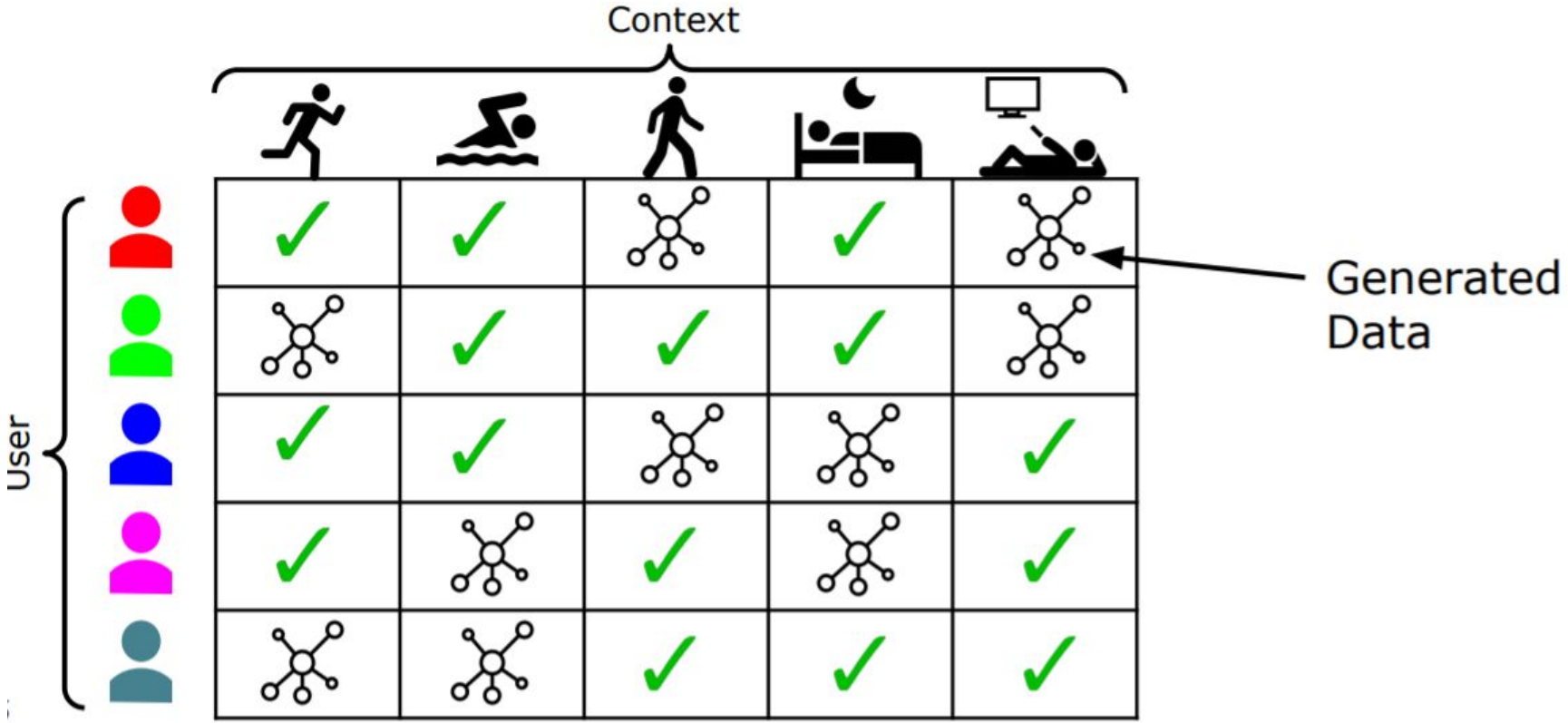
WPI

Human Context Recognition:
A Controllable GAN Approach

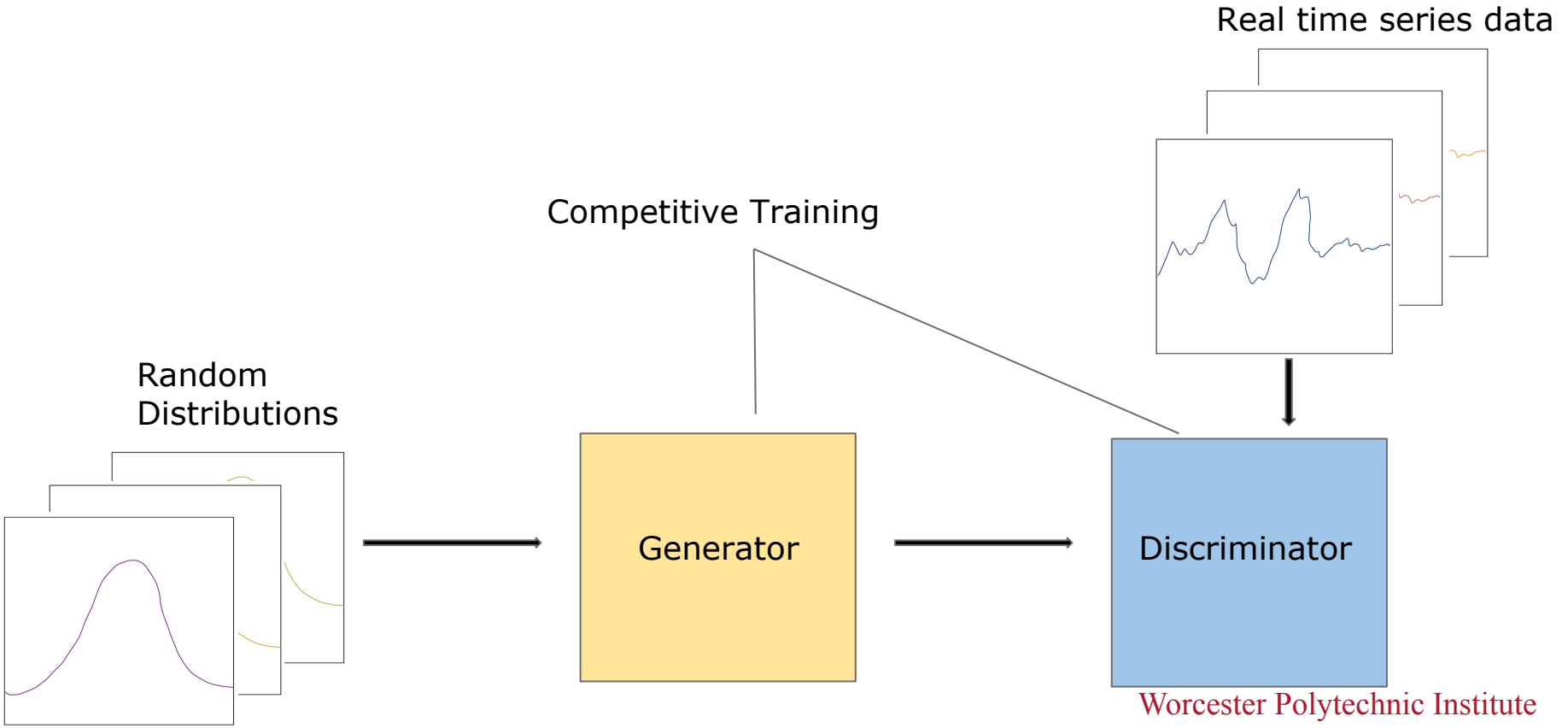
Joshua DeOliveira, Worcester Polytechnic Institute
Harrison Kim, Northeastern University
MaryClare Martin, College of the Holy Cross

Faculty Advisor: Prof. Elke Rundensteiner
PhD Mentor: Walter Gerych

Human Context Patterns Using Mobile Sensors



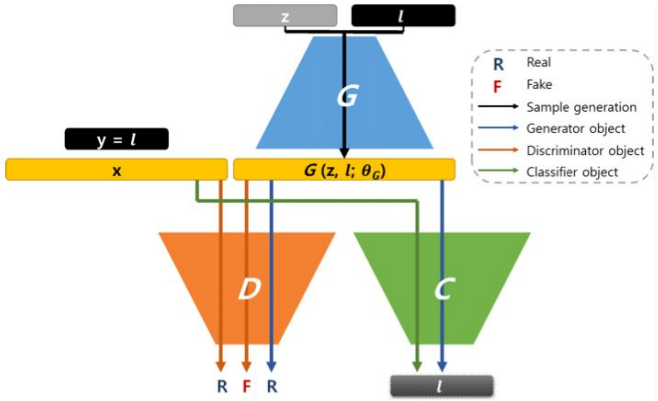
Simple GAN

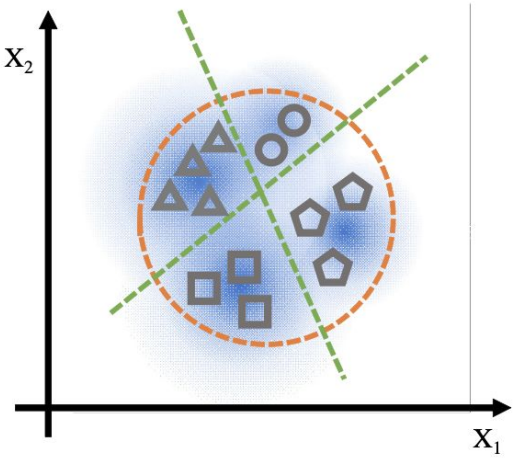

Real time series data
Competitive Training
Random
Distributions
Generator
Discriminator

Controllable GAN Architecture

Classifier ***C*** trains ***G*** on class-specific features

Discriminator ***D*** trains ***G*** on global features across the dataset





Legend:

Classifier ***C***:

Discriminator ***D***:

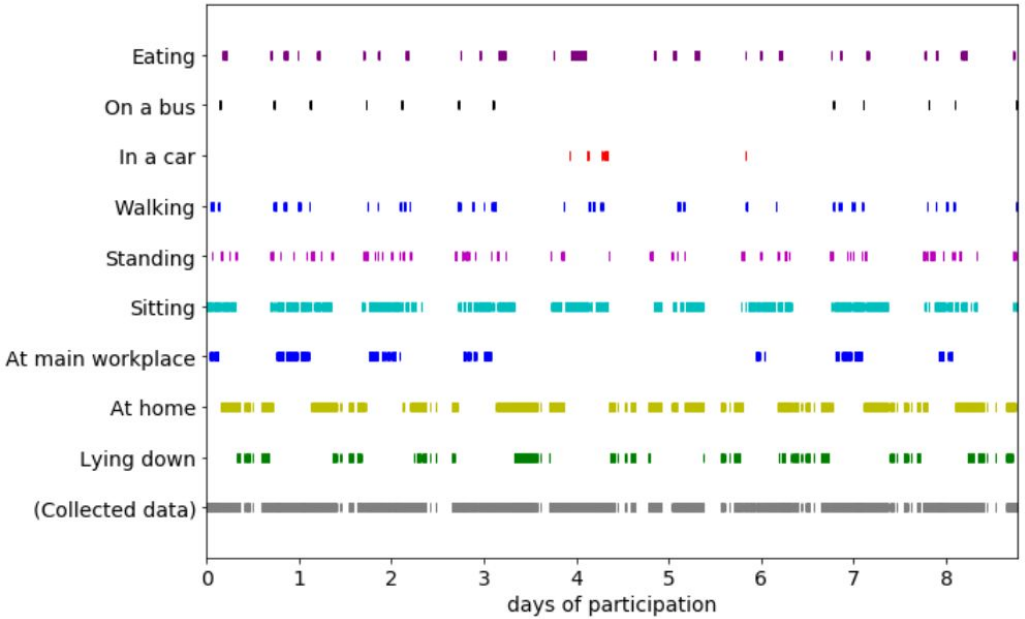
Grey figures: corpus samples from different classes

Blue region: generator samples

[1] M. Lee and J. Seok, "Controllable Generative Adversarial Network," 2014.

Our Progress

- Familiarized ourselves with different GAN architectures and their applications in sequential-data domains
- Explored the ExtraSensory dataset through visualization techniques and summary statistics
- Began developing a simple GAN structure to explore naive approaches to sensor data generation



[2] Vaizman, Y., Ellis, K., and Lanckriet, G. "Recognizing Detailed Human Context In-the-Wild from Smartphones and Smartwatches." *IEEE Pervasive Computing,* October-December 2017.

Schedule

Week	Project Goals
3 (June 7th - June 11th)	Implement a vanilla GAN in PyTorch
4 (June 14th - June 18th)	Program a controllable GAN and compare to vanilla
5 (June 21th - June 25th)	Update GANs for time-series generation
6 (June 28th - July 2nd)	Begin working on research paper
7 (July 5th - July 9th)	Start experimentation for paper
8 (July 12th - July 16th)	Have all results for paper completed and begin working on the final presentation
9 (July 19th - July 23rd)	Finalize presentation and complete final edits for paper
10 (July 26th - July 30th)	Buffer week