Machine Learning (XAI501) Term Project Bi-weekly report

*Created on* November 10, 2020

Bayesian Uncertainty Estimation for Ultrasound Medical Image Segmentation

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**Milestones**

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| --- | --- | --- |
| Date | Milestones | Remark |
| 10/28 (Wed) | Proposal | Done |
| 11/04 (Wed) | Data preprocessing and understanding | Done |
| 11/11 (Wed) | Proposed architecture design and implementation | Proceeding |
| 11/18 (Wed) | Experiments conducting (1) |  |
| 11/25 (Wed) | Experiments conducting (2) |  |
| 12/02 (Wed) | Analysis |  |
| 12/09 (Wed) | Final documentation and presentation preparation |  |
| 12/13 (Sun) | Final documentation and presentation preparation |  |

**Group progress**

* Exploratory Data Analysis (EDA)
* Data preprocessing
* Implementation of baseline architecture

**Individual progress**

* Sangjin : Analysis for data and missing labels through visualization using colab.
* Jinhyo : Converting image data to animation and analysis videos.
* Sunwoo : Dataloader and baseline model implementation.
* Kwanseok : Baseline model training and make inference images.

**New findings**

* Dataset information
  + 47 people, 120 continuous images
  + Almost half of the data don’t have labels. So we conducted some analysis.
    - There was no relationship between missing labels and subject.
    - There was no relationship between missing labels and image.
    - There was no relationship between missing labels and video frame in time sequence.
    - See the attachment : (colab)   
      <https://drive.google.com/file/d/1rCqy1KMVW-XX_9krBoJiCVwIjiNOdooc/view?usp=sharing>
  + We find that the 120 images are one video frame
    - Convert image data to gif animation files.
    - In some cases, there was no label even if it was a continuous image.
    - Sometimes, masking can occur in many places, even though the frame has not changed much.
    - There are potential mistakes because of human-labeled data.
    - See the attachment : (gif images)  
      <https://drive.google.com/drive/folders/1y1Cu3YtnUUcoFvy4sBPZtGE6nK7rLAZG?usp=sharing>
* Preprocessing
  + Image resize and missing label control
    - The original image size is (1, 420, 580)
    - Resize in half (1, 210, 290) for faster training
    - We only use labeled image, missing label data not included for first baseline experiments
* Baseline
  + Environment
    - Python3.6 and Pytorch framework
    - We use 2GPUs(1080ti) for model training.
  + Implement and Experiment details
    - We run five repetitive experiments.
    - We use the Dice loss function and Adam optimizer for model training.
    - We use the f1 score as the model evaluation score.
    - See the attachment : (colab)

<https://colab.research.google.com/drive/1Hhyp-n87QzzYVGFZyvjAJyVqYd_s0GTw?usp=sharing>

* + Experiment result
    - See the attachment : training log file (out file)

<https://drive.google.com/file/d/10dcNHXT5g_3mwezLZnLge10atwlrNVJ6/view?usp=sharing>

* + - See the attachment : experiment results (xlsx file)

<https://docs.google.com/spreadsheets/d/1goUVBnmmnLIVAoZQX1tkuWwPkgDS9EE8st8vqavWufo/edit?usp=sharing>

* + - See the attachment : saved model (pth file)

<https://drive.google.com/drive/folders/1sDxoGEI4YjtmkTvO3rLoQYBX2kasItH4?usp=sharing>

* + Inference
    - We make prediction images
    - See the attachment : how to make prediction images (colab)

<https://colab.research.google.com/drive/1MyelxThMkHAgzBB9hy82DA4EqtKEOwpy?usp=sharing>

* + - See the attachment : prediction images (png file)

<https://drive.google.com/drive/folders/1-5RlM98otQDgEJPX0F2wNSN1OIE1oZbT?usp=sharing>

**Changes to the proposal**

* None