Raluca Maria **Sandu**

Researcher · Data Scientist

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Summary

I am an enthusiastic and resourceful scientific professional who is currently finishing their PhD Degree in Biomedical Engineering at the University of Bern, previously having graduated with an MSc in the same field and a BSc in Control Engineering and Applied Computer Science. I am specialized in working on research and development projects across various topics and fields as evidenced by my academic and industry experience. Likewise, I am interested in learning about and developing business-oriented technical solutions using my skill set in computer programming, data science, statistics, image and signal processing, and ultimately machine & deep learning.

Education

University of Bern, ARTORG Center for Biomedical Engineering — *Bern, Switzerland*

Ph.D. in Biomedical Engineering — *May 2017 - Feb. 2021*

- Thesis: "Quantitative assessment of ablation treatments for liver tumours – image-based efficacy analysis and predictive modelling".

RWTH Aachen University, Faculty of Medicine — *Aachen, Germany*

M.Sc. in Biomedical Engineering — *Oct. 2014 - Apr. 2017*

- Thesis: "Image Segmentation and Semantic Description: Tools and Analytics" carried out at Philips Research Eindhoven.
- Thesis Project Grade: 100%; GPA: 83%.

Politehnica University of Bucharest, Faculty of Automatic Control and Computers — *Bucharest, Romania*

B.Sc. in Control Engineering and Applied Computer Science — *Oct. 2010 - Jul. 2014*

- Thesis: "Volumetric Capnography Respiratory Signals for Spontaneously Breathing Subjects" carried out at Philips Research Eindhoven.
- Thesis Project Grade: 98%; GPA: 83%.

Work Experience

University of Bern, ARTORG Center for Biomedical Engineering — *Bern, Switzerland*

Doctoral candidate (PH.D.) — *May 2017 - Feb. 2021*

- Data mining, image processing, feature engineering, statistical analysis, and machine learning algorithms applied in the area of CT-guided ablation treatments for liver cancer (Python, R, Django, C++, ITK, Slicer, PyCharm, Visual Studio).
- Implemented segmentation-based evaluation metrics for assessing the success of ablation treatments. Code can be found **here**.
- Applied convex optimization algorithms for modelling the ablation volume expansion. Code can be found **here**.
- Good Clinical Practice (GCP) Certificate: Clinical Investigators 1 Basic GCP and Clinical Research, CTU Bern, Feb 2019.
- Completed B2.2 level German Language Course at University of Bern (2017-2019)
- Courses undertaken: Computer Assisted-Surgery, Clinical Applications of Image-Guided Therapy, Scientific Writing, Presentation Skills.

Philips Research, Personal Care and Wellness — *Eindhoven, The Netherlands*

Research and Development Graduate Student — *Jul. 2016 - Mar. 2017*

- Designed and developed a web-based application using JavaScript, HTML and CSS for image annotation that can be found here .
- Applied image processing techniques and machine learning algorithms (SVM, PCA, Random Forests) for classification of skin surface structures.

Philips Research, Personal Care and Wellness — *Eindhoven, The Netherlands*

Research and Development Internship — *Apr. 2016 - Jun. 2016*

- Utilized image processing algorithms implemented in Python to measure the effect of various diets on the physical appearance of people.

RWTH Aachen, Helmholtz-Institute for Biomedical Engineering — *Aachen, Germany*

Student Research Assistant — *Jan. 2016 - Mar. 2016*

- Implemented signal processing methods for cardiac signals to optimize ventricular assist devices using MATLAB.

RWTH Aachen, Joint Research Centre for Computational Biomedicine — *Aachen, Germany*

Student Research Assistant — *Nov.2014 - Jul. 2015*

- Analysed interactions between cancer cell lines using MATLAB.

Philips Research, Personal Health — *Eindhoven, The Netherlands*

Research and Development Internship — *Jul. 2013 - Oct. 2013*

- Implemented signal processing methods and extracted physiological features from respiratory signals of healthy and diseased patients.
- Implemented a machine learning algorithm (Decision Trees) to classify patients with healthy vs. lung diseases using MATLAB.

Philips Research, Personal Health *Eindhoven, The Netherlands*

Research and Development Internship *Jul. 2012 - Sep. 2012*

- Implemented data mining techniques for analysis of physiological signals of chronic heart failure patients' part of tele-monitoring study.

Technical Skills

Python	**Advanced.** Numpy, scikit-learn, scipy, pydicom, simpleitk, pandas, opencv, matplotlib, seaborn.
Machine Learning	**Advanced.** PCA, SVM, decision trees, random forest, k-means, regression, cross-validation, ROC, F-score.
Deep Learning	**Intermediate.** TensorFlow, PyTorch, U-Net, CNN.
MATLAB	**Intermediate.** Data, signal and image processing.
Web Design	**Intermediate.** Django, JavaScript, HTML, CSS, JSON, Markdown, Hugo.
Database Design	**Intermediate.** SQL, ER model, normalisation. MySQL, PostgreSQL.
Version Control	**Intermediate.** Git, GitHub, Bitbucket (Jira + Confluence), Sourcetree.
R	**Intermediate.** Statistics and data manipulation (lsmeans, lme4, ggplot2, tidyverse).
C/C++/C#	**Basic.** Object-Oriented Programming
Graphic Design	**Basic.** Inkscape, GIMP, Adobe Illustrator

Languages

English	**Fluent.** Certificate in Advanced English (CAE), University of Cambridge ESOL, Grade A (2009).
German	**Upper Intermediate.** Zertifikat Niveau B1, Sprachenzentrum der RWTH Aachen, Grade 95%, (2015).
French	**Basic.** Diplôme d'études en langue française DELF B1, Grade 80% (2009).
Romanian	**Native.** Mother Tongue.

Publications

Peer-Reviewed Journal Articles

[1] **R. M. Sandu**, I. Paolucci, S. J. S. Ruiter, R. Sznitman, K. P. de Jong, J. Freedman, S. Weber, and P. Tinguely, "Volumetric Quantitative Ablation Margins for Assessment of Ablation Completeness in Thermal Ablation of Liver Tumours," *Frontiers in Oncology*, vol. 11, 2021, Publisher: Frontiers. DOI: 10.3389/fonc.2021.623098.

[2] D. Stillström, **R. M. Sandu**, and J. Freedman, "Accuracy of Electrode Placement in IRE Treatment with Navigated Guidance," *CardioVascular and Interventional Radiology*, 2021. DOI: 10.1007/s00270-020-02762-5.

[3] I. Paolucci, **R. M. Sandu**, L. Sahli, G. A. Prevost, F. Storni, D. Candinas, S. Weber, and A. Lachenmayer, "Ultrasound based planning and navigation for non anatomical liver resections — an ex-vivo study," *IEEE Open Journal of Engineering in Medicine and Biology*, 2019. DOI: 10.1109/OJEMB.2019.2961094.

Conference Proceedings

[1] **R. M. Sandu**, I. Paolucci, J. Freedman, P. Tinguely, S. J. S. Ruiter, and S. Weber, "Quantitative volumetric assessment of percutaneous image-guided microwave ablations for colorectal liver metastases," in *31st Conference of the International Society for Medical Innovation and Technology (iSMIT)*, Heilbronn, Germany, Oct. 2019.

[2] **R. M. Sandu**, I. Paolucci, J. Freedman, P. Tinguely, and S. Weber, "Quantitative volumetric assessment of ct-guided ablation treatments for colorectal liver metastases," in *IEEE Engineering in Medicine and Biology Society (EMBS) International Student Conference (ISC)*, Magdeburg, Germany, Nov. 2019.

[3] **R. M. Sandu**, I. Paolucci, J. Freedman, and S. Weber, "Quantitative volumetric assessment of percutaneous image-guided microwave ablations for colorectal liver metastases," in *CURAC, 18th Annual Meeting of the German Society for Computer and Robot-Assisted Surgery*, Reutligen, Germany, Sep. 2019.

[4] R. Hrabuska, **R. M. Sandu**, I. Paulocci, and S. Weber, "A framework for the quantitative assessment of image-guided percutaneous ablation of hepatic lesions," in *CURAC, 17th Annual Meeting of the German Society for Computer and Robot-Assisted Surgery*, Leipzig, Germany, Sep. 2018.

Book Chapter

[1] I. Paolucci, **R. M. Sandu**, P. Tinguely, C. Kim-Fuchs, M. Maurer, D. Candinas, S. Weber, and A. Lachenmayer, "Stereotactic image-guidance for ablation of malignant liver tumors," in *Liver Cancer*, IntechOpen, Oct. 2019. DOI: 10.5772/intechopen.89722.