images, 2017.
- [21] Rodrigo Laiola Guimaraes, Andrea Britto Mattos, and Carlos Cardonha. "A Comparative Study of Technology-Mediated Learning Strategies for Teaching People with Intellectual Disability", In Proceedings of the 16th Brazilian Symposium on Human Factors in Computer Systems, 2017.
- [22] Rodrigo Laiola Guimaraes, Andrea Britto Mattos, and Carlos Cardonha. "Estudo Qualitativo do Uso de Apoios Tecnologicos no Ensino de Pessoas com Deficiencia Intelectual", In Proceedings of the 16th Brazilian Symposium on Human Factors in Computer Systems, 2017.
- [23] Rodrigo da Silva Ferreira, Andrea Britto Mattos, Emilio Vital Brazil, Renato Cerqueira, Marco Ferraz, and Sergio Cersosimo. "*Multi-scale Evaluation of Texture Features for Salt Dome Detection*", In IEEE International Symposium on Multimedia, 2016.
- [24] Rodrigo Laiola Guimaraes, Andrea Britto Mattos, and Carlos Cardonha. "Investigating Instructional Pacing Supports for Teaching Students with Intellectual Disability", In Proceedings of the CHI Conference Extended Abstracts on Human Factors in Computing Systems, 2016.
- [25] Carlos Cardonha, Andrea Britto Mattos, and Rodrigo Laiola Guimaraes. "*A Platform to Support Personalized Training for People with Disabilities*", In Proceedings of the 13th Web for All Conference, 2016.
- [26] Vagner Figueredo de Santana, Rodrigo Laiola Guimaraes, and Andrea Britto Mattos. "Identifying Challenges and Opportunities in Computer-based Vocational Training for Low-Income Communities of People with Intellectual Disabilities", In Proceedings of the 13th Web for All Conference, 2016.
- [27] Carlos Henrique Cardonha, Rodrigo Laiola Guimaraes, Andrea Britto Mattos, Julio Nogima, Priscilla Avegliano, Diego Gallo, Ricardo Herrmann, and Sergio Borger. "*Toward a platform to support vocational training of people with disabilities*", In IBM Journal of Research and Development, 2015.
- [28] Rodrigo Laiola Guimaraes and Andrea Britto Mattos. "Exploring the Use of Massive Open Online Courses for Teaching Students with Intellectual Disability", In Proceedings of the 17th International ACM SIGACCESS Conference on Computers & Accessibility (ASSETS), 2015.
- [29] Rodrigo Laiola Guimaraes, Andrea Britto Mattos, Victor Martinez, and Flavio Gonzalez. "*Apoio Tecnologico para Treinamento Vocacional*", In Revista Deficiencia Intelectual, APAE de Sao Paulo, 2014.
- [30] Andrea Britto Mattos and Rogerio Schmidt Feris. "Fusing well-crafted feature descriptors for efficient fine-grained classification", In 21th IEEE International Conference on Image Processing (ICIP), 2014.
- [31] Andrea Britto Mattos, Ricardo Guimaraes Herrmann, Kelly Kiyumi Shigeno, and Rogerio Schmidt Feris. "A Mission-Oriented Citizen Science Platform for Efficient Flower Classification Based on Combination of Feature Descriptors", In International Workshop on Environmental Multimedia Retrieval, 2014.
- [32] Andrea Britto Mattos, Ricardo Guimaraes Herrmann, Kelly Kiyumi Shigeno, and Rogerio Schmidt Feris. "Flower Classification for a Citizen Science Mobile App", In Proceedings of International Conference on Multimedia Retrieval, 2014.

- [33] Andrea Britto Mattos, Ricardo Herrmann, Carlos Cardonha, Diego Gallo, Priscilla Avegliano, and Sergio Borger. "*Marker-assisted recognition of dynamic content in public spaces*", In Proceedings of the 11th Web for All Conference, 2014.
- [34] Andrea Britto Mattos, Carlos Cardonha, Diego Gallo, Priscilla Avegliano, Ricardo Herrmann, and Sergio Borger. "*Marker-based image recognition of dynamic content for the visually impaired*", In Proceedings of the 11th Web for All Conference, 2014.
- [35] Priscilla Avegliano, Carlos Cardonha, Andrea Britto Mattos, and Sergio Borger. "Shelf replenishment optimization towards the confluence of mobile and analytics", In 14th Annual Conference on Business Analytics (INFORMS), 2014.
- [36] Andrea Britto Mattos, Marcelo Van Kampen, Camila Carrico, Andre Ricardo Dias, and Alexandre Crivellaro. "*E-commerce market analysis from a graph-based product classifier*", In Computational Processing of the Portuguese Language (PROPOR), 2012.
- [37] Andrea Britto Mattos, Jesus P Mena-Chalco, and Roberto Marcondes Cesar Jr. "3D facial animation based on structural registration". In 24th Sibgrapi (Conference on Graphics, Patterns and Images) Workshop of Theses and Dissertations, 2011.
- [38] Andrea Britto Mattos, Igor dos Santos Montagner, Alexandre Crivellaro, Bruno Klava, and Marcel Brun. "Computer vision research at IBOPE Media: automation tools to reduce human intervention", In 24th Sibgrapi (Conference on Graphics, Patterns and Images) Workshop on Interactive Graphics and Visualization for Industry-Driven Applied and Exploratory Research, 2011.
- [39] Andrea Britto Mattos, Jesus P Mena-Chalco, Roberto Marcondes Cesar Jr, and Luiz Velho. "3D linear facial animation based on real data". In 23rd Sibgrapi (Conference on Graphics, Patterns and Images), 2010.
- [40] Andrea Britto Mattos and Roberto Marcondes Cesar Jr. "3D facial animation based on structural registration", In Workshops of Sibgrapi Posters, 2009.

PATENTS

- Adjusting manufacturing parameters using artificial intelligence.
- System for optimizing sensor settings in a multi-camera environment based on foundation models and historical data.
- Enhanced user interfaces for paralinguistics.
- Augmenting artificial intelligence prompt design with emotional context.
- Real-time system for streaming with live volumetric capture and associated metadata.
- Flap prediction system based on volumetric data and foundation models.
- Training and implementing a four-dimensional data object recommendation model.
- US 202001548: Artificial intelligence generated synthetic image data for use with machine language models.
- US 201901341: Adapting communications according to audience profile from social media.
- **US 201900811:** Searching for analogue subsurface structures based on topological knowledge representation (TKR).
- US 201900398: Real-time route determination based on physiological responses.
- **US 201900496:** Media transactions consent management.
- US 201900640: Online utility-driven spatially-referenced data collector for classification.
- **US 201807156:** Generating image capture configurations and compositions.
- **US 201804290:** Access control using multi-authentication factors.
- US 201805965: Intelligent area and dispersal management using autonomous vehicles
- US 201804290: Image-based encoding.
- US 201802147: Advising image acquisition based on existing training sets.
- **US 20162598:** Precision aware drone-based object mapping based on spatial pattern recognition.
- US 20162346: Recommending activity sensor usage by image processing.
- **US 20161728:** Processing image using narrowed search space based on textual context to detect items in the image.
- **US 20161724:** Learning systems and automatic transitioning between learning systems.
- US 20160767: Adapting physical activities and exercises based on facial analysis by image processing.
- **US 20160023:** System and method for identification of personal thermal comfort.
- US 20151195: System and method for automatic identification of review material.

- **US 20151286:** Detection of anomalous behavior in digital education settings based on portable device movement.
- **US 20151373:** Educational media planning and delivery for in-class lessons with limited duration.
- **US 20151202:** Restocking shelves based on image data.
- **US 20150294333 A1:** Mobile device based inventory management and sales trends analysis in a retail environment.
- BR 10 2012 009983 7 A2: Metodo de estimacao de audiencia e monitoramento de navegacao na internet.

CONFERENCE PRESENTATIONS AND ATTENDANCE

- Conference & Exhibition on Computer Graphics & Interactive Techniques (SIGGRAPH), 2023 Los Angeles,
 California.
- Conference & Exhibition on Computer Graphics & Interactive Techniques (SIGGRAPH), 2022 Virtual.
- Conference & Exhibition on Computer Graphics & Interactive Techniques in Asia (SIGGRAPH ASIA), 2021 -Virtual.
- Conference on Neural Information Processing Systems (NeurIPS), 2018 Montreal, Canada.
- International Conference on Image Processing (ICIP), 2018 Athens, Greece.
- International Conference on Multimedia and Expo (ICME), 2018 San Diego, California.
- The Web for All Conference (W4A), 2018 Lyon, France.
- Global Symposium on Al & Inclusion, 2017 Rio de Janeiro/RJ, Brazil.
- Conference on Graphics, Patterns and Images (Sibgrapi), 2017 Niterói/RJ, Brazil.
- The Web for All Conference (W4A), 2016 Montreal, Canada.
- IBM First Deep Learning Workshop, 2016 Yorktown Heights/NY USA.
- IBM WW Accessibility, 2015 Boston/MA, USA.
- The International Conference on Image Processing (ICIP), 2014 Paris, France.
- The Web for All Conference (W4A), 2014 Seoul, South Korea.
- International Conference on Multimedia Retrieval (ICMR), 2014 Glasgow, Scotland.
- Computational Processing of the Portuguese Language (PROPOR), 2012 Coimbra, Portugal.
- Open Innovation Seminar, 2011 Sao Paulo/SP, Brazil.
- Conference on Graphics, Patterns and Images (Sibgrapi), 2011 Maceió/AL, Brazil.
- Conference on Graphics, Patterns and Images (Sibgrapi), 2010 Gramado/RS, Brazil.
- Conference on Graphics, Patterns and Images (Sibgrapi), 2009 Rio de Janeiro/RJ, Brazil.

CONFERENCE ORGANIZATION

- Symposium on Knowledge Discovery, Mining and Learning (KDMiLe 2018): Local chair, Sao Paulo/SP, Brazil.
- Sao Paulo Advanced School of Computing (SP-ASC 2010): Member of the local committee, Sao Paulo/SP,
- **15th Iberoamerican Congress on Pattern Recognition (CIARP 2010):** Member of the local committee, Sao Paulo/SP, Brazil.

TALKS AT UNIVERSITIES

- **UFABC:** "Machine Learning para Visão Computacional", at IV Semana das Engenharias, 2018 Santo Andre/SP, Brazil.
- **UNICAMP:** Andrea Britto Mattos Lima, Heloisa Candello and Alan Braz. "*Pesquisa aplicada na indústria de tecnologia*", at Computer Science Seminar Series, 2016 Sao Paulo/SP, Brazil.
- **UFSCAR:** "Cidades Inteligentes: promovendo acessibilidade e educação", at 2nd Forum of the City Institute, 2014 Sao Paulo/SP, Brazil.
- **UNIP:** "Sistemas de engajamento para acessibilidade", at Computer Science Seminar Series, 2014 Sao Paulo/SP, Brazil.

- **UFABC:** "*Plataformas para acessibilidade e educacao*", at Computer Science Seminar Series, 2014 Santo Andre/SP, Brazil.
- **IME/USP:** "Pesquisa aplicada em Visao Computacional para o IBOPE Media", at Seminars of the Computer Vision Research Group, 2011 Sao Paulo/SP, Brazil.

OTHER TALKS

- Women in Data Science (WIDS) S\u00e3o Paulo: "Painel sobre Carreira em Ci\u00e9ncia de Dados", Invite panelist, 2023 -Sao Paulo/SP, Brazil.
- Women in Data Science (WIDS) UNESP: "Machine Learning na prática: da agricultura a mudanças climáticas",
 2021 Online event.
- Al Girls: "Usando Machine learning e Visão computacional para resolver problemas reais: minha experiência na IBM Research", 2021 Online event.
- Bluetalks | inovabra: "Crédito para comunidades minoritárias através da IA", 2021 Online event.
- IBM TLC-Tech Day: "Al, Watson, & Agro", 2019 Hortolandia/SP, Brazil.
- 11th Women in Information Technology (WIT-CSBC): "Mulheres na IBM: Oportunidades, carreiras tecnicas e pesquisa", Invited speaker, 2017 Sao Paulo/SP, Brazil.
- III Latin-American School on Software Engineering (ELA-ES): "Women into Computing", Invited panelist, 2016 Natal/RN, Brazil.
- IBM Thomas J. Watson Research Center: "Accessibility projects in BRL and potential directions in the multimedia field", 2015 Yorktown Heights/NY, USA.
- Feira Inovatec: "*IBOPE políticas de parcerias e áreas de interesse em inovação aberta*", Invited speaker, 2011 Sao Paulo/SP, Brazil.

PRESS

- MarkTechPost: Meet Project Rumi: Multimodal Paralinguistic Prompting for Large Language Models
- **FutureScot:** Scotland's 'innovation fellowship scheme' points to better health and social care future.
- **BBC Scotland:** 3D Telemedicine Project aired at Reporting Scotland in July/2022.
- Forbes: A new technology to help visually impaired shoppers is being tested by IBM in Brazil.
- **Chain Store Age:** IBM creates digital marketing tool for visually impaired.
- **Pesquisa FAPESP:** Olhar eletronico.

VOLUNTEERING EXPERIENCE

- Ignite Worldwide (2023): How to Get a Job in Technology Work-Based Learning Experience with Microsoft.
- Ignite Worldwide (2022): Cybersecurity Work-Based Learning Experience with Microsoft.
- Adote um Gatinho (2019): The NGO specializes in rescuing street cats and facilitating their adoption. I
 contributed to the team responsible for transporting cats from the shelter to adopters' homes, ensuring
 safety measures, and managing contractual matters.
- **Paulo Montenegro Institute (2012):** Teaching basic math and statistic lessons for adults of low-income communities.

Sao Paulo, March 2024.