Cilia Segmentation

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Approaches

- Networks
  - U-Net
  - The One Hundred Layers Tiramisu
  - Fast R-CNN
- PreProcessing
  - Finding Variance
  - Dense Optical FLow in Open CV
- Post Processing
 - Thresholded summed multiple frames from sample

Pre Processing

- Pixel-wise Variance
  - Over All frames
  - Over Periodic frams
- Optocal Flow
  - Embedding of Magnitude and Angle
  - Normalized Sum of Magnitudes over all frames
- Thresholding and Mean / Median Filters
  - Fixed Thresholding was applied to all above modes
  - Mean and median filter was applied to gray scale images

U-Net
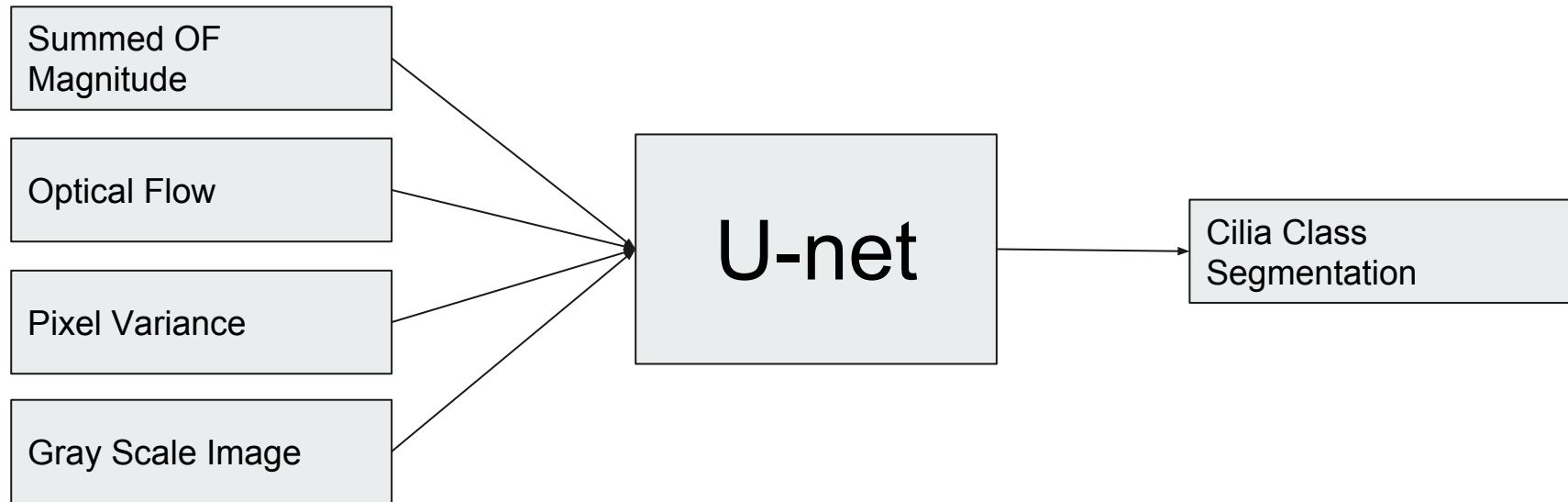
The One Hundred Layers Tiramisu

●Tiramisu showed promising results on camvid and gatech datasets.
●Implemented the 100 layer network in keras which was initially in Theano.
●Faced out of memory issues very often.
●Finally ended up with a stable config of network with batch size as 1 taking upto 18GB of main memory.
●Couldn't make it up in time as each epoch took 1 hour to run.

Results/Final Output

- **Image Only-**Accuracy was 32 on autolab, then it overfitted and went down.
- **Variance and Image-** Best Combination- it boosted the accuracy to 39.8 on autolab with 80 epochs
- **Variance and Image and Optical Flow-**This network although more expensive to train did not get anywhere better than 36.4 on autolab.
- **Variance and Image and Optical Flow and Optical Flow Magnitude-** This network although hoped initial to be the best performing never went above 10% IOU on autolab. the highest epoch to which it was trained is : 110

Thank you!

Questions?

Fast RCN

- Trains state-of-the-art models was based on VGG16, 9x faster than traditional R-CNN
- Code was based on Python and Caffe.
- However the training of network was not efficient and the model did not run really well.
- Couldn't make it up in time, so continued working with U-NET