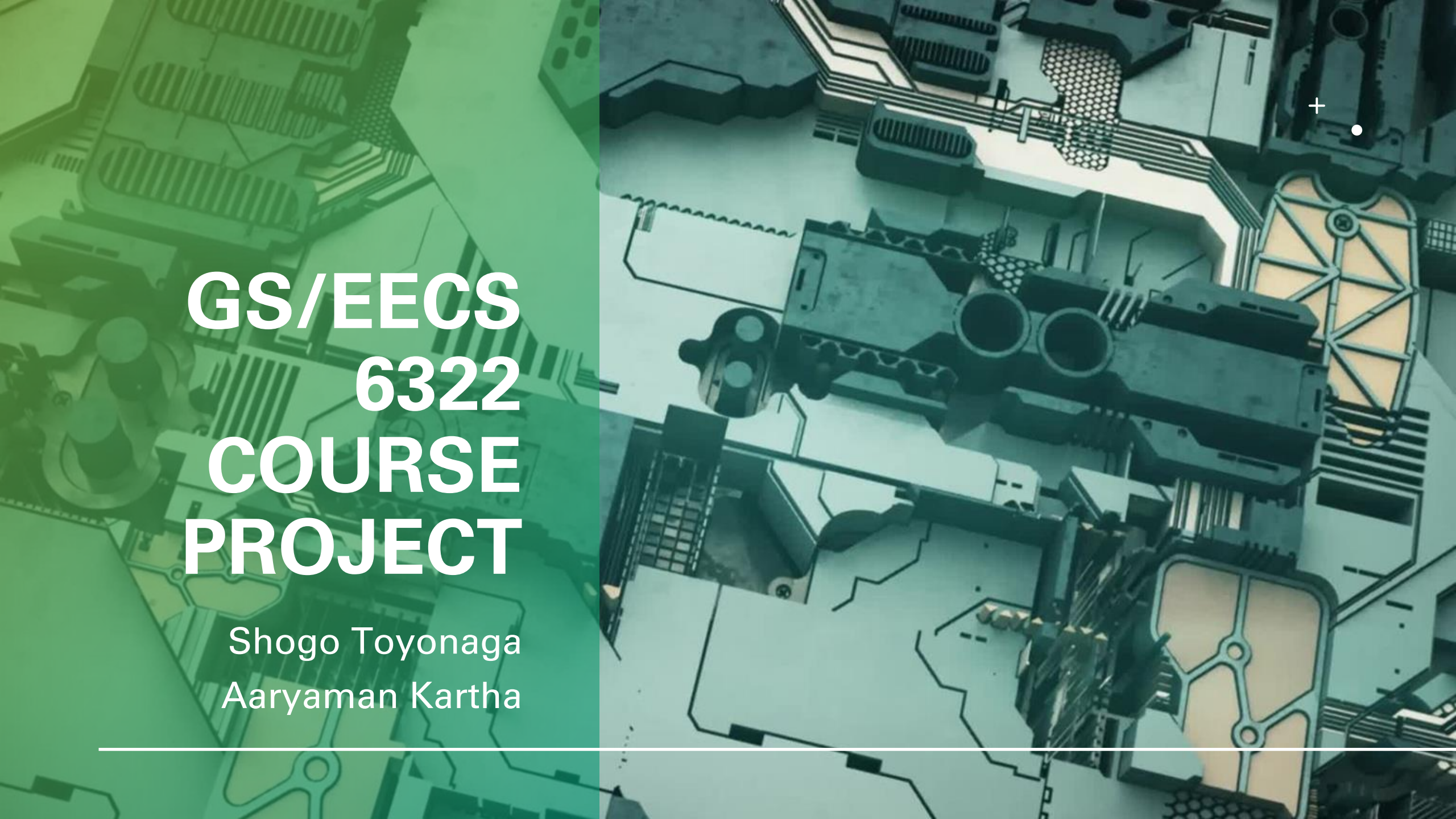


GS/EECS 6322 COURSE PROJECT

Shogo Toyonaga
Aaryaman Kartha

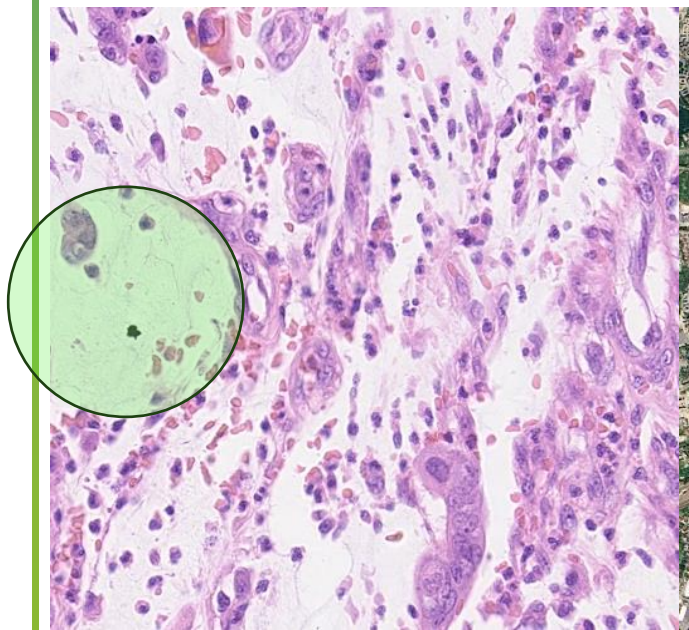
EFFICIENT CLASSIFICATION OF VERY LARGE IMAGES WITH TINY OBJECTS

Fanjie Kong, Ricardo Henao

(CVPR 2022)

Motivation

- **Efficient** Classification of very large images (mega/giga) with tiny informative objects
- Very important in certain domains – i.e Medical Imaging to find tumors



Motivation

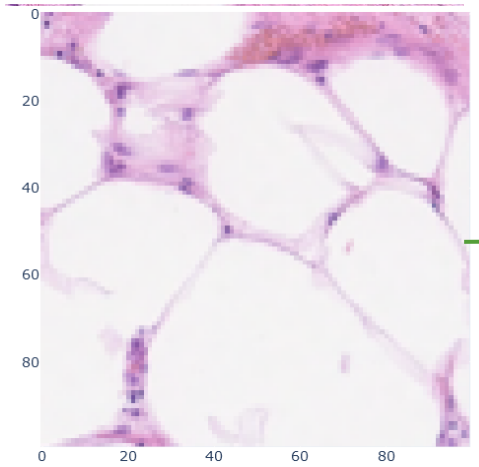
- Only a small region of the image is of interest for classification purposes
- Existing architectures face memory constraints when dealing with large images
- How can we implement a **memory-efficient** architecture that achieves good accuracy?

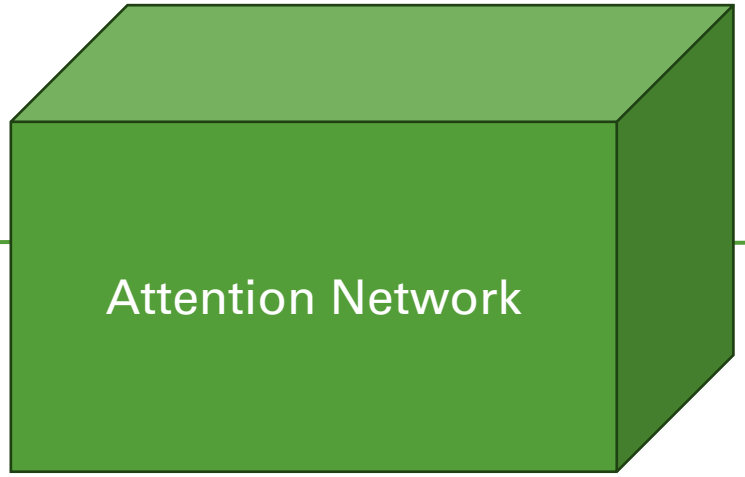
Paper Outline

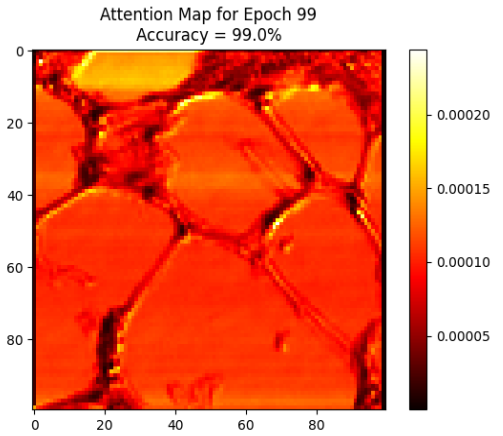
- **Memory constraints** and **Low ROI : Image** difficulties are addressed at once
- **Contribution:** Two-Stage Hierarchical Attention Sampling Approach with Contrastive Learning

STAGE 1

Stage 1

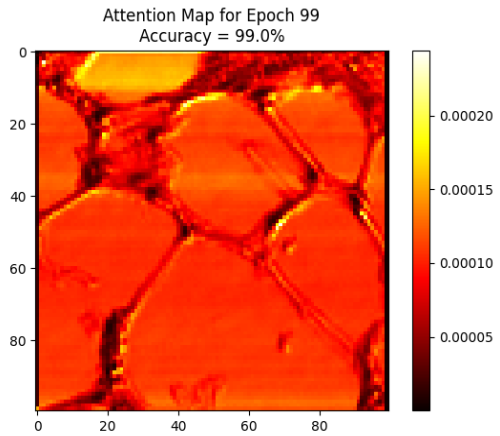

0
20
40
60
80
0
20
40
60
80

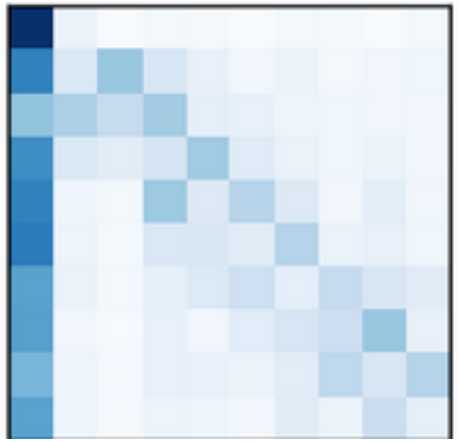

Attention Network


Attention Map for Epoch 99
Accuracy = 99.0%
0
20
40
60
80
0
20
40
60
80
0.00020
0.00015
0.00010
0.00005

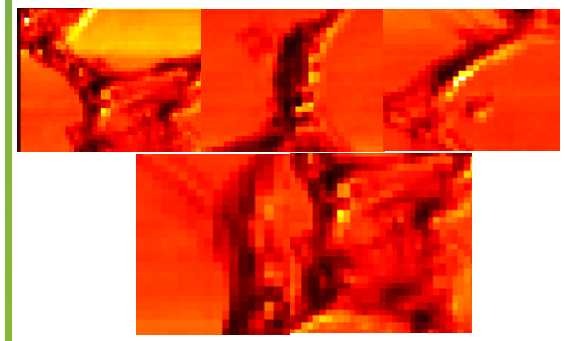
STAGE 2

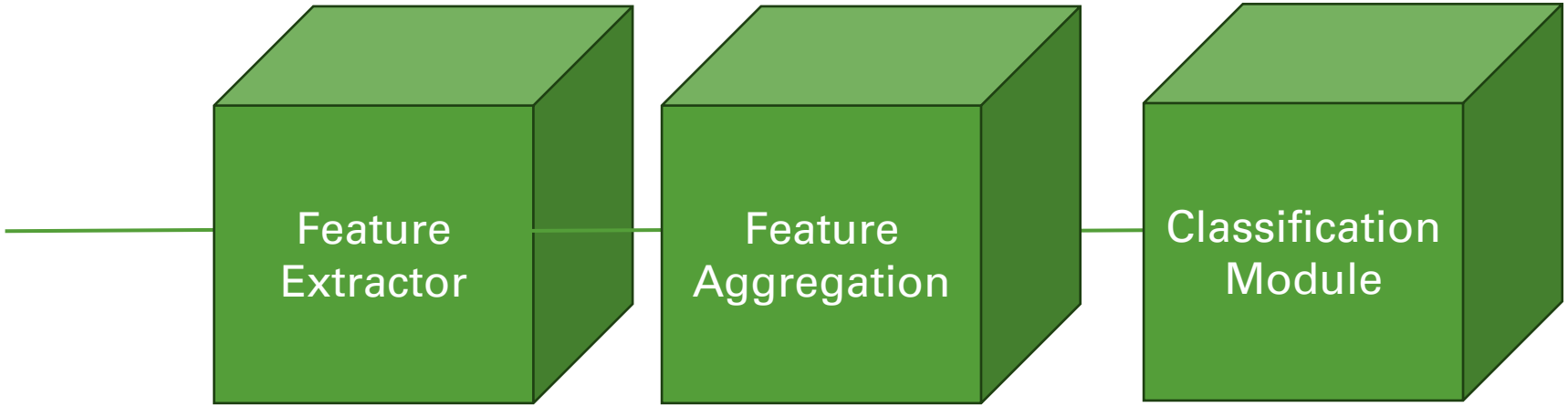
Stage 2





$$\sum_n -\log(1 - \Psi_\Theta(x_n|y_n = 1))$$





What We Did

- Implemented Data Loaders for Colon and Traffic Signs Experiments
- Programmed and Evaluated Stage 1 against 10-fold Cross Validation tests
- Ran Experimental Benchmarks against competing architectures

Successes

- Stage 1 performed relatively closely in accuracy to the paper's findings
- Reasonable accuracy and runtimes were obtained by running evaluations with our data loaders against competing architectures

Failures 

- Datasets
  - Not fully available through repo, had to create/modify some subsets ourselves
- Model Architecture
  - Results were a success but we couldn't get second sampling attention map to work
- Training Discrepancies
- Contrastive Learning
  - Since second sampling attention map wasn't working contrastive learning wasn't done

Wrap-Up

- Our implementation of Zoom-In obtains servicable results in a timely fashion
- Implementation can run on lower commodity hardware

THANK YOU!

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