

# Gabriel Mateo Mejía Sepúlveda

BIOMEDICAL & ELECTRONIC ENGINEERING · UNIVERSIDAD DE LOS ANDES

☎ (+57) 3213591911 | ✉ gm.mejia@uniandes.edu.co | 🏠 g27182818.github.io/ | 📞 g27182818 | 📺 Gabriel-Mateo-Mejia | 🎓 Gabriel Mejía

## Profile

Last year master's student 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 specific 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. S. Biomedical Engineering

UNIVERSIDAD DE LOS ANDES

*Bogotá, Colombia*

*Jan. 2022 - Dec. 2023*

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

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

UNIVERSIDAD DE LOS ANDES, GPA: 4.80/5.0

*Bogotá, Colombia*

*Jan. 2018 - Apr. 2022*

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

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

UNIVERSIDAD DE LOS ANDES, GPA: 4.81/5.0

*Bogotá, Colombia*

*Aug. 2017 - Oct. 2022*

- Relevant courses: Dynamic Systems, Reinforcement Learning, Stochastic Processes.
- Minor in chinese language & culture

## Professional Experience

### Research Projects Professional

BIOMEDICAL COMPUTER VISION GROUP, UNIVERSIDAD DE LOS ANDES

*Bogotá, Colombia*

*Jun. 2021 - Present*

- Principal investigator: Pablo Arbelaez Ph.D.
- Leveraged vision transformers and graph neural networks (GNNs) in pytorch geometric for gene expression prediction from histology images in spatial transcriptomics data. Additionally, performed high-throughput architectural search with weights and biases.
- Used multinomial logistic regression in pytorch to develop a classification/detection model for cancer diagnosis using bulk RNA-seq.
- Designed algorithms for 3D brain tumor segmentation in multi-parametric MRIs using scikit-learn Random forests and morphological transformations from OpenCv.
- Developing transcriptomic aging clocks using GNNs with interpretation protocols based on adversarial attacks.

### Wet Lab Research Assistant

RESEARCH GROUP IN NANO-BIOMATERIALS, CELLULAR ENGINEERING AND BIO-PRINTING, UNIVERSIDAD DE LOS ANDES

*Bogotá, Colombia*

*Aug. 2020 - Jun 2021*

- Principal investigator: Juan Carlos Cruz Ph.D.
- Worked on the development of a library of anti-microbial and translocating peptides assessed by yeast surface display methods.

### Undergraduate Teaching Assistant

UNIVERSIDAD DE LOS ANDES

*Bogotá, Colombia*

*Jul. 2017 - Dec. 2021*

- Teaching assistant of the following undergraduate courses: Dynamic systems (2 years), undergraduate physics support (1.5 years), undergraduate mathematics support (1.5 years), Freshman students' Support Program (1 year), digital systems (1 semester), control systems analysis (1 semester), biomedical image processing and analysis (1 semester), electronics workshop (1 semester).
- Give support lectures, design homeworks, grade assignments.

## Selected Publications

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

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

*ICCV CVAMD2023*

*Oct. 2023*

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

**Hirni: Segmentation of Brain Tumors in Multi-parametric Magnetic Resonance Imaging Scans**

CI-BI&amp;BI

## Honors & Awards

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|------|--|----------------|
| 2023 | <b>Best Paper Award</b> , ICCV Workshop on Computer Vision for Automated Medical Diagnosis                         | CDG, France    |
| 2022 | <b>Best Paper Award</b> , MICCAI Workshop on Computational Mathematics Modeling in Cancer Analysis.                | SIN, Singapur  |
| 2022 | <b>DeepMind Scholarship</b> , One of three awarded by academic excellence and research in Artificial Intelligence. | BOG, Colombia  |
| 2022 | <b>Otto de Greiff Contest</b> , Third best undergraduate thesis in Colombia (Appropriated technologies category).  | CLO, Colombia  |
| 2022 | <b>Best Graduation GPA</b> , Of the electronic and biomedical engineering departments.                             | BOG, Colombia  |
| 2022 | <b>Summa Cum Laude</b> , Top 1% graduation GPA in engineering faculty over the past 5 years and integral merits.   | BOG, Colombia  |
| 2019 | <b>Ramon de Zubiría</b> , Highest overall GPA of biomedical and electronic engineering departments.                | BOG, Colombia  |
| 2017 | <b>Bronze Medal</b> , XLVIII International Physics Olympiad  | YIA, Indonesia |

## Skills

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|------------------------------|---|
| <b>Programming Languages</b> | Python, Matlab, R, C/C++.   |
| <b>Scientific Software</b>   | NumPy, SciPy, OpenCV, Scikit-Image, Pandas, RDKit, Scanpy, Squidpy. |
| <b>ML Frameworks</b>         | Pytorch, Scikit-Learn, H2O.   |
| <b>ML Monitoring</b>         | Weights and biases.   |
| <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           | CDG, France   |
| 2023 | <b>Poster Presentation</b> , 10th Aging Research and Drug Discovery Conference                          | CPH, Denmark  |
| 2023 | <b>Poster Presentation</b> , Khipu: 4th Latin American Meeting In Artificial Intelligence               | MVD, Uruguay  |
| 2022 | <b>Speaker</b> , IEEE R9 Latin American Student Congress  | BOG, Colombia |
| 2022 | <b>Oral Presentation</b> , MICCAI workshop on Computational Mathematics Modeling in Cancer Analysis     | SIN, Singapur |
| 2021 | <b>Oral Presentation</b> , IEEE 2nd International Congress of Biomedical Engineering and Bioengineering | BOG, Colombia |