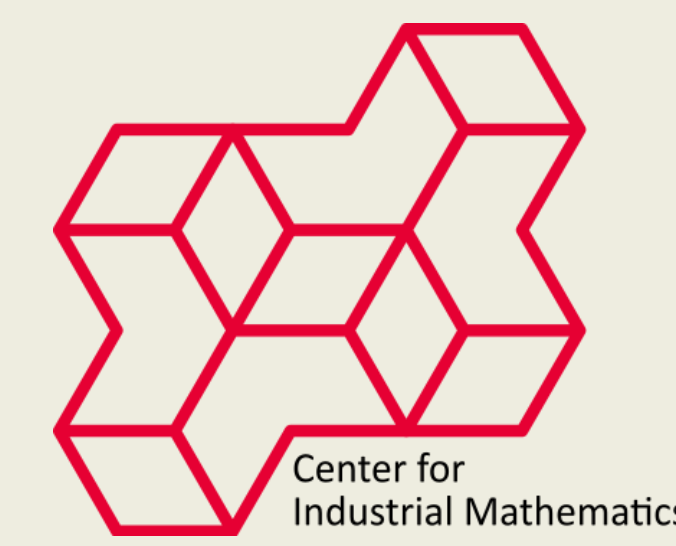


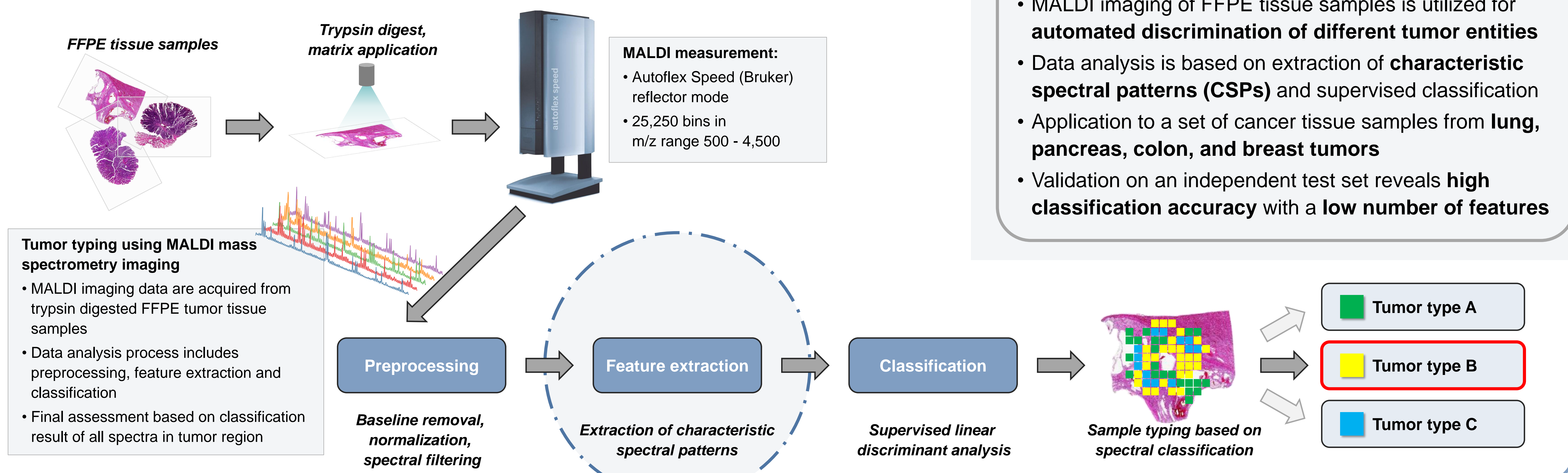
Automated tumor typing of tissue sections based on MALDI mass spectrometry imaging data and machine learning using characteristic spectral patterns



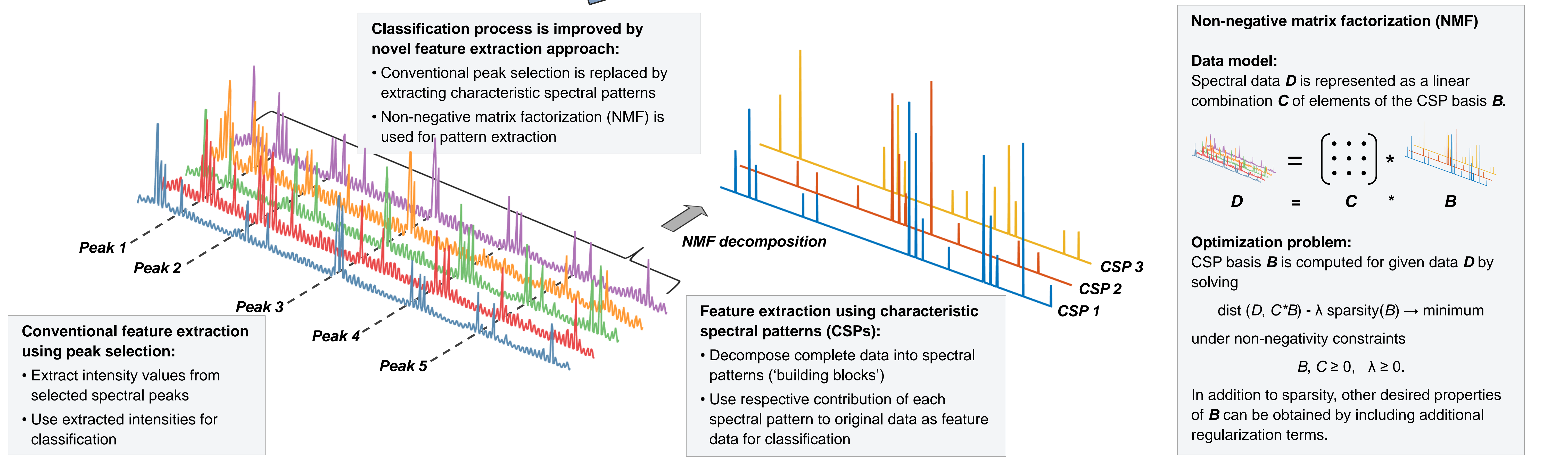
Tobias Boskamp^{1,2}, Delf Lachmund¹, Janina Oetjen¹, Rita Casadonte³, Jan Hendrik Kobarg², Jörg Kriegsmann⁴, Peter Maass^{1,2}

¹ University of Bremen, Bremen, Germany; ² SCILS GmbH, Bremen, Germany; ³ Proteopath GmbH, Trier, Germany; ⁴ Center for Histology, Cytology and Molecular Diagnostic, Trier, Germany

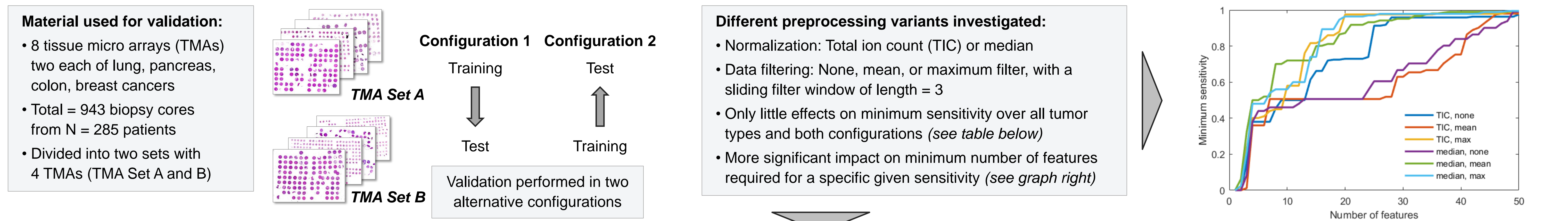
Tumor typing process based on MALDI imaging and machine learning



Feature extraction using characteristic spectral patterns



Validation results on tissue micro array dataset



	Configuration 1		Configuration 2		Peak selection (core level)*
	Core level sensitivity	Spectrum level sensitivity	Core level sensitivity	Spectrum level sensitivity	
Lung	50 / 50 (100%)	95.7%	97 / 97 (100%)	98.5%	92 %
Pancreas	167 / 167 (100%)	92.5%	206 / 207 (99.5%)	95.9%	75 %
Colon	166 / 166 (100%)	97.9%	94 / 94 (100%)	96.9%	97 %
Breast	81 / 81 (100%)	98.6%	81 / 81 (100%)	94.3%	91 %

* R. Casadonte et al. MALDI imaging classification of tumors in formalin-fixed paraffin-embedded tissues. ASMS Conference, St. Louis 2015.

	TIC	Median
None	97.5%	97.5%
Mean	98.8%	98.8%
Max	99.5%	99.5%

Normalization had no effect on classifier performance, minor effects due to data filtering

Conclusion

- NMF based feature extraction yield robust and highly accurate classification models suitable for tumor typing
- Classification accuracy higher than in prior studies where classification is based on individual peak selection
- Low number of features required, reducing the risk of overfitting
- Only minor effects of preprocessing variants observed

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