

Table of Contents

1. Preamble.....	1
2. Introduction.....	3
2.1. Brain tumors.....	3
2.2. Imaging in neurooncology - Basics.....	9
2.3. Imaging in neurooncology - Applications and limitations.....	17
2.4. Radiomics	22
2.5. Aim of the thesis.....	52
3. Methodic evaluation of radiomics analyses.....	53
3.1. Automatic segmentation of the metabolic tumor volume.....	53
3.1.1. Aim of the study	53
3.1.2. Methods	56
3.1.3. Results.....	61
3.1.4. Discussion.....	66
3.2. Repeatability of radiomics features.....	68
3.2.1. Aim of the study	68
3.2.2. Methods	71
3.2.3. Results.....	75
3.2.4. Discussion.....	78
4. Radiomics in diagnosis.....	82
4.1. Prediction of IDH, BRAF and PD-L1 status in brain tumor patients.....	82
4.1.1. Aim of the study	82
4.1.2. Methods	85
4.1.3. Results.....	92
4.1.4. Discussion.....	102

5. Radiomics in therapy.....	107
5.1. Treatment response prediction to stereotactic radiosurgery in patients with brain metastases.....	107
5.1.1. Aim of the study	107
5.1.2. Methods	109
5.1.3. Results	115
5.1.4. Discussion.....	119
6. Radiomics for prognosis.....	122
6.1. Survival prediction in glioblastoma patients.....	122
6.1.1. Aim of the study	122
6.1.2. Methods	124
6.1.3. Results	129
6.1.4. Discussion.....	137
7. Conclusion and Outlook.....	140
List of abbreviations.....	146
List of figures.....	149
List of tables.....	151
Bibliography.....	152
Acknowledgements.....	181
Curriculum Vitae.....	184
Publication and presentations.....	187