

# Gabriel Mateo Mejía Sepúlveda

BIOMEDICAL & ELECTRONIC ENGINEERING · UNIVERSIDAD DE LOS ANDES

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## Profile

Master's in biomedical engineering focused on deep learning for medical applications, founded by a Google DeepMind scholarship. My interests are at the intersection of AI/ML, drug discovery, and omics data. I am particularly excited about applications such as inverse protein folding, small molecule design, digital twins, early diagnosis techniques, and the recognition of therapeutic targets in cancer/aging. I have 3+ years of experience applying AI for spatial/bulk transcriptomics analysis, histopathology and 3D tumor segmentation. Using state-of-the-art tools such as graph neural networks, and vision transformers; as well as classical ML algorithms. I have a solid domain knowledge of physiology and biochemistry that allows me to design algorithms well suited to bio-molecular data types. I consider myself oriented to problem solving and I highly value the translation of theoretical studies into real-world clinical practice.

## Education

### M. Sc. Biomedical Engineering

UNIVERSIDAD DE LOS ANDES

- Google DeepMind scholar.
- Emphasis in Deep Learning applied to transcriptomics and histopathology.
- Relevant courses: Advanced Machine Learning, Computer Vision.

Bogotá, Colombia

Jan. 2022 - Apr. 2024

### B. E. Biomedical Engineering - Summa Cum Laude

UNIVERSIDAD DE LOS ANDES, GPA: 4.80/5.0

- Relevant courses: Processing and Analysis of Biomedical Images, Biotechnology and Biomolecular Engineering.

Bogotá, Colombia

Jan. 2018 - Apr. 2022

### B. E. Electronic Engineering - Summa Cum Laude

UNIVERSIDAD DE LOS ANDES, GPA: 4.81/5.0

- Relevant courses: Dynamic Systems, Reinforcement Learning, Stochastic Processes.

Bogotá, Colombia

Aug. 2017 - Oct. 2022

## Work Experience

### AI Consultant

KEYONIQ, SWITZERLAND

- Implementing **age predictors** based on **blood biochemistry** markers with **deep learning and tree-based models**.
- Handle **operational hospital data** and develop **processing pipelines** to enable machine learning training.

Remote, Baar, Switzerland

Jan. 2024 - Present

## Research Experience

### Research Projects Professional

BIOMEDICAL COMPUTER VISION GROUP, UNIVERSIDAD DE LOS ANDES

- Principal investigator: Pablo Arbelaez Ph.D.
- **Technical lead** of a **5 people** team to compile the biggest benchmark of gene expression prediction from histology in **spatial transcriptomics**.
- Designed **transformer-based denoising models** for corrupted data **reconstruction** in **spatial transcriptomics**.
- Leveraged **vision transformers** and **graph neural networks (GNNs)** for **gene expression prediction from histology** images in **spatial transcriptomics** data. Additionally, performed high-throughput **architectural search**.
- Used **multinomial logistic regression** to develop a classification/detection model for **cancer diagnosis using bulk RNA-seq**.
- Designed algorithms for **3D brain tumor segmentation** in multi-parametric MRIs **Random forests** and morphological transformations.
- Developing **transcriptomic aging clocks** using **GNNs** with interpretation protocols based on **adversarial attacks**.

Bogotá, Colombia

Jun. 2021 - Apr. 2024

## Selected Publications

### SEPAL: Spatial Gene Expression Prediction from Local Graphs

MEJÍA, G. M., CARDENAS, P., RUIZ, D., CASTILLO, A., ARBELÁEZ, P.

<https://doi.org/10.48550/arXiv.2309.01036>

ICCV CVAMD2023

Oct. 2023

### CanDLE: Illuminating Biases in Transcriptomic Pan-Cancer Diagnosis

MEJÍA, G. M., BLOCH, N., ARBELÁEZ, P.

[https://doi.org/10.1007/978-3-031-17266-3\\_7](https://doi.org/10.1007/978-3-031-17266-3_7)

MICCAI CMMCA2022

Sept. 2022

## Honors & Awards

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2023	<b>Best Paper Award</b> , ICCV Workshop on Computer Vision for Automated Medical Diagnosis	<i>CDG, France</i>
2023	<b>Best Graduation GPA</b> , Electronic engineering department.	<i>BOG, Colombia</i>
2023	<b>Summa Cum Laude</b> , Top 1% graduation GPA in engineering faculty over the past 5 years and integral merits.	<i>BOG, Colombia</i>
2022	<b>Best Paper Award</b> , MICCAI Workshop on Computational Mathematics Modeling in Cancer Analysis.	<i>SIN, Singapur</i>
2022	<b>DeepMind Scholarship</b> , One of three awarded by academic excellence and research in Artificial Intelligence.	<i>BOG, Colombia</i>
2022	<b>Otto de Greiff Contest</b> , Third best undergraduate thesis in Colombia (Appropriated technologies category).	<i>CLO, Colombia</i>
2022	<b>Best Graduation GPA</b> , Biomedical engineering department.	<i>BOG, Colombia</i>
2022	<b>Summa Cum Laude</b> , Top 1% graduation GPA in engineering faculty over the past 5 years and integral merits.	<i>BOG, Colombia</i>
2019	<b>Ramon de Zubiría</b> , Highest overall GPA of biomedical and electronic engineering departments.	<i>BOG, Colombia</i>

## Skills

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<b>Programming Languages</b>	Python (advanced), Matlab (advanced), R (intermediate), C/C++ (beginner).
<b>Scientific Software</b>	NumPy, SciPy, OpenCV, Scikit-Image, Pandas, RDKit, Scanpy, Squidpy.
<b>ML Frameworks</b>	Pytorch, Scikit-Learn, RAPIDS, H2O.
<b>ML Monitoring</b>	Weights and biases, Optuna.
<b>ML Interpretability</b>	SHAP, Captum.
<b>Languages</b>	Spanish (Native), English (Professional), German (Basic).

## Events

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2023	<b>Oral Presentation</b> , ICCV workshop on Computer Vision for Automated Medical Diagnostics	<i>CDG, France</i>
2023	<b>Poster Presentation</b> , 10th Aging Research and Drug Discovery Conference	<i>CPH, Denmark</i>
2023	<b>Poster Presentation</b> , Khipu: 4th Latin American Meeting In Artificial Intelligence	<i>MVD, Uruguay</i>
2022	<b>Speaker</b> , IEEE R9 Latin American Student Congress	<i>BOG, Colombia</i>
2022	<b>Oral Presentation</b> , MICCAI workshop on Computational Mathematics Modeling in Cancer Analysis	<i>SIN, Singapur</i>
2021	<b>Oral Presentation</b> , IEEE 2nd International Congress of Biomedical Engineering and Bioengineering	<i>BOG, Colombia</i>