Using “Cheap” Information to when  
“Expensive” Information is lacking

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# Abstract

In recent years Convolutional neural network have been a major power of progress in the efficiency of several computer vision tasks – classification, detection, segmentation etc.   
a lot of the advancements in the field are contributed the exponential increase in data, particularly annotated data. Data annotation is to this day a laboring task and is the bottleneck in many regions of computer vision where annotation is very expensive such as the medical imaging field where annotation is being made by expert radiologists. The scarcity of annotated data makes us think on the usage of utilizing other information that might be available easily and can be beneficial for segmentation tasks. In this work we examine several methods and data sources which are easily available in order to improve the task of segmentation the lower vertebrae. We were able to improve DATA DATA DATA

# Introduction

The proper segmentation of the lower vertebrae is crucial for the detection of Vertebral Compression Fractures (VCF) which are very common in the elder or in the case of a metastasis present nearby. Early detection VCF can have a crucial impact on the patient’s treatment.

In recent years the task of vertebral segmentation has been based on different variations

Of convolutional neural network suited for segmentation such U-Net, FCN and so on.  
These methods have shown great improvements across the board in many segmentation scenarios. The caveat of these methods is that they rely solely on annotated images (masks)  
which is created by expert radiologists and therefore scarce and expansive.   
  
In this work we try to explore techniques for utilizing other information which can be acquired  
easily from any hospital alongside vertebral images which are not annotated. Such information can be retrieved from the patient’s medical sheet. We are using the gender and the  
age of the patient. Our assumption is that learning to classify gender (bigger bones) and age (bone deterioration) from the CT scan of the vertebrae forces the network to learn the underlying structure of the vertebrae and the intervertebral discs. The method will be explained more thoroughly soon, but our goal is to use this information (age and gender) to generate pre-trained weights for the segmentation task. This method has the ability to increase the amount of used information by orders of magnitudes, leveraging un-annotated CT scans and this way to generate tailor made pre-trained weights to specific segmentation or detection tasks.

# Related Work

This work follows somewhat the paradigm of Self-Supervised Learning (SSL) where we starting to train

# Data

# Methods

# Experiments

# Conclusion