CT-based hand-crafted radiomics for the management of pulmonary nodules

Impact paragraph

Lung cancer ranks first in cancer-related deaths and second in the new cancer cases in both males and females as reported by the American Cancer Society in 2020 [1]. Computed tomography (CT) is an important tool for the detection and assessment of early lung cancer that has high survival rate [2-4]. Pulmonary nodules are defined as focal opacities of no more than 3 centimeters in diameter on CT images and can be cancerous (early lung cancer) or non-cancerous [5]. Radiomics is an approach that can quantitatively analyze CT images and provides individualized prediction of clinical outcomes [6]. To this extend, radiomics may benefit both doctors and patients. In this thesis, we studied radiomics in the field of pulmonary nodules. These studies may bring certain scientific and social impacts.

Scientific impacts

1. All of studies are open access and are published on scientific and professional journals with high impact factors (e.g., Radiology, European Radiology, and European Journal of Nuclear Medicine and Molecular Imaging) that have more influence and transmissibility in scientific community.

2. **Chapter 2** introduced the current research state, challenges, and future directions of radiomic studies in lung cancer. This knowledge dissemination may highlight future studies.

3. **Chapter 3** indicated that quantitative shape and uniformity features can also be predictors of nodules growth. This finding may influence clinical practice in the future.

4. **Chapter 4** separated ground-glass and solid CT radiomic features of part-solid nodules, such approach may highlight further studies to predict clinical outcomes by dividing the different components on images (e.g., calcification, bleeding, cystic, solid, ground glass, and edema composition).

5. **Chapter 5** provided a new way that combines intraoperative frozen section and preoperative CT.

Social impacts

1. Radiomics, as a branch of artificial intelligence, has a potential to speed up clinical work and reduce doctors' workload.

2. Personalized clinical decision may optimize public medical resources and reduce costs to patients.

3. Improvement of detection and management of early lung cancer can reduce the mortality of lung cancer.

References

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