Interactive Contouring Through Contextual Deep Learning

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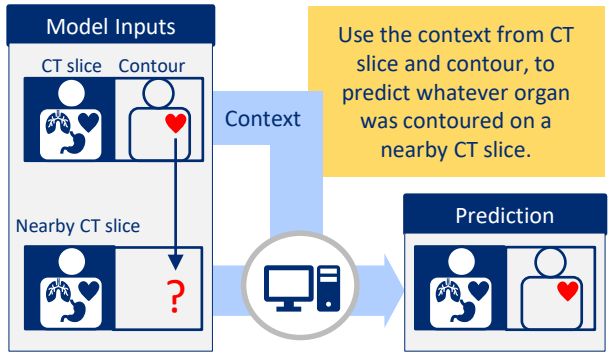
OBJECTIVE

We investigate whether an interactive contouring approach can leverage contextual information using deep learning to assist clinicians in manual contouring tasks.
This can decrease time spent contouring where no fully automatic solutions exist, or assist when editing contours.



Use the context from CT slice and contour, to predict whatever organ was contoured on a nearby CT slice.

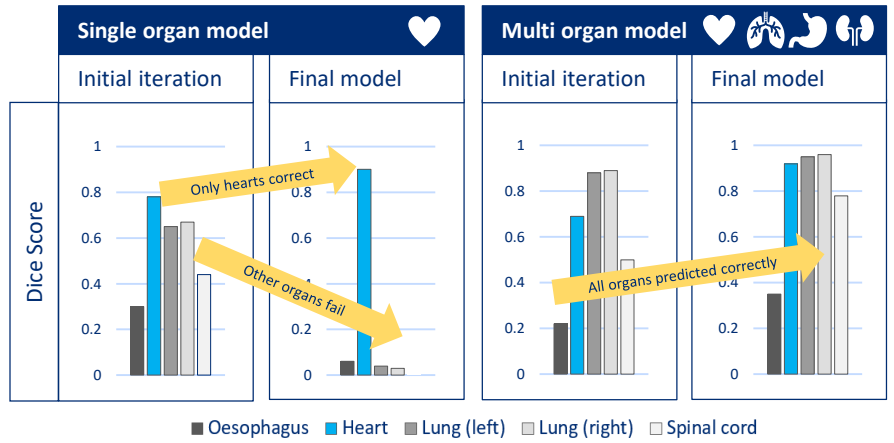
MATERIAL AND METHODS

2 machine learning models with identical architecture, either using a single organ (the heart) or all 5 OARs (multi-organ model) in their training set.

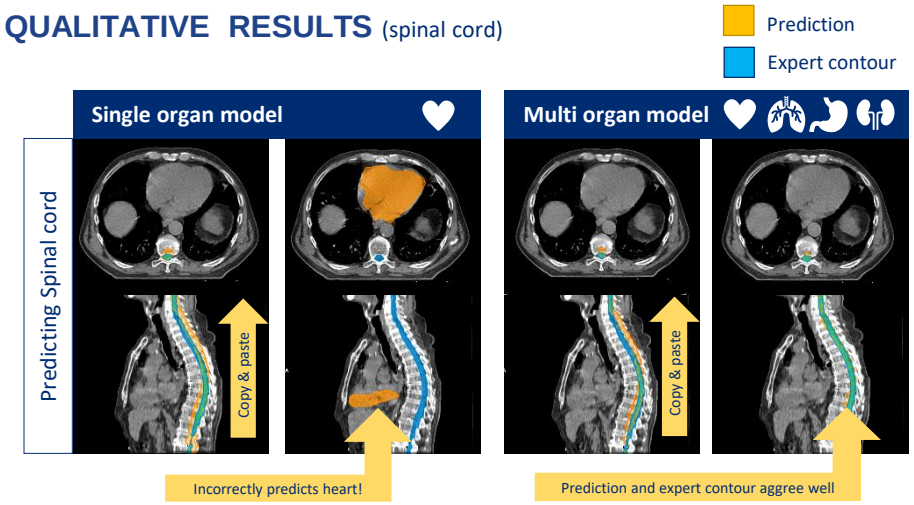
12082 contoured slices in training
4647 contoured slices in testing

5 Different organs at risk (OARs) are investigated: oesophagus, heart, left lung, right lung and spinal cord

QUANTITATIVE RESULTS



QUALITATIVE RESULTS (spinal cord)



Single organ model performs well only on the organ it was trained on despite given context.

Multi organ model performs well on all organs. It can accurately predict from context, which organ should be contoured.

Performance **at the first iteration** is attributed to **simple copying** of input contours.

CONCLUSIONS

User provided context can be incorporated into deep learning contouring to facilitate semi-automatic segmentation

An appropriate training set must be selected to ensure that the approach generalises to use context rather than learning organ-specific segmentation.

In the future, this approach may enable faster de-novo contouring in clinical practice.

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