

# Guillaume THIBAULT

## Curriculum Vitae

### 1 Present Position and Address

Research Assistant Professor  
OHSU Center for Spatial Systems Biomedicine (OCSSB) &  
BioMedical Engineering (BME) department  
Oregon Health & Science University (OHSU)  
2730 SW Moody Ave, CLSB 3N046.03, Portland OR, 97201-5042  
email: thibaulg [at] ohsu (dot ) edu

### 2 Education

- 2009 Ph.D., Computer science and numerical imaging, Laboratory of Science Information and Systems, Aix-Marseille University  
*Thesis advisors: Jean-Luc Mari and Jean Sequeira*  
*Thesis title: Shape and Texture Indexes: Application to Cell Nuclei Characterization and Classification*
- 2005 M.S 2, Computer science and numerical imaging, Laboratory of Science Information and Systems, Aix-Marseille University  
*Thesis advisor: Romain Raffin*  
*Thesis title: Virtual Sculpt*
- 2004 M.S 1, Computer science, Faculty of Science of Luminy, Aix-Marseille University  
*Thesis advisor: Jean-Marc Boï*  
*Thesis title: Detection of objects added in a scene*
- 2003 B.S, Mathematics & Computer science, Faculty of Science of Luminy, Aix-Marseille University

### 3 Professional Experience

#### Academic

- Since 2015 Research Assistant Professor, OCSSB / BME  
Oregon Health & Science University (OHSU)
- 2013-2014 Post-doc, OHSU Center for Spatial Systems Biomedicine (OCSSB)  
Center for Spoken Language Understanding (CSLU),  
Oregon Health & Science University (OHSU)
- 2010-2013 Post-doc, Center for Mathematical Morphology (CMM),  
Mines-ParisTech
- 2009-2010 Post-doc, Center for Mathematical Morphology (CMM),  
Mines-ParisTech
- 2005-2009 Ph.D student, Laboratory of Science Information and Systems,  
Aix-Marseille University

## Other

- 1997-2012 Firefighter/paramedic, Service Départemental d'Incendie et de Secours des Bouches du Rhône (SDIS 13).
- 2010-2013 Consultant in computer science, image processing and pattern recognition.
- 2007 Project manager in computer science for the SDIS 13.
- 2003 Computer science developer for the CarMask company.

## 4 Scholarship

### Area(s) of Research/Scholarly Interest

#### General

Machine/Deep Learning, Computer Vision (2D & 3D Image Processing, Segmentation, and Features Extraction), Biomedical Imaging, Quantitative/Computational biology, Computer-Aided Diagnosis, Computer Science.

#### Specific

- Development of a machine/deep learning based pipeline for the automatic cells and structures segmentation and classification in H&E images. It provides accurate measurements to pathologists and biologists.
- Development of a complete pipeline (registration, z-projection, segmentation, features extraction, spatial analysis) for cyclic immunofluorescence images.
- Development of new algorithms on 2D and 3D image processing and machine learning for the automatic cell characterization and classification in quantitative biology.
- Development of 2D/3D image processing and deep learning techniques to automatically segment the different cell structures in electron microscopy images. This helps to understand the cancerous cell structures, behaviors and interactions.
- Development of statistical matrices for 2D and 3D texture characterization. Among these methods, the size zone matrix (SZM) and the distance zone matrix (DZM) have become a standard in radiomics<sup>1</sup>. A direct application is the early prediction of the chemotherapy impact on breast cancer tumors. This early prediction allows to confirm if a specific drug is going to be effective, and then facilitate the therapy choice.
- Development of 2D mathematical morphology methods for the automatic immunogolds detection, in order to detect and quantify the presence of specific proteins.
- Development of new methods for the automatic diseases and eye structures detection in retinal images from diabetic patients, in order to prevent the diabetic retinopathy. These automatic detections are used in a telemedicine network in order to facilitate the patient automatic medical follow up, by detecting the retinopathy in early stages. As a result, it prevents the disease consequences, lighten the medical interventions and increases the number of examined patients.

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<sup>1</sup>See the "Image biomarker standardisation initiative - feature definitions", <https://arxiv.org/abs/1612.07003>

## Publications / Creative Works

In the following list, a PhD student under my mentorship is underlined>.

### Peer-reviewed Journal Articles

- Archana Machireddy, **Guillaume Thibault**, Alina Tudorica, Aneela Afzal, May Mishal, Kathleen Kemmer, Arpana Naik, Megan Troxell, Eric Goranson, Karen Oh, Nicole Roy, Neda Jafarian, Megan Holtorf, Wei Huang, Xubo Song. “Early Prediction of Breast Cancer Therapy Response using Multi-Resolution Fractal Analysis of DCE-MRI Parametric Maps”, *Tomography - A Journal for Imaging Research*, special Quantitative Imaging Networks (QIN) issue. In press.
- Takahiro Tsujikawa\*, **Guillaume Thibault**\*, Vahid Azimi, Sam Sivagnanam, Grace Banik, Casey Means, Rie Kawashima, Daniel R. Clayburgh, Joe W. Gray, Lisa M. Coussens, Young Hwan Chang. “Robust cell detection and segmentation for image cytometry reveal Th17 cell heterogeneity”, *Cytometry Part A*, 2019.
- Langer EM\*, Allen-Petersen BL\*, King SM, Kendsersky ND, Turnidge MA, Kuziel GM, Riggers R, Samatham R, Amery TS, Jacques SL, Sheppard BC, Korkola JE, Muschler JL, **Thibault G**, Chang YH, Gray JW, Presnell SC, Nguyen DG, Sears RC. “Modeling tumor phenotypes in vitro with three-dimensional bioprinting”, *Cell Reports*, 2019, 26: 608-623, PMID: 30650355. \*Equal contribution.
- Ryan S. Lane, Julia Femel, Alec P. Breazeale, Christopher P. Loo, **Guillaume Thibault**, Andy Kaempf, Motomi Mori, Takahiro Tsujikawa, Young Hwan Chang, Amanda W. Lund. “IFN $\gamma$ -activated dermal lymphatic vessels inhibit cytotoxic T cells in melanoma and inflamed skin”, *Journal of Experimental Medicine*, October 2018. DOI 10.1084/jem.20180654
- Takahiro Tsujikawa, Sushil Kumar, Rohan N. Borkar, Vahid Azimi, **Guillaume Thibault**, Young Hwan Chang, Ariel Balter, Rie Kawashima, Gina Choe, David Sauer, Edward El Rassi, Daniel R. Clayburgh, Molly F. Kulesz-Martin, Eric R. Lutz, Lei Zheng, Elizabeth M. Jaffee, Patrick Leyshock, Adam A. Margolin, Motomi Mori, Joe W. Gray, Paul W. Flint, and Lisa M. Coussen. “Quantitative multiplex immunohistochemistry reveals myeloid-inflamed tumor-immune complexity associated with poor prognosis”, in *Cell Reports* 2017, DOI <https://doi.org/10.1016/j.celrep.2017.03.037>.
- **Guillaume Thibault**, Alina Tudorica, Aneela Afzal, Stephen Y-C. Chui, Arpana Naik, Megan L. Troxell, Kathleen A. Kemmer, Karen Y. Oh, Nicole Roy, Neda Jafarian, Megan L. Holtorf, Wei Huang, and Xubo Song. “DCE-MRI Texture Features for Early Prediction of Breast Cancer Therapy Response”, in *Tomography*, vol. 3, n $^{\circ}$ 1, March 2017.
- **Guillaume Thibault** and Izhak Shafran. “Fuzzy Statistical Matrices for Cell Classification”, in arXiv, November 2016.
- Xiwei Zhang, **Guillaume Thibault**, Etienne Decencière, Beatriz Marcotegui, Bruno Laÿ, Ronan Danno, Guy Cazuguel, Gwénolé Quellec, Mathieu Lamard, Pascale Massin and Ali Erginay. “Exudate detection in color retinal images for mass screening of diabetic retinopathy”, in *Medical Image Analysis*, vol. 18, n $^{\circ}$ 7, pp. 1026-1043, 2014.
- **Guillaume Thibault**, Jesus Angulo and Fernand Meyer. “Advanced Statistical Matrices for Texture Characterization: Application to Cell Classification”, in *IEEE Transaction on Biomedical Engineering*, vol. 61, n $^{\circ}$ 3, pp. 630-637, 2014.
- Etienne Decencière, Guy Cazuguel, Xiwei Zhang, **Guillaume Thibault**, Jean-Claude Klein, Fernand Meyer, Beatriz Marcotegui, Gwénolé Quellec, Mathieu Lamard, Ronan Danno, Damien Eli, Pascale Massin, Ali Erginay, Bruno Laÿ and Agnès Chabouis. “TeleOphta: Machine Learning and image processing methods for teleophthalmology”, in *IRBM*, vol. 34, n $^{\circ}$ 2, pp. 196-203, 2013.

- **Guillaume Thibault**, Bernard Fertil, Claire Navarro, Sandrine Pereira, Pierre Cau, Nicolas Levy, Jean Sequeira and Jean-Luc Mari. “Shape and Texture Indexes, Application to Cell Nuclei Classification”, in International Journal of Pattern Recognition and Artificial Intelligence (IJPRAI), vol. 27, n°1, 2013.
- **Guillaume Thibault**, Bernard Fertil, Jean Sequeira et Jean-Luc Mari. “Indices de forme et de texture, de la 2D vers la 3D. Application au classement de noyaux de cellules”, in Revue des Sciences et Technologies de l’Information (RSTI) 2/2010.

### National Book

- **Guillaume Thibault**. “Indices de forme et de texture”. European University Editions, ISBN 978-613-1-53989-3.

### Book Chapter

- Claudia S. López, Cédric Bouchet-Marquis, Christopher P. Arthur, Jessica L. Riesterer, Gregor Heiss, **Guillaume Thibault**, Lee Pullan, Sunjong Kwon, and Joe W. Gray. “A fully integrated, three-dimensional fluorescence to electron microscopy correlative workflow”, **to appear** in Methods in Cell Biology, 2017.

### Patent

- Young Hwan Chang and **Guillaume Thibault**. “Automatic Nuclei Segmentation in Histopathology Images”, US20190042826A1, 2018/08.
- Xiwei Zhang, **Guillaume Thibault**, Etienne Decencière. “Spatial Normalization of Eye Fundus Images”, N°12.53929.

### Peer-reviewed Conference Proceedings

- Nathan McMahon, Jocelyn Jones, Jennifer Eng, Sunjong Kwon, Young Hwan Chang, **Guillaume Thibault**, Koei Chin, Michel Nederlof, Joe W Gray, Summer Gibbs. “Signal removal methods for highly multiplexed immunofluorescent staining using antibody conjugated oligonucleotides”, in Imaging, Manipulation, and Analysis of Biomolecules, Cells, and Tissues XVII, March 2019, DOI: 10.1117/12.2510573.
- Geoffrey F. Schau, **Guillaume Thibault**, Mark A. Dane, Joe W. Gray, Laura M. Heiser, and Young Hwan Chang. “Variational autoencoding tissue response to microenvironment perturbation”, Proc. SPIE 10949, Medical Imaging 2019: Image Processing, 109491M, doi: 10.1117/12.2512660.
- Archana Machireddy, **Guillaume THIBAUT**, Xubo SONG, and Wei Huang. “Analysis of DCE-MRI for Early Prediction of Breast Cancer Therapy Response”, in 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS), 2018.
- Young Hwan Chang, **Guillaume Thibault**, Brett Johnson, Owen Madin, Cole Meyers, Vahid Azimi, Danielle Jorgens, Christopher Corless, Adam Margolin, and Joe W. Gray. “Deep Learning based Nucleus Classification in Histological Tissue Image”, **accepted** in EMBS 2017.
- Vahid Azimi, Young Hwan Chang, **Guillaume Thibault**, Jaclyn Smith, Takahiro Tsujikana, Christopher Corless, Adam Margolin, and Joe W. Gray. “Quantitative Image Analysis Pipeline for Tumor Purity Estimation”, in IEEE ISBI 2017.
- Young Hwan Chang, **Guillaume Thibault**, Brett Johnson, Adam Margolin, Joe W. Gray. “Integrative Analysis on Histopathological Image for Identifying Cellular Heterogeneity”, in SPIE Medical Imaging (Digital Pathology) 2017.

- Young Hwan Chang, **Guillaume Thibault**, Vahid Azimi, Brett Johnson, Danielle Jorgens, Jason Link, Adam Margolin, and Joe Gray. “Quantitative Analysis of Histological Tissue Image based on Cytological Profiles and Spatial Statistics”, in IEEE Engineering in Medicine and Biology Society 2016.
- **Guillaume Thibault**, Alina Tudorica, Aneela Afzal, Stephen Chui, Arpana Naik, Megan Troxell, Kathleen Kemmer, Karen Oh, Nicole Roy, Megan Holtorf, Wei Huang and Xubo Song. “Early Prediction of Breast Cancer Therapy Response to Neoadjuvant Chemotherapy through Texture Analysis of DCE-MRI”, in MICCAI-BIA 2015, Proceedings of the 3<sup>rd</sup> MICCAI Workshop on Breast Image Analysis.
- **Guillaume Thibault**, Kristiina Iljin, Christopher Arthur, Izhak Shafran and Joe Gray. “Adaptive H-Extrema for Automatic Immunogold Particle Detection”, in Progress in Pattern Recognition, Image Analysis, Computer Vision, and Applications, CIARP 2013.
- Nastaran Ghadar, Xikang Zhang, Kang Li, Deniz Erdogmus, **Guillaume Thibault**, Alireza Bayesteh-tashk, Izhak Shafran, Kris Coleman and Kathleen Grant. “Visual hull reconstruction for automated primate behavior observation”, in IEEE International Workshop on Machine Learning for Signal Processing (MLSP), 2013.
- **Guillaume Thibault**, Jesùs Angulo. “Efficient Statistical/Morphological Cell Texture Characterization and Classification”, in International Conference on Pattern Recognition (ICPR) 2012.
- Xiwei Zhang, **Guillaume Thibault**, Etienne Decencièrre, Guy Cazuguel, Gwénolé Quèllec, Ronan Danno, Bruno Laÿ, Ali Erginay, Pascale Massin, Zeynep Guvenli-Victor, Agnes Chabouis. “Automatic Detection of Exudates in Retinal Images”, in Association for Research in Vision and Ophthalmology (ARVO) 2012.
- Xiwei Zhang, **Guillaume Thibault**, Etienne Decencièrre, Guy Cazuguel, Gwénolé Quèllec, Ronan Danno, Bruno Laÿ, Ali Erginay, Pascale Massin, Zeynep Guvenli-Victor, Agnes Chabouis. “Spatial Normalization of Eye Fundus Images”, in International Symposium on Biomedical Images (ISBI) 2012.
- Jesùs Angulo, Delphine Reberieux, **Guillaume Thibault**, Chantal Etievant, Fernand Meyer. “Self-normalization of cell images in multifocus quantitative fluorescence”, in International Congress for Stereology (ICS) 2011, October, Beijing, China.
- Xiwei Zhang, **Guillaume Thibault**, Etienne Decencièrre. “Application of the Morphological Ultimate Opening to the Detection of Microaneurysms on Eye Fundus Images from Clinical Databases”, in International Congress for Stereology (ICS) 2011.
- **Guillaume Thibault**, Jesùs Angulo, Fernand Meyer. “Advanced Statistical Matrices for Texture Characterization: Application to DNA Chromatin and Microtubule Network Classification”, in International Conference on Image Processing (ICIP) 2011.
- **Guillaume Thibault**, Bernard Fertil, Claire Navarro, Sandrine Pereira, Pierre Cau, Nicolas Levy, Jean Sequeira and Jean-Luc Mari. “Texture Indexes and Gray Level Size Zone Matrix. Application to Cell Nuclei Classification”, in Pattern Recognition and Information Processing (PRIP) 2009.
- **Guillaume Thibault**, Bernard Fertil, Jean Sequeira and Jean-Luc Mari. “Cell Nuclei Classification Using Shape And Texture Indexes”, in International Conference in Central Europe on Computer Graphics, Visualization and Computer Vision (WSCG) 2008.
- Romain Raffin, **Guillaume Thibault**, Gilles Gesquiere. “Simple And Efficient Tools For VirSculpt”, in International Conference on Computer Graphics Theory and Applications (GRAPP) 2006.

## Abstracts

- **Guillaume Thibault**, A. Tudorica, A. Afzal, S. Chui, A. Naik, M. Troxell, K. Kemmer, K. Oh, N. Roy, M. Holtorf, Wei Huang and Xubo Song. “Texture Analysis for Quantitative and Semi-Quantitative DCE-MRI Metrics for Early Prediction of Breast Cancer Therapy Response”, in International Society for Magnetic Resonance in Medicine (ISMRM) 2016.
- **Guillaume Thibault**, A. Tudorica, A. Afzal, S. Chui, A. Naik, M. Troxell, K. Kemmer, K. Oh, N. Roy, M. Holtorf, Wei Huang and Xubo Song. “DCE-MRI Texture Analysis for Early Prediction of Breast Cancer Therapy Response”, in International Society for Magnetic Resonance in Medicine (ISMRM) 2015.

## Other

- **Guillaume Thibault** and Izhak Shafran. “Fuzzy Statistical Matrices”, in arXiv [arxiv.org/abs/1611.06009](https://arxiv.org/abs/1611.06009).

## Software Release

- LogiMask software for the CarMask company. Automatic paper cut for cars bedding.

## 5 Review Activities

- Since 2010 Regular reviewer for the Oxford Journals on Bioinformatics.
- 2019 Pattern Recognition.
- 2015 IEEE Transactions on Biomedical Engineering (IEEE BME).
- 2011 International Conference on Computer Analysis of Images and Patterns (CAIP).

## 6 Education

### Student Advising

- **PhD student** I have mentored a PhD student, Xiwei Zhang. He was then a CBIO (Mines-ParisTech, Fontainebleau, France) post-doctoral student, and he is currently Software Engineer at Amadeus IT Group. I met with him 1 to 1.5 hours biweekly to discuss their research.
- **Masters Students** I have mentored Alexandra Chernomorets (Nasonova A.A). Then she was a PhD student in the Laboratory of Mathematical Methods of Image Processing, and she is currently working at the Lomonosov Moscow State University, Moscow, Russia I have also mentored six students during various projects in image processing and databases.
- I have mentored many graduated and under-graduated summer intern students at OHSU.

### Courses

- 2016 - 2018 Microscopy image segmentation lecture at OHSU (CONJ 670), for Ph.D students.
- 2010 & 2011 Mathematical morphology (twice 4-hours practical classes for last year engineer students).
- 2008 Mathematical morphology and pattern recognition (twenty 2-hours practical classes for master students).
- 2007 & 2008 Image processing (twenty 2-hours practical classes for master students).
- 2006 Mathematical methods for computer science (twenty 2-hours lessons and twenty 2-hours practical classes for third year college students).
- 2005 & 2006 C programming language (twenty 2-hours practical classes for first year college students).