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

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Challenges

• Generalization of calcified plaque detection model on different domains

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


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

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