

Supplementary Material for MBNet: A Multi-Task Deep Neural Network for Semantic Segmentation and Lumbar Vertebra Inspection on X-ray Images

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1 Training and Validation

We trained our MBNet with 200 epochs, and the accuracy curves of training and validation are shown in Fig. 1. the loss curves of training and validation are shown in Fig. 2.

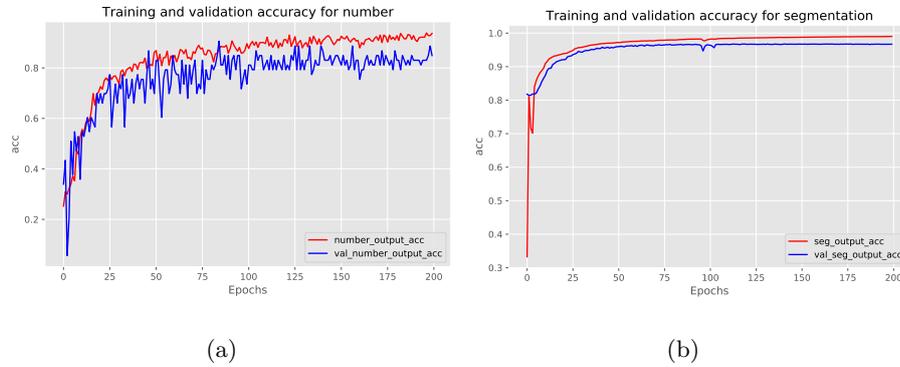


Fig. 1. Accuracy curve of training and validation on our Lumbar dataset under MBNet network model. Training and validation accuracy report the total accuracy of training and validation stages, respectively. (a) is evaluated for the inspected values. (b) is evaluated for semantic segmentation of the lumbar vertebrae, sacrum, and femoral heads.

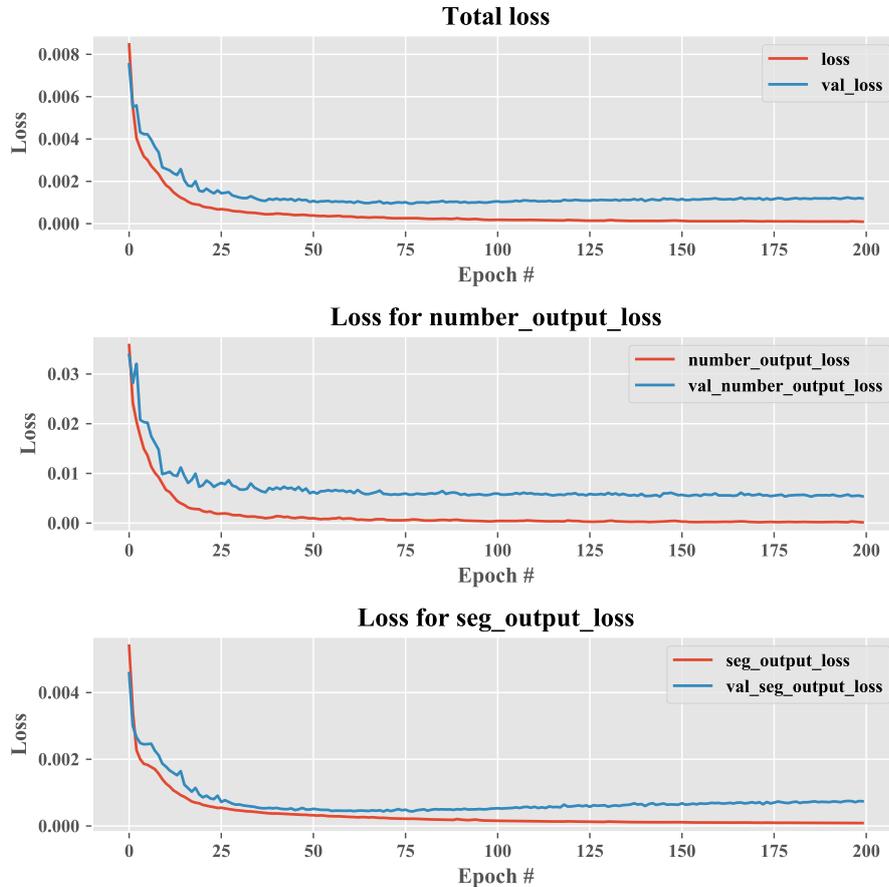


Fig. 2. Loss curve of training and validation on our Lumbar dataset under MBNet network model. Training and validation loss report the total loss of training and validation stages respectively. Loss for number_output_loss is evaluated for the inspected values. Loss for seg_output_loss is evaluated for semantic segmentation of the lumbar vertebrae, sacrum, and femoral heads.

2 Case Results

In this section, present some additional results. Fig. 3 supply some the lumbar vertebra inspection with our MBNet and BiLuNet on X-ray images. Fig 3(b, f, j, n) are our MBNet results with the inspection results and the semantic segmentation of vertebrae, sacrum, left and right hip joints, in red, green, blue and cyan, respectively. Fig 3(c, g, k, o) are the reference annotation by a doctor. Fig 3(d, h, l, p) are our BiLuNet results with deriving the parameters from the

segmentation and the identified shape and location of these objects (L1, L2, L3, L4, L5, S1, hip axis).

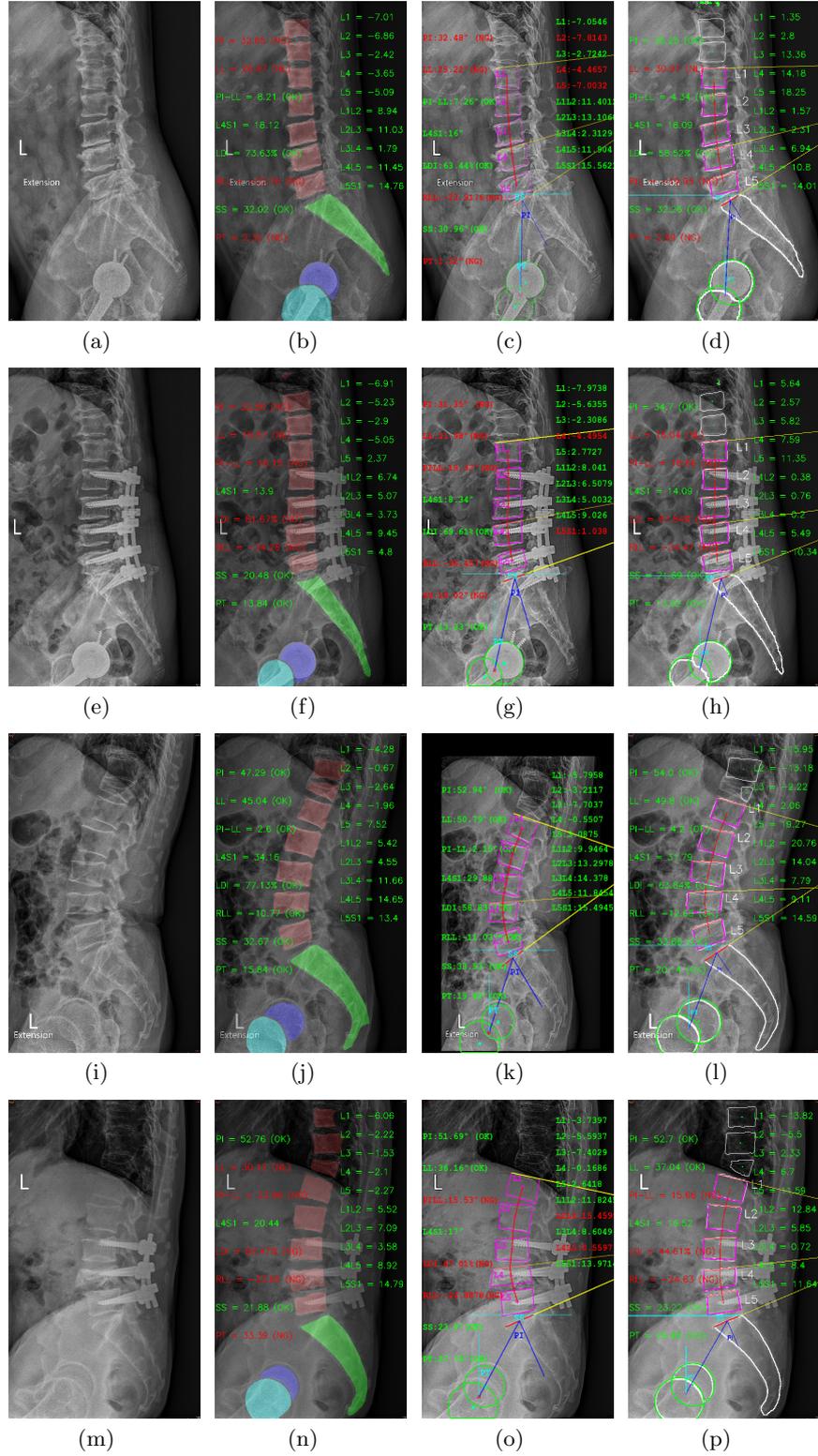


Fig. 3. The lumbar vertebra inspection with our MBNet and BiLuNet on X-ray images. (a, e, i, m) the input X-ray images before and after surgery. (b, f, j, n) our MBNet results with the inspection results and the semantic segmentation of vertebrae, sacrum, left and right hip joints, in red, green, blue and cyan, respectively. (c, g, k, o) the reference annotation by a doctor. (d, h, l, p) our BiLuNet results with deriving the parameters from the segmentation and the identified shape and location of these objects (L1, L2, L3, L4, L5, S1, hip axis).