Guillaume Jaume

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RESEARCH INTERESTS

My research focuses on deep learning for graph-structured data with applications to computational pathology. I developed graph-based representations and models of histopathological tissues, notably by leveraging Graph Neural Networks. Specifically, I have explored three lines of research in computational pathology: scalability, explainability and weakly supervised settings.

EDUCATION

- **Ph.D. in Electrical Engineering** *Jan 2018 - Jan 2022*
  IBM Research, Zurich & EPFL, Lausanne, Switzerland
  Thesis: Graph Representation Learning in Computational Pathology
  Advisors: Prof. Dr. Jean-Philippe Thiran; Dr. Maria Gabrani

- **M.Sc. in Electrical Engineering & Information Technology** *Sep 2015 - Sep 2017*
  EPFL, Lausanne, Switzerland
  Thesis: A Cognitive Solution to Extract and Understand Information in Medical Forms (GPA 6/6)

- **Erasmus exchange, Electrical & Computer Engineering** *Sep 2014 - June 2015*
  Heriot-Watt University, Edinburgh, United Kingdom

- **B.Sc. in Electrical Engineering** *Sep 2012 - June 2015*
  EPFL, Lausanne, Switzerland

WORK EXPERIENCE

- **Harvard Medical School, Boston, United-States** *From May 2022*
  Post-doctoral research fellow at Mahmood Lab – Brigham's Women's Hospital
  Focus: Scalable Computational Pathology, Biomarker Discovery

- **IBM Research Zurich, Switzerland** *Dec 2017 - Fev 22*
  Pre-doctoral researcher in the Cognitive Healthcare & Life Sciences group
  Focus: Computational Pathology, Graph Representation Learning
  Collaborators: ETH Zurich, Mayo Clinic, CHUV Lausanne, University Hospital of Zurich, University Hospital of Paris, University of Bern, National Research Council of Italy

- **EPFL, Lausanne, Switzerland** *Sep 2014 - Jun 2016*
  Teaching Assistant with Prof. Dr. Nicolas Macris & Prof. Dr. Andreas Burg
  Focus: Supervise students in practicals, projects and labs

- **CERN, Geneva, Switzerland** *June 2015 - Aug 2015*
  CERN Summer Student Program, High-Luminosity LHC
  Project: Development of 3D automation tools for Radio Frequency measurements

PUBLICATIONS

Journals:

- P. Pati*, **G. Jaume***, A. Foncubierta-Rodriguez et al., "Hierarchical Graph Representations in Digital Pathology," Medical Image Analysis, 2021 [arXiv] [Code]

Conferences & Workshops:

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*denotes equal contribution

- **G. Jaume***, P. Pati*, B. Bozorgtabar et al., "Quantifying Explainers of Graph Neural Networks in Computational Pathology," IEEE CVPR, 2021 [arXiv] [Code]
- V. Anklin*, P. Pati*, **G. Jaume*** et al., "Learning Whole-Slide Segmentation from Inexact and Incomplete Labels using Tissue Graphs," MICCAI, 2021 [arXiv] [Code]
- **G. Jaume***, P. Pati*, A. Foncubierta-Rodriguez et al., "HistoCartography: A Toolkit for Graph Analytics in Digital Pathology," MICCAI Compay Workshop, 2021 [arXiv] [Code] [**Best Software Paper Award**]
- P. Pati*, **G. Jaume***, A. Foncubierta-Rodriguez et al., "HACT-Net: A Hierarchical Cell-to-Tissue Graph Neural Network for Histopathological Image Classification," MICCAI, Graphs in Biomedical Image Analysis Workshop, 2020 [arXiv] [**Best paper award**]
- **G. Jaume***, P. Pati*, A. Foncubierta-Rodriguez et al., "Towards Explainable Graph Representations in Digital Pathology," ICML, Computational Biology Workshop, 2020 [arXiv] [**Best paper award**]
- **G. Jaume**, H. Ekenel, J-P. Thiran, "FUNSD: A Dataset for Form Understanding in Noisy Scanned Documents," IEEE ICDAR, 2019 [arXiv] [Website]
- **G. Jaume**, A. Nguyen, M. Martinez et al., "edGNN: A simple and powerful GNN for labeled graphs," ICLR, Representation Learning on Graphs and Manifolds Workshop, 2019 [arXiv] [Code]
- **G. Jaume**, B. Bozorgtabar, H. Ekenel et al., "Image-Level Attentional Context Modeling Using Nested-Graph Neural Networks," NeurIPS, Relational Representation Learning Workshop, 2018 [arXiv]

Book chapters:

- P. Pati*, **G. Jaume***, A. Foncubierta-Rodriguez, et al., "Graph Representation Learning & Explainability in Breast Cancer Pathology: Bridging the gap between AI and Pathology Practice," Artificial Intelligence as applied in Human Pathology, Editor: R. Huss, World Scientific, 2021

Preprints:

- **G. Jaume***, P. Pati*, et al., "Weakly Supervised Learning for Joint Whole-Slide Segmentation and Classification in Prostate Cancer," 2021
- N. Brancati,..., **G. Jaume**, et al., "BRACS: A Dataset for BReAst Carcinoma Subtyping in H&E Histology Images," 2021

LIBRARY & DATASETS

- **HistoCartography**: A collection of image-to-graph translation and state-of-the-art graph algorithms for facilitating interpretable entity-based analysis in digital pathology [Code]
- **BR**e**A**st **C**arcinoma **S**ubtyping (**BRACS**): A large cohort of H&E stained histopathological images for automated breast cancer diagnosis [Website]
- **FUNSD**: A dataset for Form Understanding in Noisy Scanned Documents [Website]

PATENTS

- P. Pati, **G. Jaume**, K. Thandiackal, A. Foncubierta-Rodriguez, M. Gabrani, "Registration Free Multimodal Digital Pathology," 2021 [Filed]
- P. Pati, **G. Jaume**, A. Foncubierta-Rodriguez, M. Gabrani, "AI agent to assist pathology whole slide image interpretation through hierarchical representations," 2021 [Filed]
- **G. Jaume**, A. Foncubierta-Rodriguez, M. Gabrani, "Extracting structured information from a document containing filled form images," 2019 [Granted]
- **G. Jaume**, A. Foncubierta-Rodriguez, M. Gabrani, "Method and system for extracting information from an image of a filled form document," 2019 [Granted]

AWARDS

- Nominated for the EPFL Doctorate Award *Jan 2022*
- IBM Outstanding Technical Achievement and Innovation Award *May 2021*
  "Intelligent and quantitative immunostaining of tumor tissue sections"
- IBM First Invention Plateau *June 2021*
- Best Paper Awards:
  - MICCAI, Computational Pathology (COMPAY) Workshop *Sep 2021*
  - MICCAI, Graphs in Biomedical Image Analysis Workshop *Oct 2020*
  - ICML, Computational Biology Workshop *July 2020*

STUDENT SUPERVISION

- Valentin Anklin, *Master's thesis* *Autumn 2020*
  "Learning Segmentation in Histology from Inexact and Incomplete Labels using GNNs"
- Lauren Alisha Fernandez, *Master's thesis* *Autumn 2019*
  "Cell-graph Networks for Representation and Grading of Histopathology Images"
- Atul Kumar, *Master's thesis* *Autumn 2019*
  "Learning to generate Scene Graphs from Images and vice-versa"
- Martin Svatos, *Research internship* *Spring 2019*
  "Mind the Logit Gap: Incomparable Tasks in Continual Learning"
- Maria Halushko, *Research internship* *Autumn 2018*
  "Text Detection in Noisy Scanned Documents"

COMMUNITY SERVICE

- **Workshop Co-organizer:**
  - IEEE International Symposium on Biomedical Imaging (ISBI), *Kolkata* *March 2022*
    "BRIGHT: BReast tumor Image classification on Gigapixel HisTopathological images"
  - American Medical Informatics Association (AMIA), *San Diego* *Nov 2021*
    "Workshop on Explainable Multimodal AI in Cancer Patient Care"
  - Applied Machine Learning Days (AMLD), *Lausanne* *April 2021*
    "Building Interpretable AI for Digital Pathology" [Code]
- **Talks:**
  - Symposium on DigPath in the DACH Region, *Bern* – Invited by Prof. Inti Zlobek *Feb 2022*
    "Graph Representation Learning in Computational Pathology"
  - Tissue Image Analytics Centre, *Warwick* – Invited by Prof. Nasir Rajpoot *Oct 2021*
    "HistoCartography: Graph representations and models in Computational Pathology"
  - Charité University Hospital, *Berlin* *Oct 2021*
    "Graph Representations and Models in Digital Pathology"
  - PathAI, *New York* *July 2021*
    "Weakly-Supervised Learning for Whole-Slide-Image Segmentation"
  - Harvard Medical School, *Boston* – Invited by Prof. Faisal Mahmood *July 2021*
    "A Graph Network Tour of Computational Pathology"
  - Lausanne University Hospital (CHUV), *Lausanne* *May 2021*
    "Computational Pathology: Building Interpretable AI at Scale"
  - Swiss Digital Pathology Consortium (SDiPath), *Bern* *Jan 2021*
    "Graph Representation Learning & Explainability in Computational Pathology"

- Computer Research Institute of Montreal (CRIM), *Montreal*   *Nov 2020*
  "Deep Learning on Graphs: An Overview" [Code]
- 10+ Internal IBM Talks, *Zurich*   *2019-2021*
  IBM Research, IBM Watson, IBM Global Business Services
- **Reviewer:** IEEE CVPR, Medical Image Analysis

REFERENCES

- Prof. Dr. Jean-Philippe Thiran   jean-philippe.thiran@epfl.ch
  Full Professor, EPFL, Lausanne
- Prof. Dr. Inti Zlobek   inti.zlobec@pathology.unibe.ch
  Head of Translational Research Unit, University of Bern
- Dr. Pierre Moulin   pierre.moulin@novartis.com
  Project Lead IMI BigPicture, Novartis, Basel