Deep-Learning-Based Computerized Prostate Cancer Classification Using A Hierarchical Classification Framework

Tech ID: 29986 / UC Case 2016-595-0

SUMMARY

UCLA researchers in the Department of Radiological Sciences have developed a deep-learning-based computerized algorithm for classification of prostate cancer using multi-parametric-MRI images.

BACKGROUND

Prostate cancer is currently the most common form of cancer found in men. Diagnostic imaging is a crucial component of classifying the severity of prostate cancer. Multi-parametric magnetic resonance imaging (mp-MRI) is used to differentiate between clinically significant and indolent lesions in prostates. However, this is complicated due to the ambiguity of lesion appearances in prostate cancer and lack of standardized parameters for analyzing mp-MRI images. To address this issue, computer-aided diagnosis (CAD) algorithms have been garnering interest as these machine-learning based tools could increase accuracy and avoid inconsistencies in diagnoses. Unfortunately, current machine-learning methods, such as deep learning, are limited in their use for CAD due to their need for massive clinical datasets for training. Unlocking the potential to use deep learning methods for CAD could vastly improve image analysis tools available for prostate cancer diagnosis.

INNOVATION

UCLA researchers have developed a novel prostate cancer classification algorithm using deep learning method for automatic analysis of mp-MRI images. This algorithm overcomes the issue of having limited training samples and therefore can be applied to multiple clinical domains, not just prostate cancer diagnosis. Furthermore, this invention does not require images of precise lesion boundaries for accurate analysis, creating a more convenient and robust workflow.

APPLICATIONS

- Diagnosis of cancer or other medical conditions using medical imaging (mp-MRI)
- Research tool for standardized analysis of clinical samples

ADVANTAGES

- Avoids the need for handcrafted features
- Higher classification accuracy
- Applicable to a variety of clinical domains
- Not limited by training samples
- Only requires approximate image patches containing the lesion, instead of precise lesion boundaries; more convenient

STATE OF DEVELOPMENT

The researchers have developed the invention and have successfully reduced the invention to practice.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,939,874	03/09/2021	2016-595
Germany	Issued Patent	3432784	09/23/2020	2016-595
France	Issued Patent	3432784	09/23/2020	2016-595

INVENTORS

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OTHER INFORMATION

KEYWORDS

Prostate cancer, Cancer, Lesions, Cancer classification, Computer-aided diagnosis, mp-MRI, MRI, Deep learning, Machine-learning

CATEGORIZED AS

- Imaging
  - Medical
  - Software
- Medical
  - Diagnostics
  - Disease: Cancer
  - Imaging
  - Software

RELATED CASES

2016-595-0

United Kingdom	Issued Patent	3432784	09/23/2020	2016-595
Netherlands (Holland)	Issued Patent	3432784	09/23/2020	2016-595

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

▶ A Method For Accurate Parametric Mapping Based On Characterization Of A Reference Tissue Or Region

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