

Localizing neurosurgical instruments across domains and in the wild

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Background



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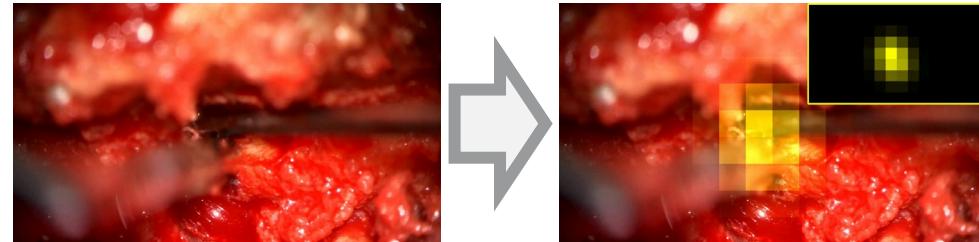
Data

Training surgeries	
Tumor	Phantom
Independent test surgeries	
Tumor	Vascular
Spine	
Clinical in the wild data	Phantom



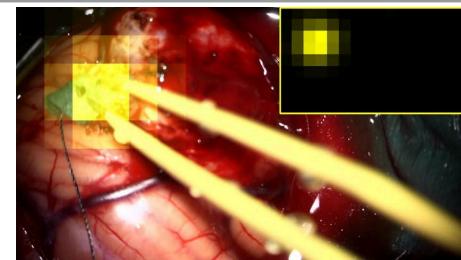
Goal

→ Localize surgical saliency by localizing instrument tips



Surgical saliency is not a pixel-level problem → coarse saliency

Metrics



Predicted saliency Q_{Pred}



Ground truth saliency Q_{GT}

$$SIM = \sum_{i,j} \min((q_{Pred})_{i,j}, (q_{GT})_{i,j}) \quad \text{with } Q_{Pred} \text{ and } Q_{GT} \text{ normalized.}$$

In the example above, $SIM = 0.62$

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Health Robotics and Automation



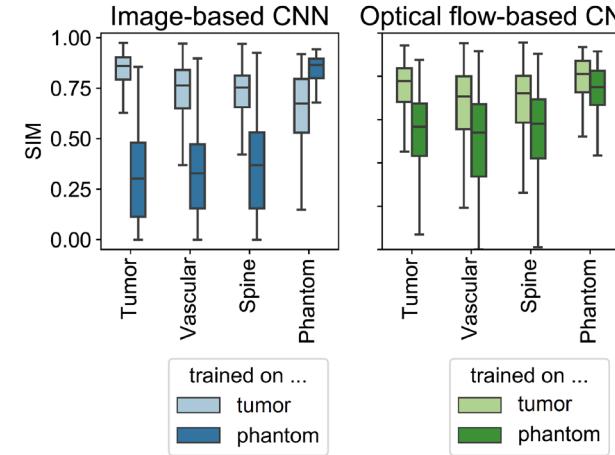
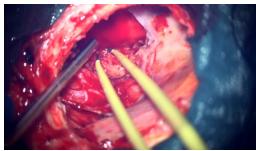
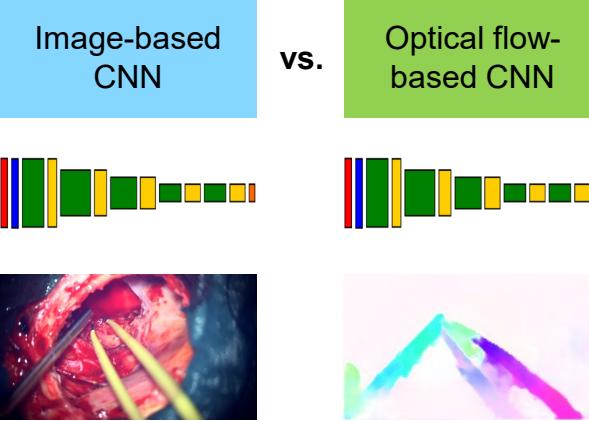
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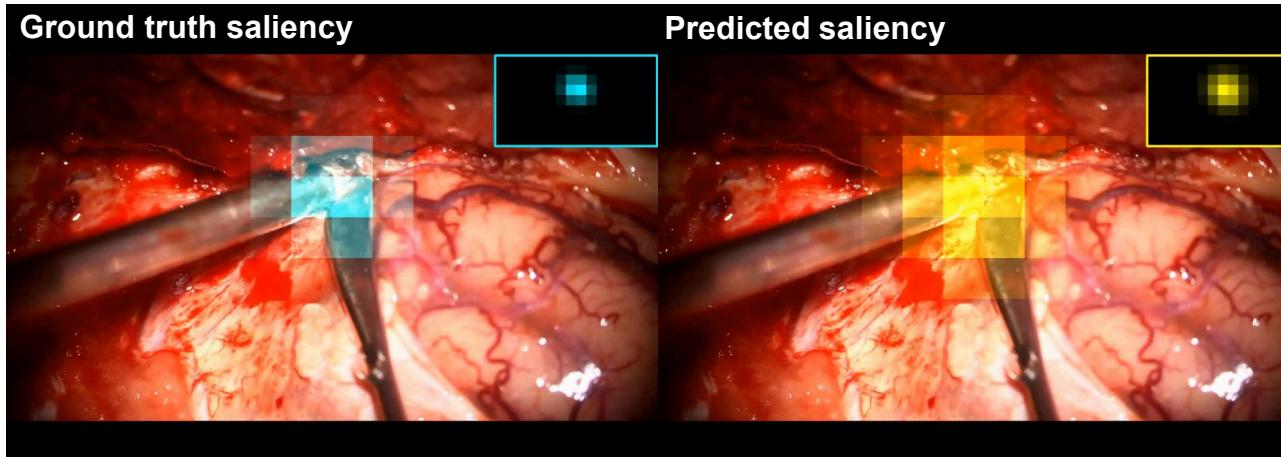
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Pre-analysis



Example video



Spatio-temporal fusion

