

Spatial correlation of radiomics features with segmentation errors of PET-based tumor contours in the lung

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Introduction

- Accurate target volume definition is critical as errors taking place therein are systematic and become amplified as they propagate downstream along the treatment delivery.
- Uncertainty incurring in PET-based lesion target definition are well recognized; however, the underlying mechanisms remain largely unaddressed.
- To achieve accurate target delineation, knowledge on interactions between visual perception heterogeneity and fine-grained image cues would be of the essence.

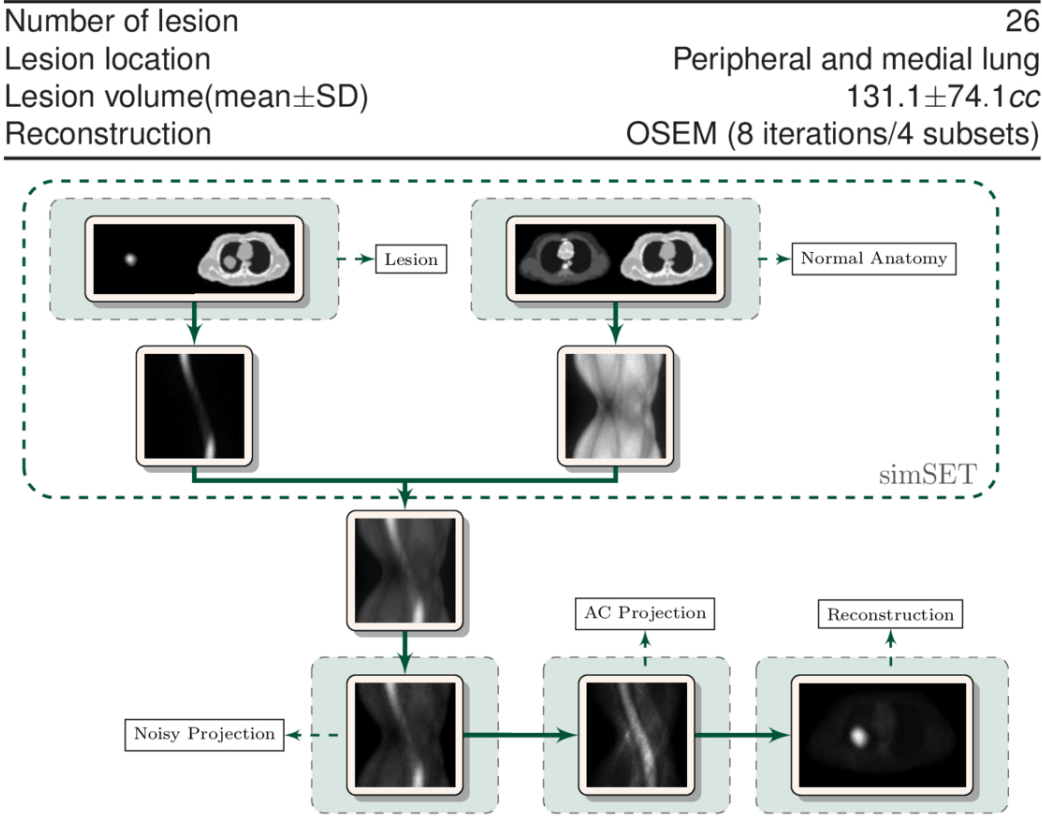
Objective

To assess if local fine-grained imaging features occupies a role in radiologic image perception and interpretation of PET imaged lung lesions.

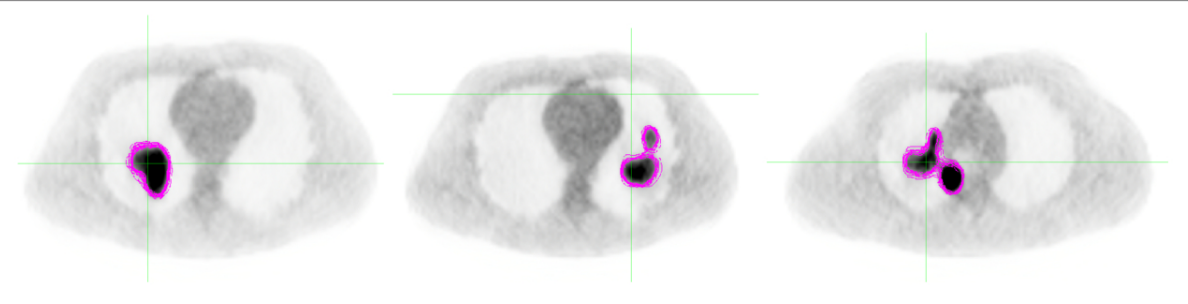
Radiomics Features for Parametric Mapping

Category	Feature
Gray-level	Contrast (CONTR)
Co-occurrence (GLCO)	Entropy (ENTR)
	Homogeneity (HOMO)
	Dissimilarity (DISSI)
Gray-level	Coarseness (COAR)
Neighborhood Difference (GLNDIF)	Contrast (CONTR)
	Busyness (BUSY)
	Complexity (CPLX)
	Strength (STRG)
Gray-level Size Zone (GLSZ)	Short zone emphasis (SZE)
	Large zone emphasis (LZE)
	Intensity variability (IV)
	Zone size variability (ZSV)
	Zone percentage (ZP)
	Low intensity zone emphasis (LIZE)
	High intensity zone emphasis (HIZE)
	Low intensity short zone emphasis (LISZE)
	High intensity short zone emphasis (HISZE)
	Low intensity large zone emphasis (LILZE)
	High intensity large zone emphasis (HILZE)
Gray-level Neighborhood Dependence (GLNDEP)	Small number emphasis (SNE)
	Large number emphasis (LNE)
	Number non-uniformity (NNU)
	Second moment (SM)
	Entropy (ENTR)

PET Simulation



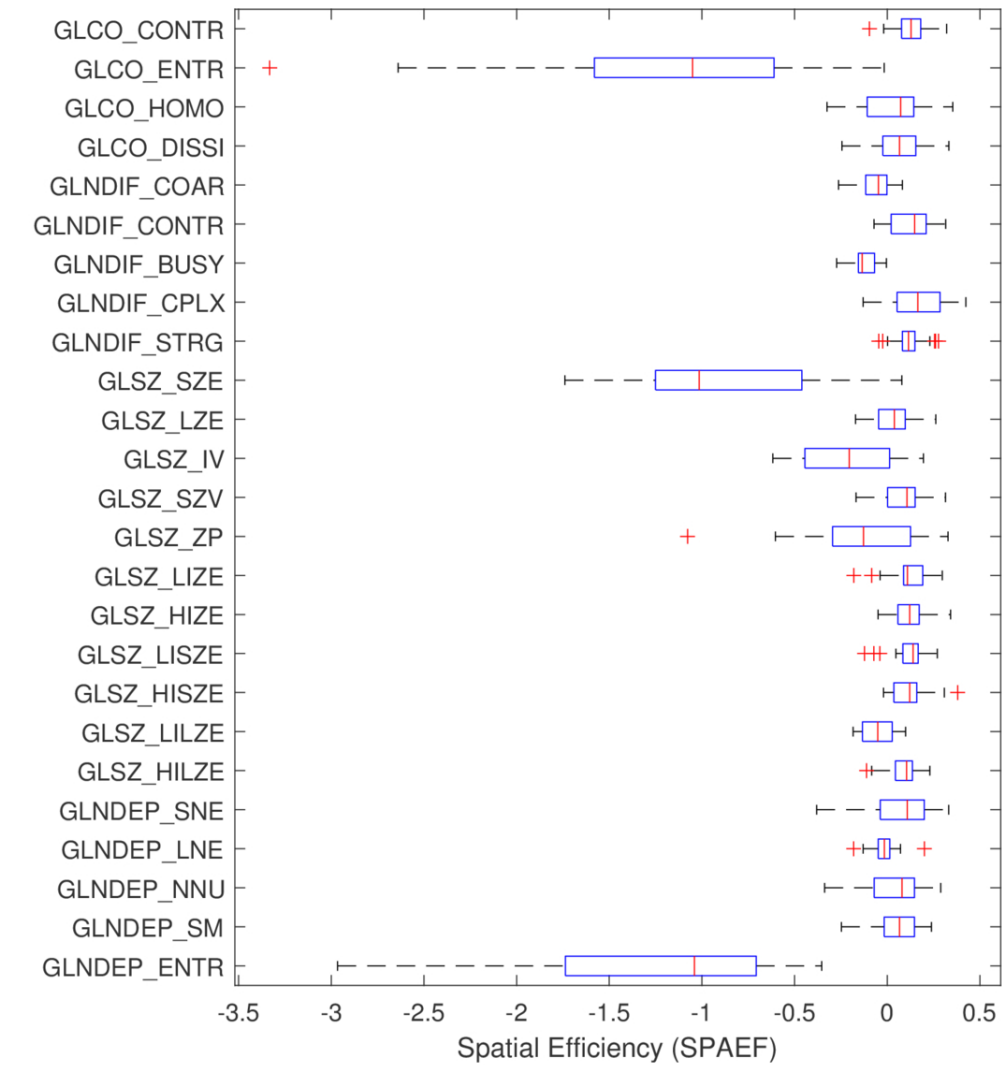
Manual Contours



Error Map Vs. Parametric Map



Spatial Correlation



Conclusion

- It was demonstrated that likelihood of manual misclassification at the voxel level correlates with certain local fine-grained imaging features.
- This may further the understanding as to what causes variation in the contouring of PET positive lung lesions.

References

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3. Yang et al. Eur J Nucl Med Mol Imaging. 2013;40(5):716-27.
4. Aristophanous et al. Med Phys. 2008;35(7):3331-42.