

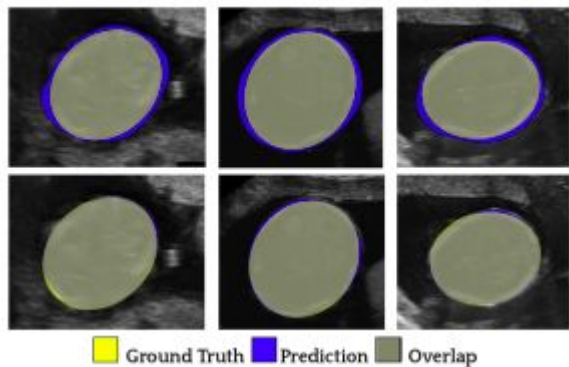
Project Proposal

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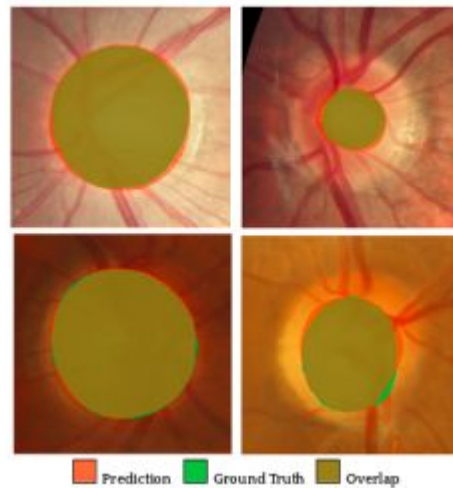
Image Segmentation

- We plan on implementing [Image Segmentation Using Hybrid Representations](#) which was published in 2020.
- This paper created a U-net based architecture which segments Optic Disc and Optic Cup in color fundus images and fetal Head in ultrasound images.
- This paper uses additional frequency preserving features, namely the Scattering Coefficients (SC), for medical image segmentation.
- Our motivation for choosing this paper is the fact that this paper proposes a general purpose network which can segment on multiple modalities

Example Images



Fetal Head circumference



Optic Disc and Cup

More details

- For Optic Disc and Cup Segmentation we plan on using publicly available datasets: DRISHTI-GS1 [10], RIM-ONE v2 [11], and REFUGE
- For Fetal Head circumference we plan on using The HC18 challenge dataset

Model architecture

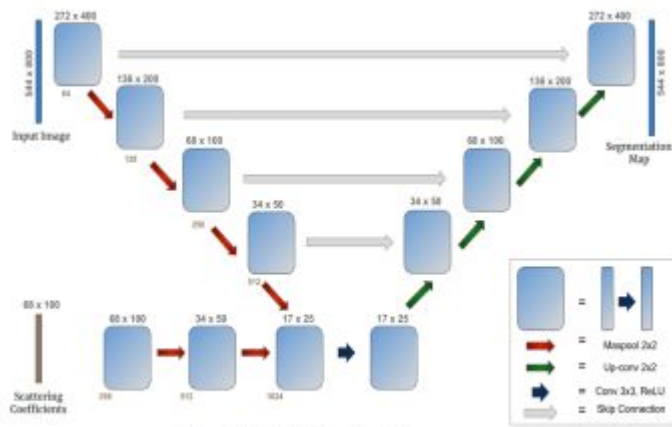


Fig. 1: DU-Net Architecture

Experiment with Transformer Architecture

- We plan on trying transformers for these datasets using [TransUNet](#) architecture or [Medical Transformer](#). Also we plan to look into general DETR like transformer architecture from CV as baseline.
- Once we can make these work we plan to look more into transformers in general.
- The above two papers are quite recent 8th Feb, 2021 and 21st Feb, 2021; although we have code bases for both available, we want to try to retrain these models for above mentioned datasets. Through this experiment we want to test two things if indeed these models perform better and some dataset for which they were not tested. Secondly, we also want to learn and explore the most recent DL advancement in medical imaging.
- The reason we have kept this slide as second is because there is a possibility that we might not be able to get these running in a span of 15 days.

References -

1. **Image Segmentation Using Hybrid Representations** - Alakh Desai, Ruchi Chauhan, Jayanthi Sivaswamy
2. **Medical Transformer: Gated Axial-Attention for Medical Image Segmentation** - Jeya Maria Jose Valanarasu, Poojan Oza, Ilker Hacihaliloglu, and Vishal M. Patel
3. **TransUNet: Transformers Make Strong Encoders for Medical Image Segmentation** - Jieneng Chen, Yongyi Lu, Qihang Yu, Xiangde Luo, Ehsan Adeli, Yan Wang, Le Lu, Alan L. Yuille, and Yuyin Zhou
4. **End-to-End Object Detection with Transformers** - Nicolas Carion, [Francisco Massa](#), [Gabriel Synnaeve](#), [Nicolas Usunier](#), [Alexander Kirillov](#), [Sergey Zagoruyko](#)
- 5.