



National Institutes of Health
Clinical Center



Image Translation by Latent Union of Subspaces for Cross-Domain Plaque Detection

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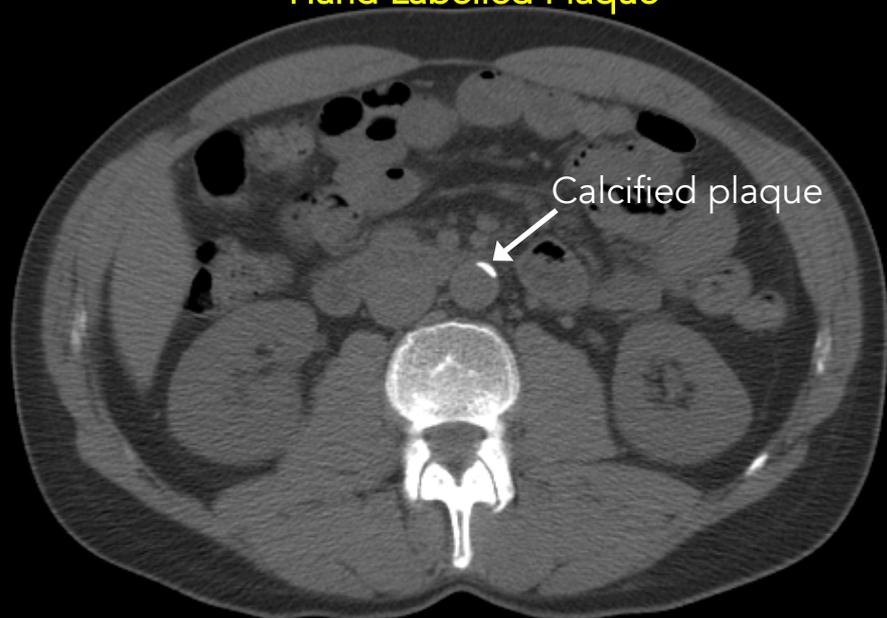
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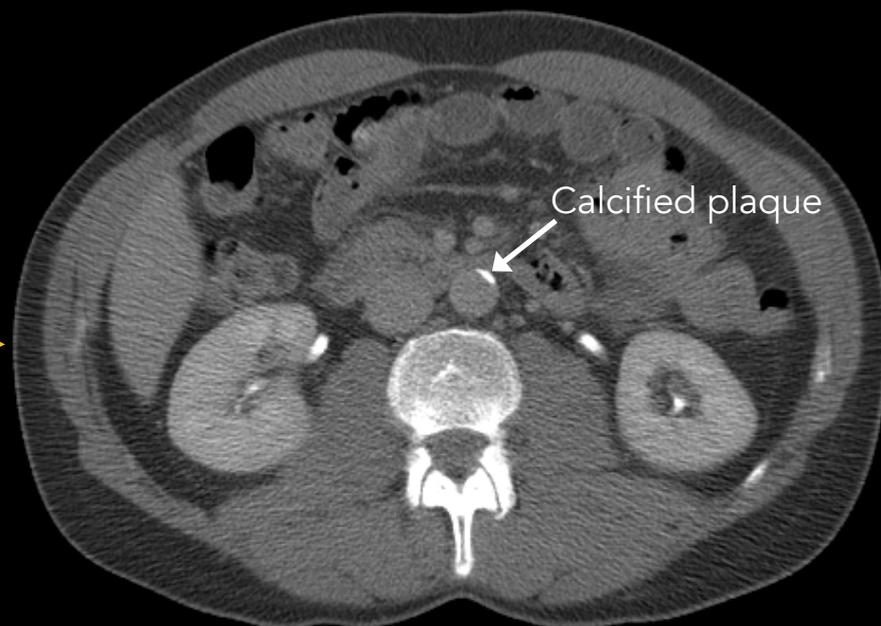
Challenges

- Generalization of calcified plaque detection model on different domains

Non-Contrast CT (NCCT)
Hand Labelled Plaque



Contrast Enhanced CT (CECT)



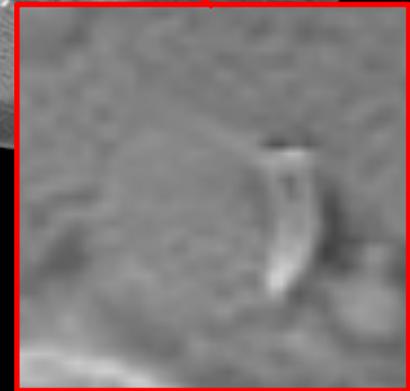
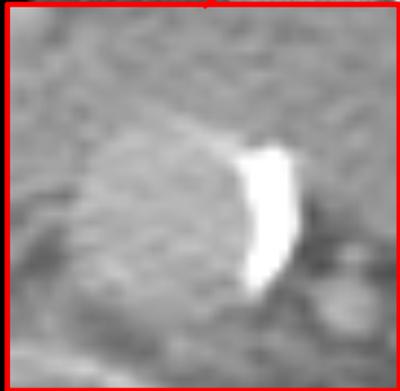
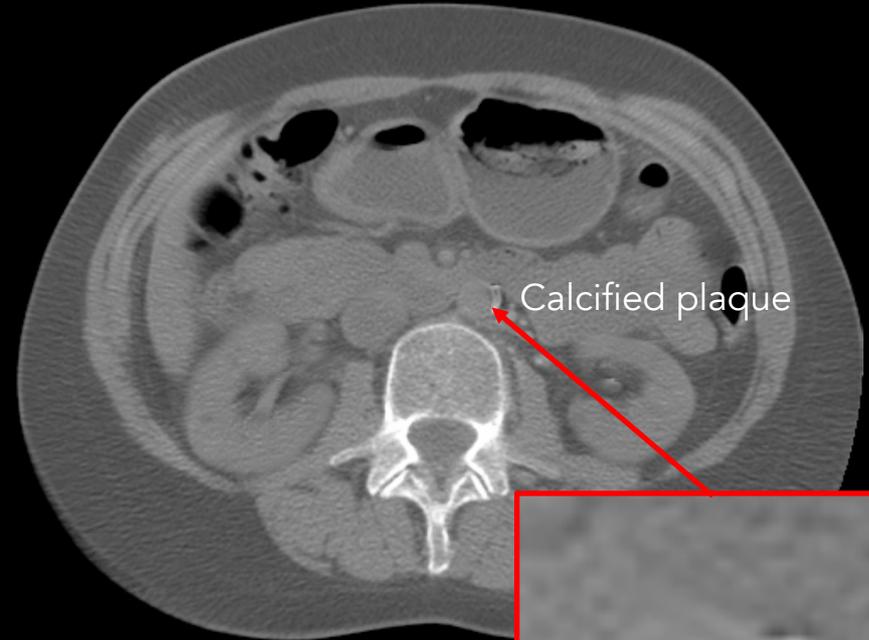
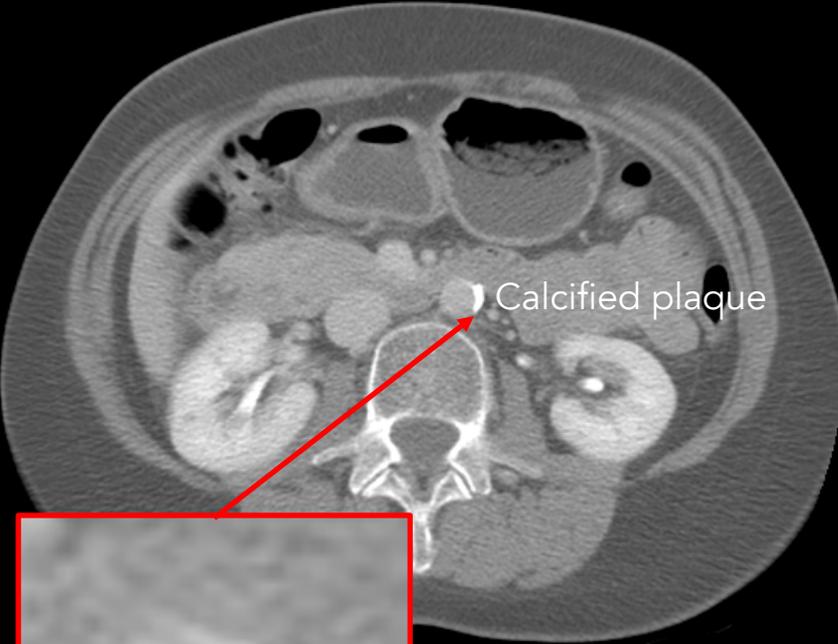
Can we translate image across domains?



Current Cross-Domain Image Translation Method

Contrast-Enhanced CT

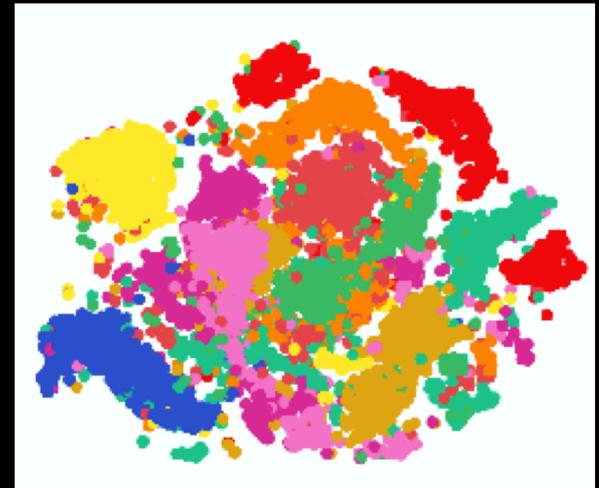
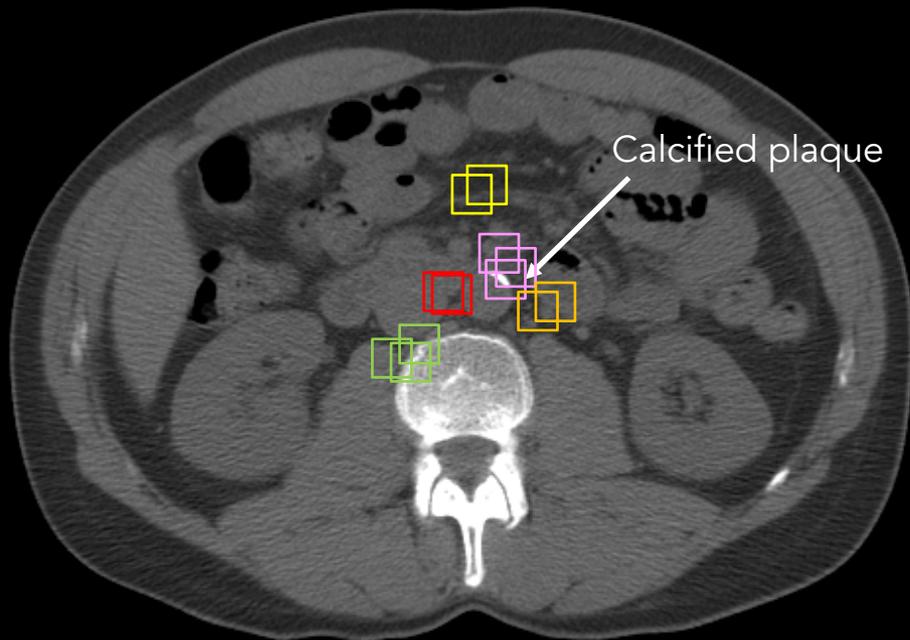
Synthetic Non-Contrast CT (Liu et al. 2018)



Calcified plaques are not preserved after image translation



Extract Small Patches to Union of Subspaces

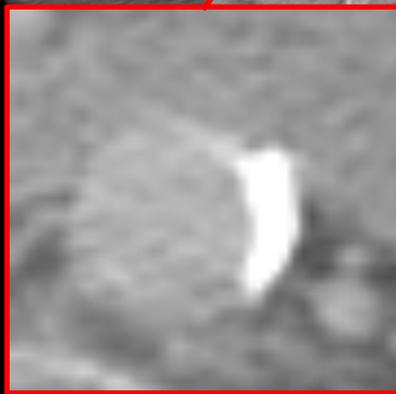
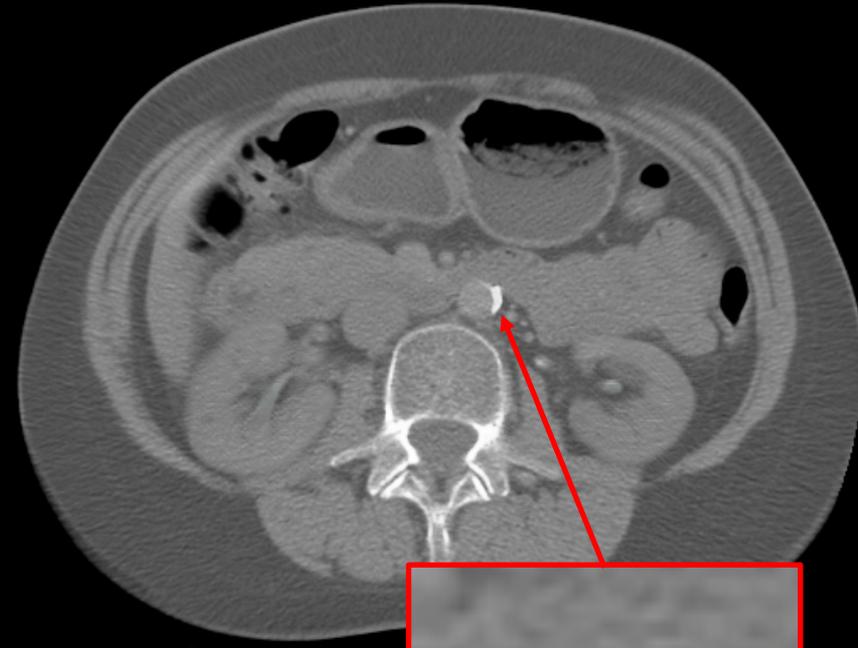
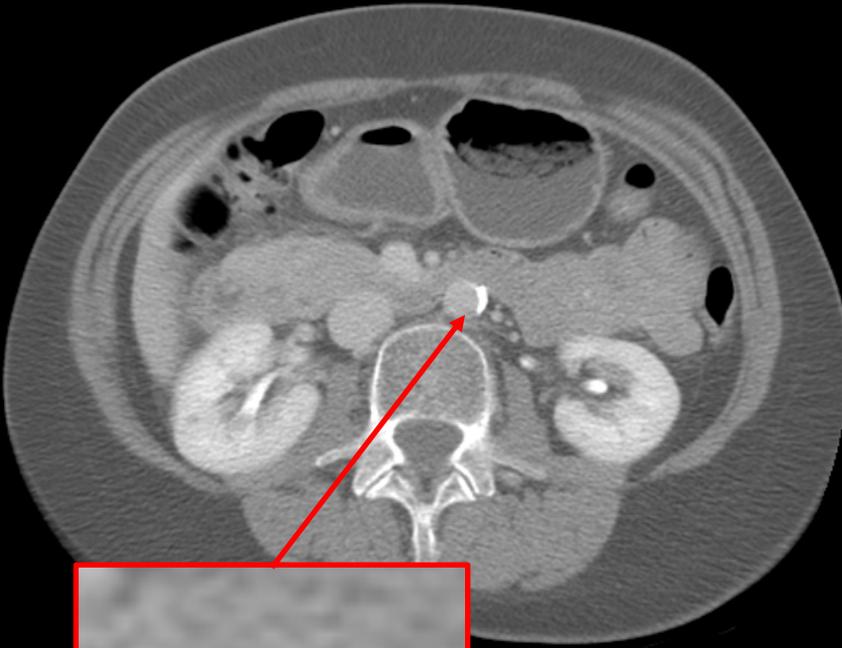


Different image patch lies in different clusters

Cross-Domain Image Translation by Shared Union of Subspaces

Contrast Enhanced CT

Synthetic Non-Contrast CT (our model)



Calcified plaques are preserved much better after image translation



Results

- Contrast Enhanced CT (CECT) calcified plaque detection & segmentation by Mask-RCNN

He, Kaiming et al. "Mask R-CNN." *2017 IEEE International Conference on Computer Vision (ICCV)* (2017): 2980-2988.

Training Data	Non-Contrast CT (NCCT)	Non-Contrast CT (NCCT)	Non-Contrast CT (NCCT)
Testing data	Synthetic NCCT by Cycle GANS Zhu et. al	Synthetic NCCT by UNIT Liu et. al	Synthetic NCCT by our model
Precision	60.5±2.87%	63.2±2.64%	77.5±2.58%
Recall	65.7±3.21%	69.5±3.05%	78.6±2.87%
Dice	0.534±0.236	0.566±0.198	0.676±0.176





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Thanks

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