

# SPINE VERTEBRAE SEGMENTATION IN 3D CT SCAN IMAGES

Jan Alexander

Promotors: dr. J. Roels & dr. ir. B. Vankeirsbilck

## PROBLEM MOTIVATION

### CT scan segmentation

Automatization of CT scan interpretation:  
pathology diagnosis and surgical intervention.



lumbar hernia procedure

### Weak supervision

Data labelling costly and time consuming

What could we do with less?

Instance segmentation model trained on **point supervised** data can strongly reduce cost [1].

## PROJECT OBJECTIVE

**Construction and analysis** of point supervised instance segmentation mode of the lumbar spine.

**Comparison** of the performance of point supervised models with fully supervised reference model.

Based on freely available data.

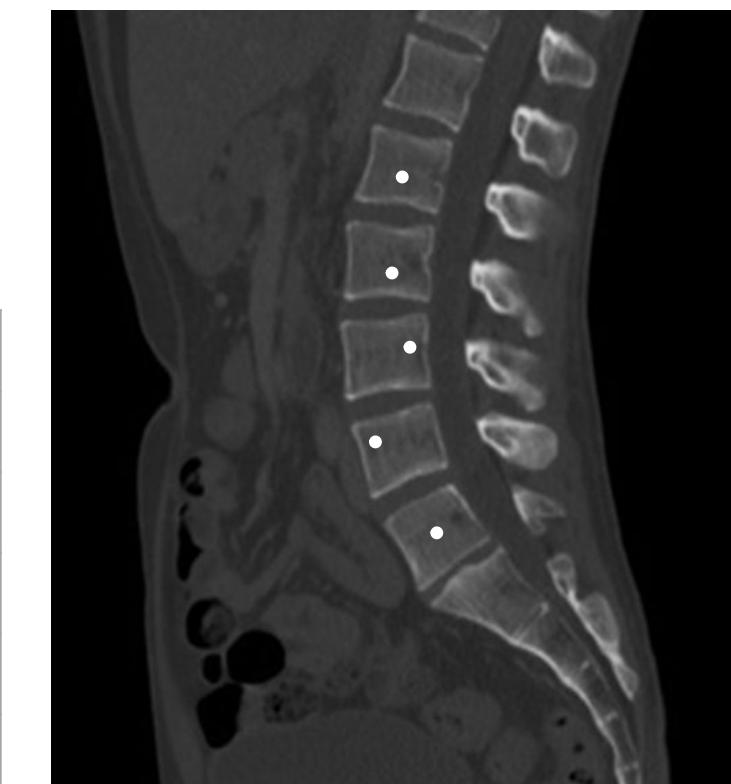
## PREVIOUS WORK

### Datasets

5 datasets [2-7,13] :

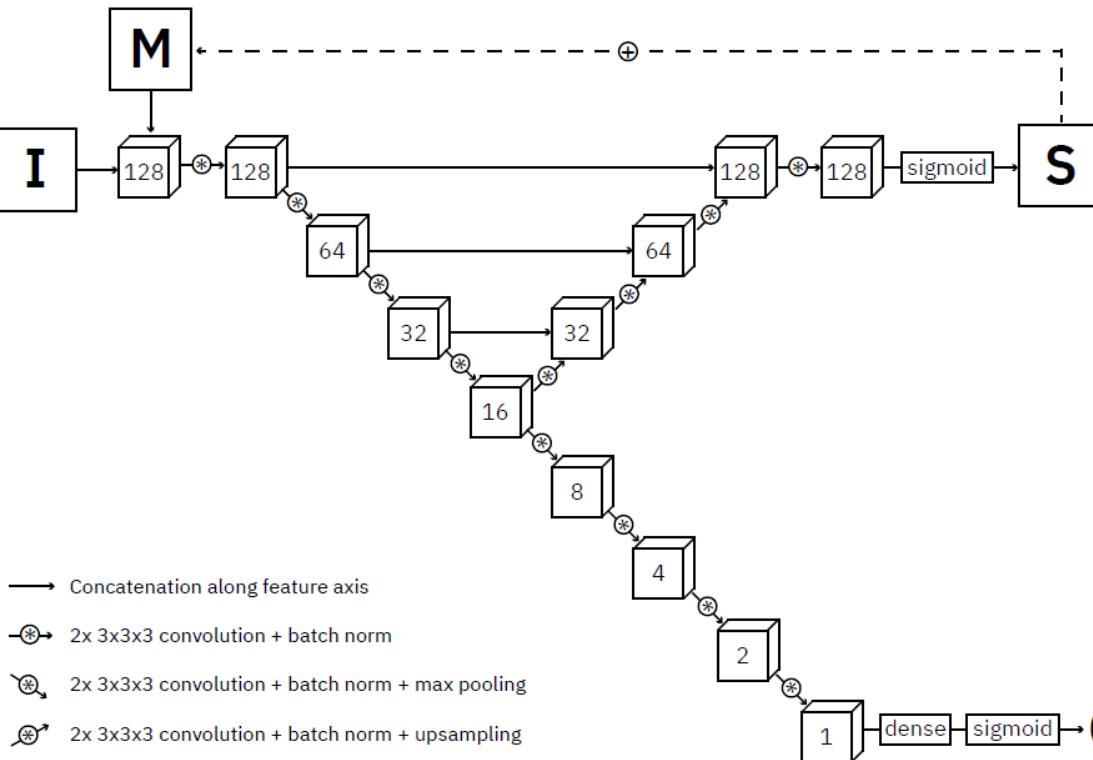
- 359 images, 242 patients
- 103 male, 109 female, 22 unknown
- Average age: 53 years

DATASET	IMAGES	ANNOTATION
USiegen	17	Full
xVertSeg	25	Full
PLoS	22	Full
MyoSeg	53	Full
Uwash	242	Point



### Architectures

Fully supervised model as reference [12]



3D U-Net with instance memory

### Point supervision techniques

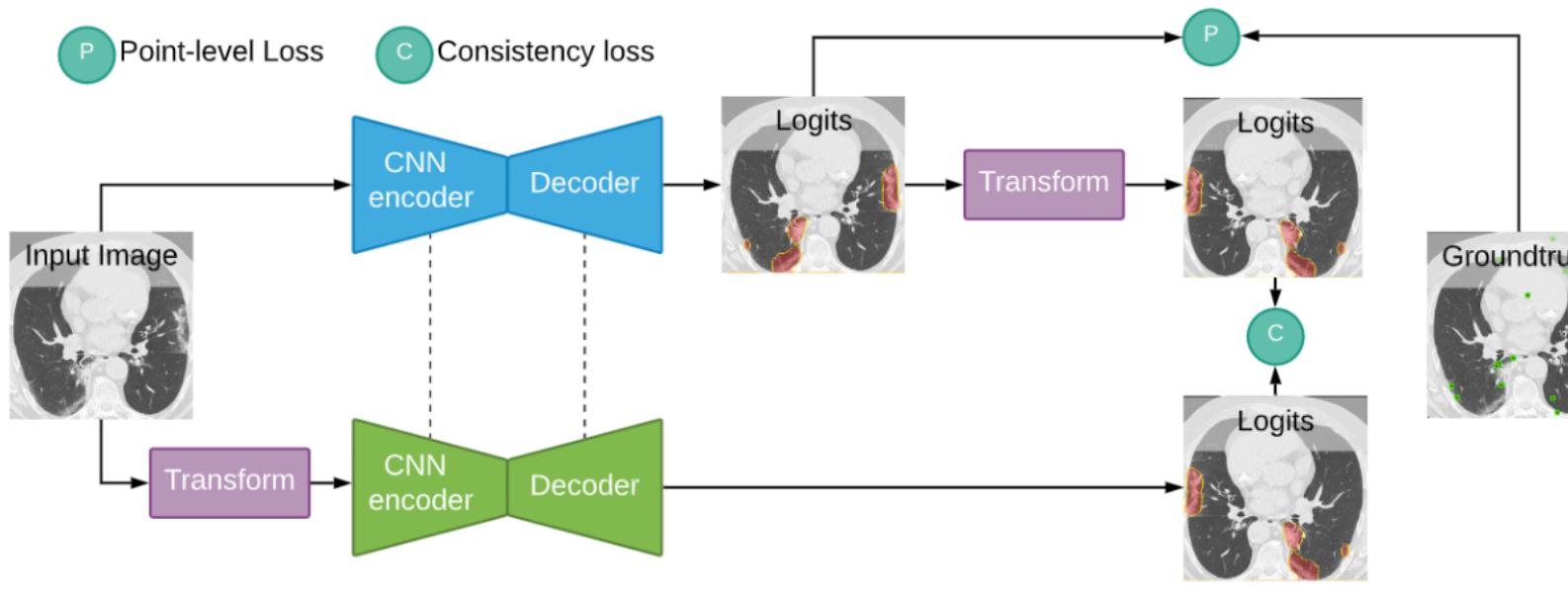


Illustration of consistency loss network [9]

## APPROACH

### Comparison with fully segmented model

Convert full segmentation to point supervision.

- Compare weakly supervised model with fully supervised model, trained on same dataset:

**Different backbones:** ResNet, VGG16 & upsampling, U-net)

**Different loss functions:** Consistency, WISe

**Evaluation of 3th dimension:** 2D+ (channels), 3D, instance memory

- Train best model with UW data and evaluate again.

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The REISS project is led by dr. Ir. B. Braeckman

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