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سخنران

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عنوان سمینار:

Deep Learning for Prostate Cancer Management: Investigating the Impact of Network Architecture on the Accuracy of Volume Measurement and MRI-Ultrasound Prostate Registration

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Abstract:

Convolutional neural networks (CNNs) have recently led to significant advances in automatic segmentation of anatomical structures in medical images, and a wide variety of network architectures are now available to the research community. For applications such as segmentation of the prostate in MR images, the results of the PROMISE12 online algorithm evaluation platform have demonstrated differences between the best-performing segmentation algorithms in terms of numerical accuracy using standard metrics such as the Dice score and boundary distance. These small differences in the segmented regions/boundaries outputed by different algorithms may potentially have an unsubstantial impact on the results of downstream image analysis tasks, such as estimating organ volume and multimodal image registration, which inform clinical decisions. This impact has not been previously investigated. In this talk, I will describe our experience in quantifying the accuracy of six different CNNs in segmenting the prostate in 3D patient T2-weighted MRI scans and compared the accuracy of organ volume estimation and MRI-ultrasound registration errors using the prostate segmentations produced by different networks. The result provides a real-world example that these networks with different segmentation performances may potentially provide indistinguishably adequate registration accuracies to assist prostate cancer imaging applications. I will conclude by recommending that the differences in the accuracy of downstream image analysis tasks that make use of data output by automatic segmentation methods, such as CNNs, within a clinical pipeline should be taken into account when selecting between different network architectures, in addition to reporting the segmentation accuracy.

Biography:

Nooshin Ghavami is a final year PhD student in the department of Biomedical Engineering and Medical Physics in University College London (UCL). After pursuing a Bachelor's degree in Biomedical Engineering from King's College London and a Master's of Research in Medical Imaging from UCL, she continued within the same field for a PhD. Her research interests include; prostate cancer, MRI, segmentation and deep learning.