Radiomics: Images are more than just pictures

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INTRODUCTION

- Images have always been used for visual interpretation.
- Radiomics is defined as the conversion of images to higher dimensional data and the subsequent mining of these data for improved decision support.
- Radiomics can be performed with tomographic images from CT, MR imaging, and PET studies.



Habitats

IMAGE ACQUISITION







IMAGE ACQUISITION

- NCI
- QIBA profile
- American College of Radiology, RSNA, the Society of Nuclear Medicine and Molecular Imaging, the International Society of Magnetic Resonance in Medicine, and the World Molecular Imaging Society

VOI IDENTIFICATION





HABITATS



FLAIR

T2

SEGMENTATION





FEATURE EXTRACTION

SEMANTIC	AGNOSTIC		
Size	Histogram (skewness, kurtosis)		
Shape	Haralick Textures		
Location	Laws Textures		
Vascularity	Wavelets		
Spiculation	Laplacian transforms		
Necrosis	Minkowski functionals		
Attachments or lepidics	Fractal dimensions		

BUILDING DATABASES

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Building Databases Using Monoteff Access



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CLASSIFIER MODELLING AND DATA SHARING







RESULTS

- Enabling Diagnosis
- Tumor Prognosis
- Treatment Selection
- Deciding where to biopsy or resect

DWI - ADC









Survival = 7 mos

Survival > 15 mos*

Source Image CT

Energy overlaid on Source Image





CHALLENGES

- Data sharing
- Developing standards

CONCLUSION

Radiomic analysis can be used to identify correlations, not causes. Another step towards Precision Medicine

SIMILAR TOPICS THIS SEMESTER

- RISE registry
- Antimicrobial resistance surveillance
- Using RWD and RWE in decision making
- Computational approaches to patient stratification

REFERENCES

- 1. Giger ML. Update on the potential of computer- aided diagnosis for breast cancer. Future Oncol 2010;6(1):1–4.
- 2. Doi K. Computer-aided diagnosis in medical imaging: historical review, current status and future potential. Comput Med Imaging Graph 2007;31(4-5):198–211.
- 3. Guo Z, Shu Y, Zhou H, Zhang W, Wang H. Radiogenomics helps to achieve personalized therapy by evaluating patient responses to radiation treatment. Carcinogenesis 2015; 36(3):307–317.
- 4. Wibmer A, Hricak H, Gondo T, et al. Haralick texture analysis of prostate MRI: utility for differentiating non-cancerous prostate from prostate cancer and differentiating prostate cancers with different Gleason scores. Eur Radiol 2015;25(10):2840–2850.
- 5. Coroller TP, Grossmann P, Hou Y, et al. Ctbased radiomic signature predicts distant metastasis in lung adenocarcinoma. Radiother Oncol 2015;114(3):345–350.
- 6. Committee on the Review of Omics-Based Tests for Predicting Patient Outcomes in Clinical Trials, Board on Health Care Services, Board on Health Sciences Policy, Institute of Medicine. Evolution of Translational Omics: Lessons Learned and the Path Forward. Micheel CM, Nass SJ, Omenn GS, eds. Washington, DC: National Academies Press.
- 7. Gerlinger M, Rowan AJ, Horswell S, et al. Intratumor heterogeneity and branched evolution revealed by multiregion sequencing. N Engl J Med 2012;366(10):883–892.
- 8. Sottoriva A, Spiteri I, Piccirillo SG, et al. Intratumor heterogeneity in human glioblastoma reflects cancer evolutionary dynamics. Proc Natl Acad Sci U S A 2013;110(10): 4009–4014
- 9. Radiology: Volume 278: Number 2—February 2016