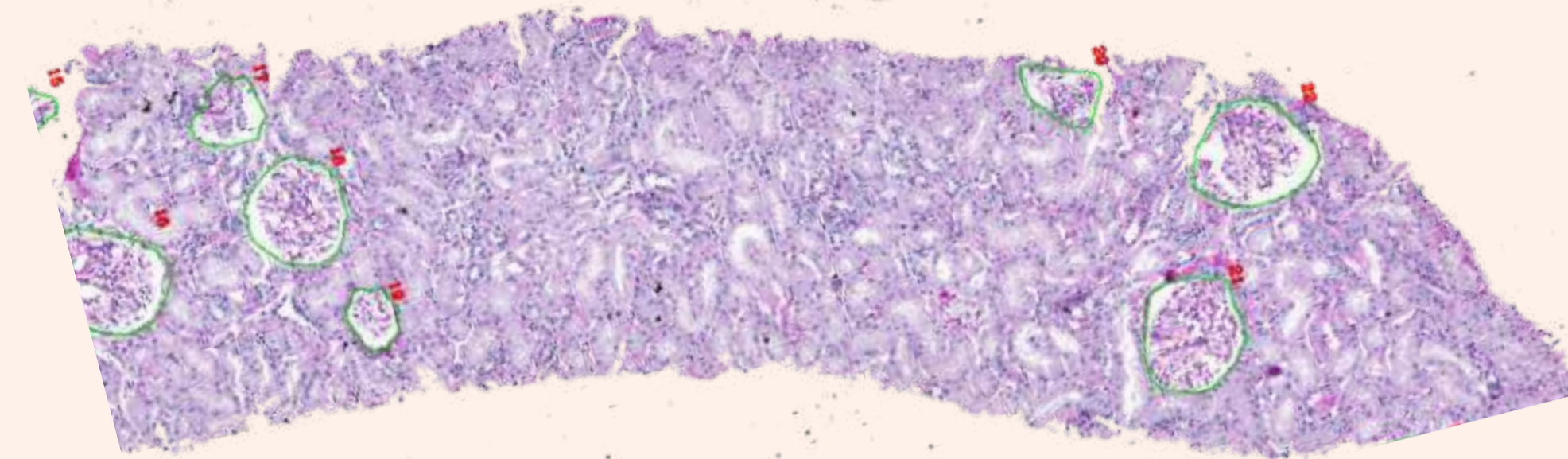


AUTOMATIC COMPUTATIONAL SEARCH OF HISTOLOGICAL IMAGES OF RENAL LESION USING SEMANTIC ATTRIBUTES

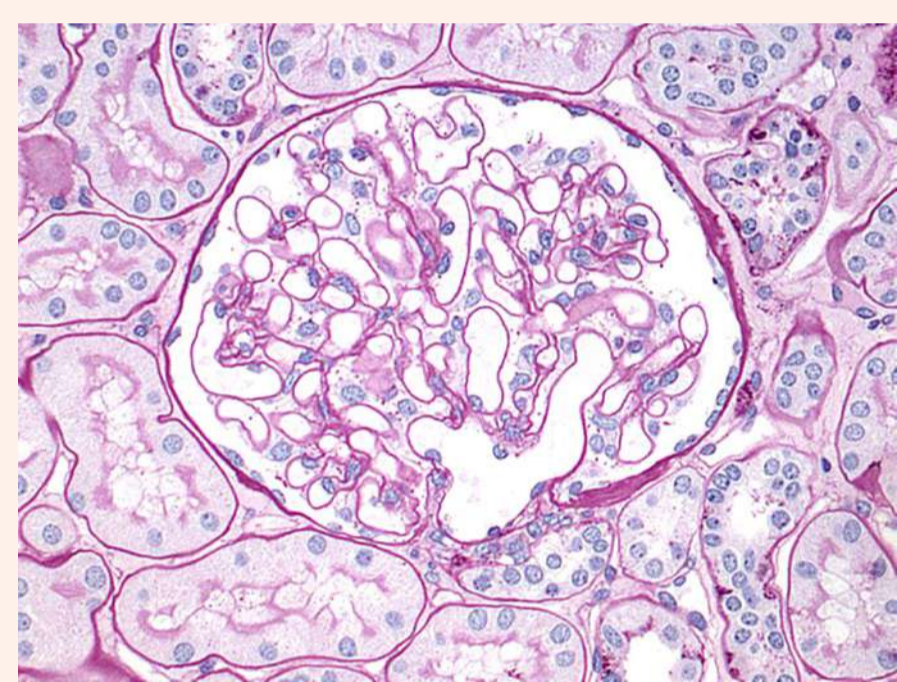
Luciano R Oliveira¹, Angelo A Duarte², Rodrigo T Galumby², Michele Angelo², Washington LC dos-Santos^{1,3,*}

We propose a system that finds biopsy images using semantic attributes despite staining variations. It can identify similarities between images via glomerulus segmentation and lesion classification. Our team's previous work has been used to establish semantic attributes for the new search engine.

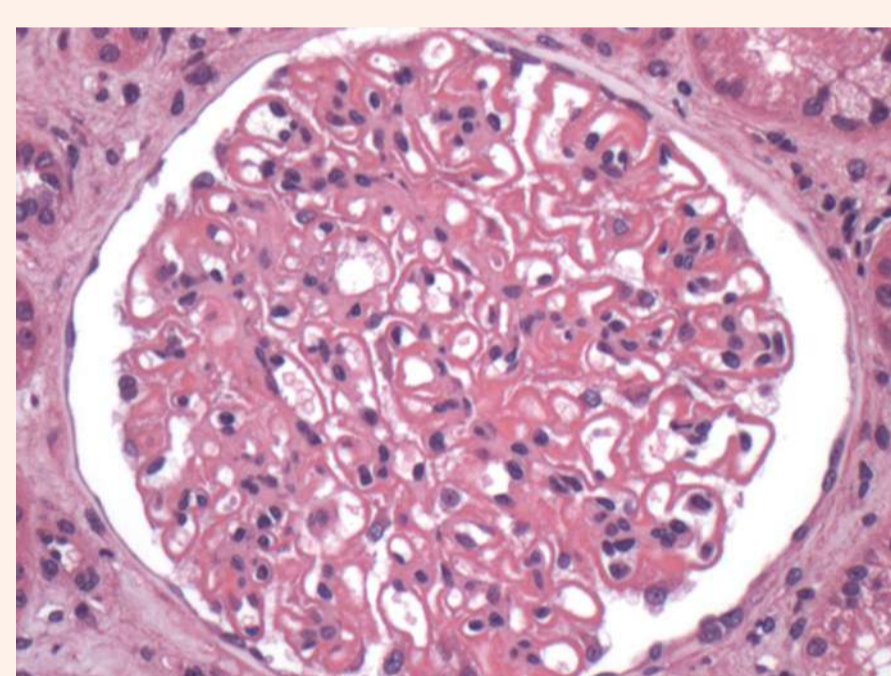


GLOMERULUS SEGMENTATION

The new DS-Fnet achieved a dice score (DSC) of 95.05% in the "HuBMAP - Hacking the Kidney" challenge on Kaggle. On the NEPTUNE and proprietary FIOCRUZ data sets, DS-FNet also obtained a high DSC, while only trained with HE stain images and predicting over images stained with other techniques.
<https://doi.org/10.1016/j.compmedimag.2022.102104>

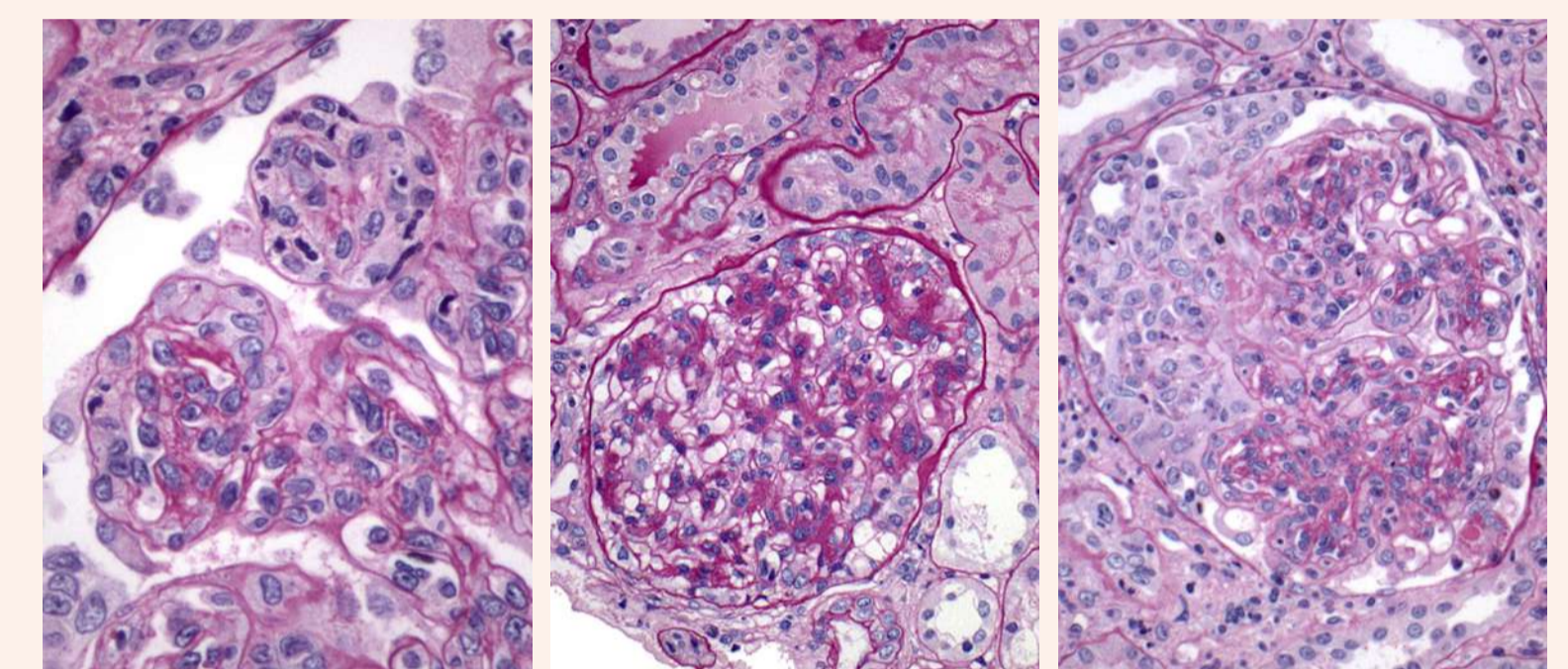


NORMAL GLOMERULUS



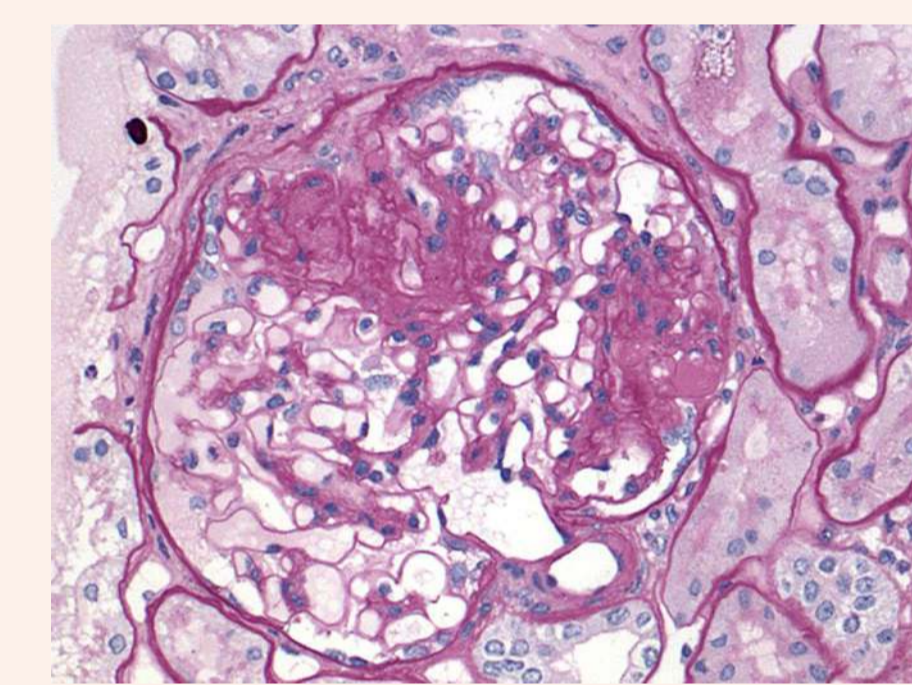
MEMBRANOUS GLOMERULOPATHY

We evaluated four deep-learning architectures (ResNet-18, MobileNet, DenseNet, and Wide-ResNet) using Monte Carlo dropout for uncertainty estimation. Wide-ResNet had the highest accuracy (93.2%). By using uncertainty-based thresholds improved accuracy to 96%.
<https://doi.org/10.1080/21681163.2022.2029573>



GLOMERULAR HYPERCELLULARITY

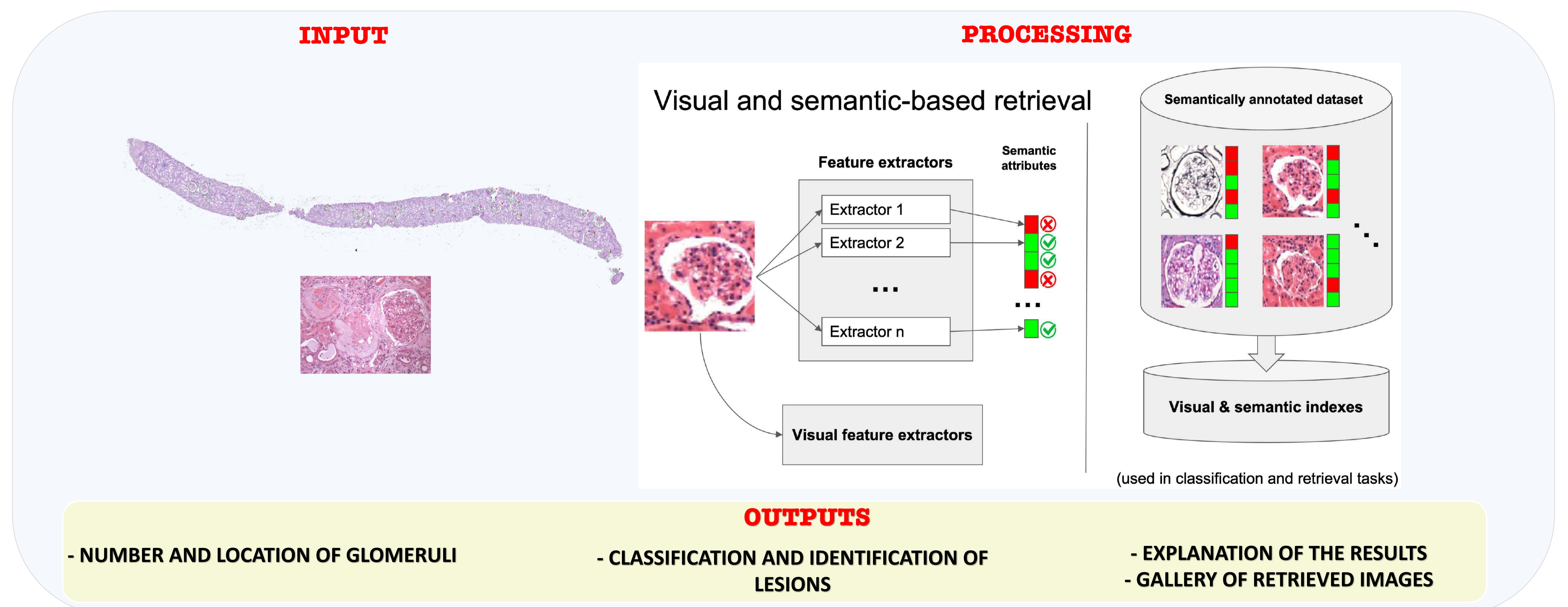
CNN and SVM achieved near-perfect classification results for normal/lesioned glomeruli in a proprietary FIOCRUZ dataset. For the multiclassification of hypercellularity sub-lesions (mesangial, endocapillary, and combined), the model achieved an average accuracy of 82%.
<https://doi.org/10.1016/j.artmed.2020.101808>



SEGMENTAL GLOMERULAR SCLEROSIS

An ensemble approach composed of CNNs (VGG-19, Inception-V3, ResNet-50, DenseNet-201, and EfficientNet-B2) was used to detect glomerulosclerosis with near-perfect performance (accuracy 99.0% and kappa of 98.0%).
<https://doi.org/10.1007/s00180-022-01307-3>

A new system is being developed to find glomerulus images based on semantic attributes of an input image. Attributes can be categorical or numerical, which are matched with stored data to indicate the presence or absence of a lesion and to analyze the extension of a lesion. Attributes are easily pluggable to the system.



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