

# SpectraMosaic

an exploratory tool for the interactive visual analysis of magnetic resonance spectroscopy (MRS) data

## Abstract

Magnetic resonance spectroscopy is a promising method that allows a noninvasive analysis of the chemical environment of the brain. However, a visualization tool that would support an interactive visual analysis of such data, including comparison of different samples and capturing variance in ratios of tissue metabolites, was not available so far. Therefore, this problem was addressed by the research team led by Laura Garrison at the University of Bergen and Mohn Medical Imaging and Visualization Centre (MMIV), which focuses on developing a tool allowing intuitive and interactive exploration of tissue metabolite concentration ratios in spectroscopy clinical and research studies.

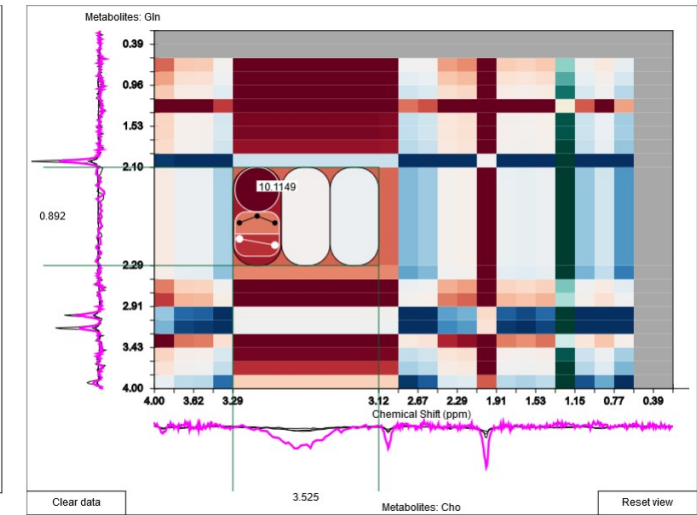
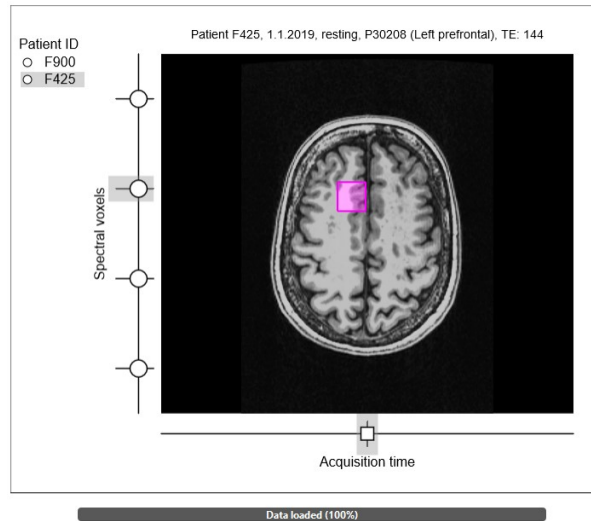
This thesis has been conducted as a part of this research initiative. Based on the already created prototypes of visual design and user interface, the goal of this thesis is to transfer these sketches into a working tool. This includes the tasks of selecting suitable technologies, proposing subtle design changes and procedures of algorithmization, and implementing the application. The result was used to validate design choices and propose changes and additional features for future development of this project. Feedback on this application was given by three domain experts from the hospital research environment, who confirmed the efficacy of the system. The project was presented at the 9th EG Workshop on Visual Computing for Biology and Medicine in September 2019 in Brno [1].

## References

- [1] GARRISON, Laura; VAŠIČEK, Jakub; GRÜNER, Renate; SMIT, Noeska; BRUCKNER, Stefan. SpectraMosaic: An Exploratory Tool for the Interactive Visual Analysis of Magnetic Resonance Spectroscopy Data. In: Proceedings of 9th EG Workshop on Visual Computing for Biology and Medicine (VCBM). 2019.
- [2] GARRISON, Laura; VAŠIČEK, Jakub; CRAVEN, Alexander; GRÜNER, Renate; SMIT, Noeska; BRUCKNER, Stefan. Interactive visual exploration of metabolite ratios in MR spectroscopy studies. In: Computers & Graphics. 2020.

**Author:** Mgr. Jakub Vašíček  
**Advisor:** doc. RNDr. Barbora Kozlíková, Ph.D.

Department of Computer Graphics  
Faculty of Informatics  
Masaryk University



## Main goals of the project:

- Design an interactive insight-generation tool for researchers dealing with MRS
- Support rapid exploration and comparison of metabolite ratio variation in MRS data across several dimensions of interest
- Provide a fully functional prototype in the form of a web application
- Conduct a user study with collaborators from the hospital research environment

## Summary of results:

- The final prototype confirmed the efficiency of the design for displaying the variance of metabolite concentration ratios in MRS data.
- Feedback from the user study was very positive, highlighting the comfortable use of certain features, and generally stating that this application would augment current workflow.
- The work was presented at the 9th EG Workshop on Visual Computing for Biology and Medicine in 2019 [1], and published in Computers & Graphics in 2020 [2].