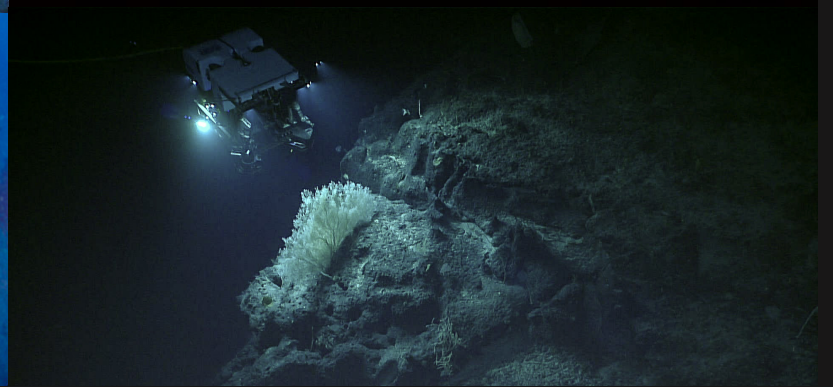
Underwater Image Enhancement

Sonia Cromp (sonic@cs.wisc.edu)

Underwater Image Enhancement (UIE)

- Marine biology
- Archaeology
- Earth sciences
- Documentation
- Sunken ship recovery
- And more



Underwater Image Enhancement (UIE)

State-of-Art

- Domain knowledge
- Deep learning
- Unpaired learning

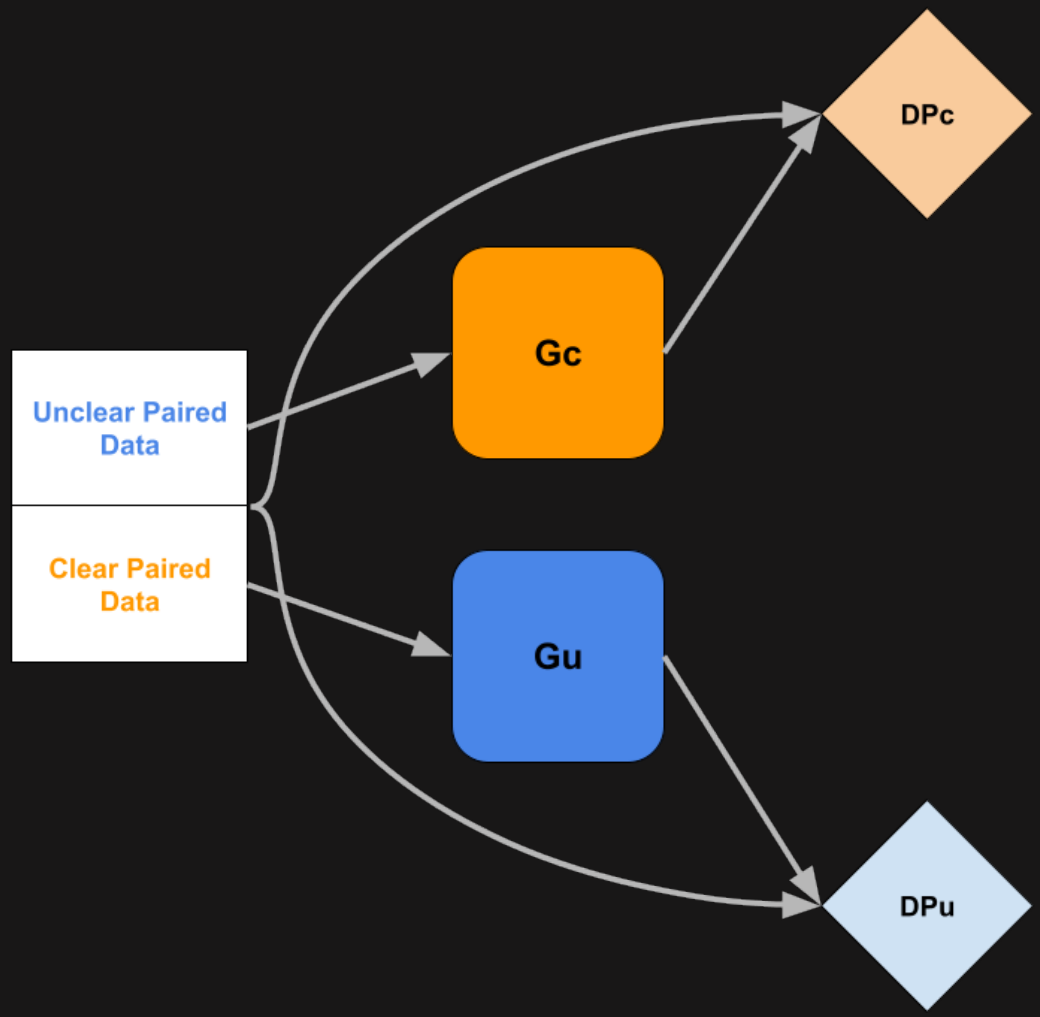
Challenges

- Dataset size
- High domain variance
- Computational resources

Relevant approaches

- CycleGAN
- FUnIE GAN

Paired training



Unpaired training

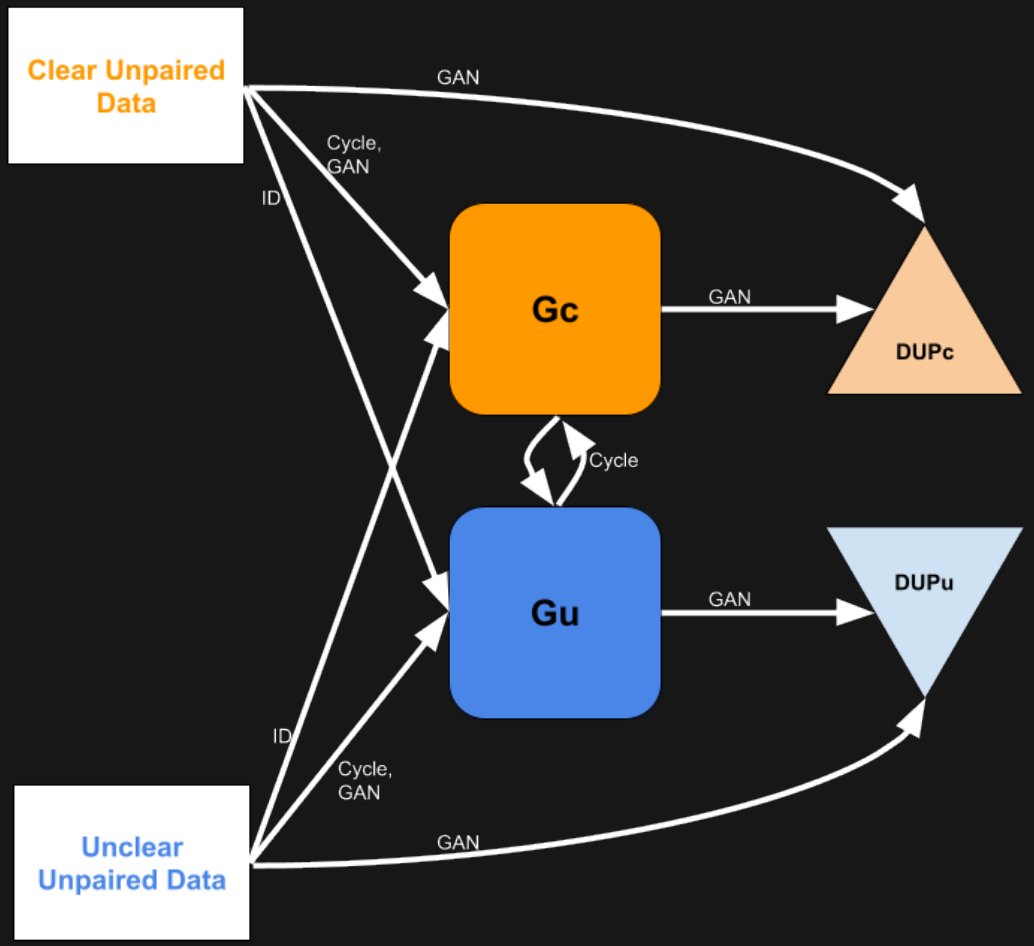
Clear losses (unclear same)

GAN: *min acc(Dc(Gc(unclear)))*

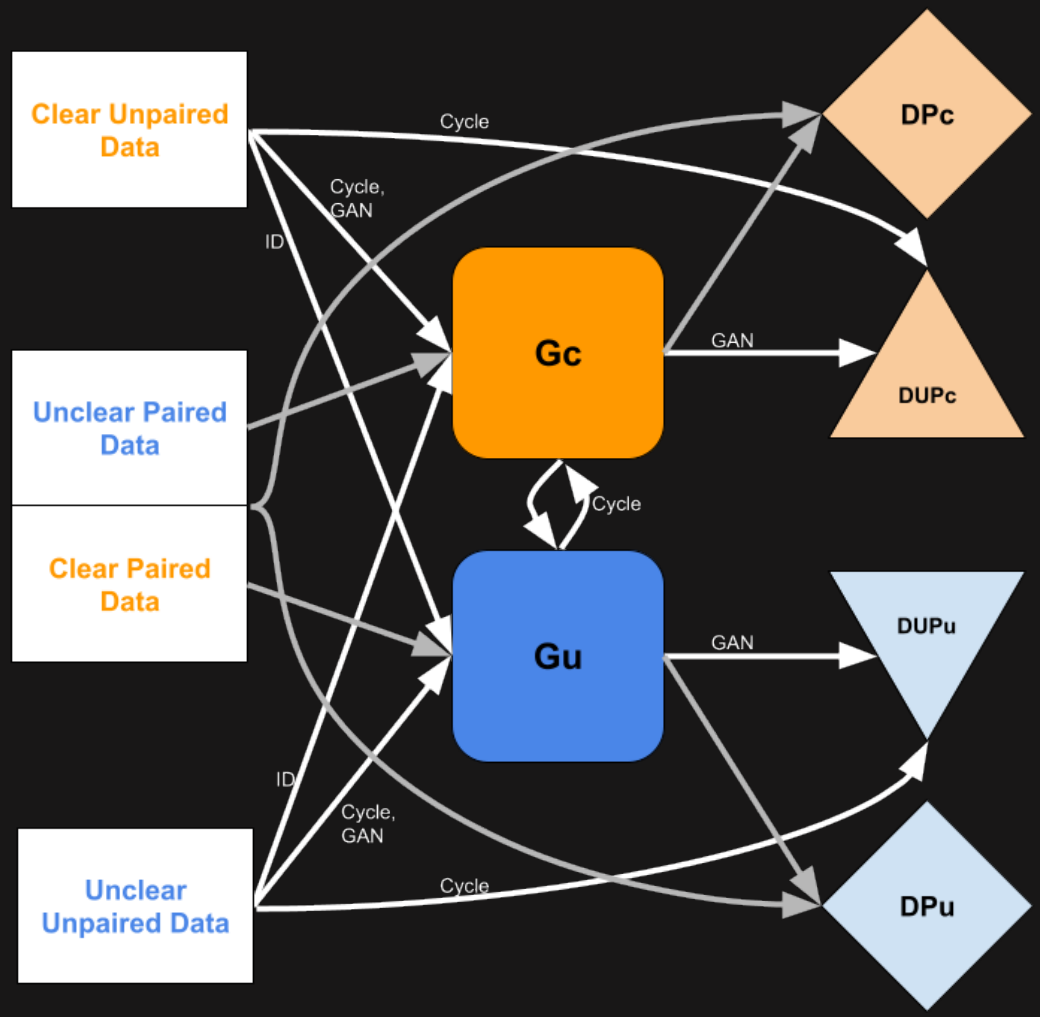
Cycle: *clear'=Gc(Gu(clear))*

min dist(clear, clear')

ID: *min dist(clear, Gc(clear))*



UW PUP GAN

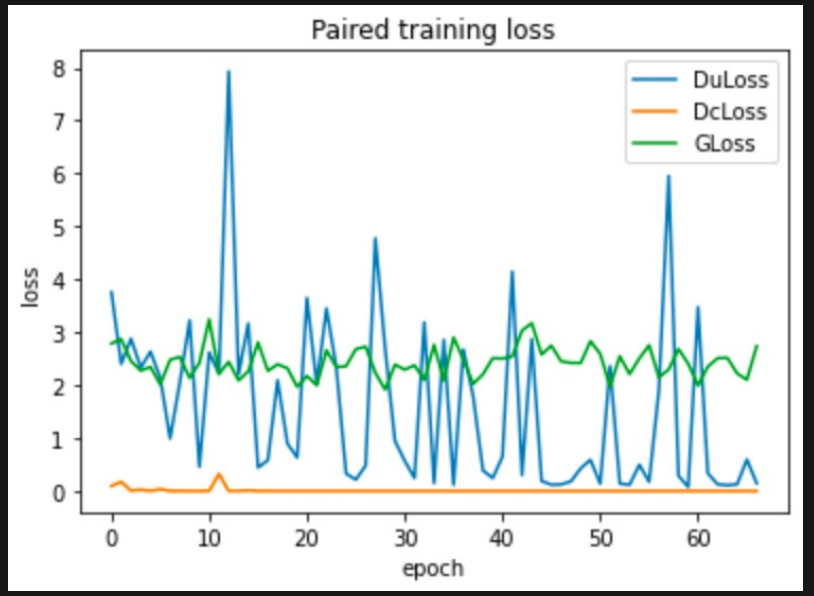

Clear Unpaired Data
Unclear Paired Data
Clear Paired Data
Unclear Unpaired Data
Gc
Gu
DPc
DUPc
DUPu
DPu
Cycle
Cycle, GAN
ID
GAN
Cycle
ID
Cycle, GAN
Cycle
GAN

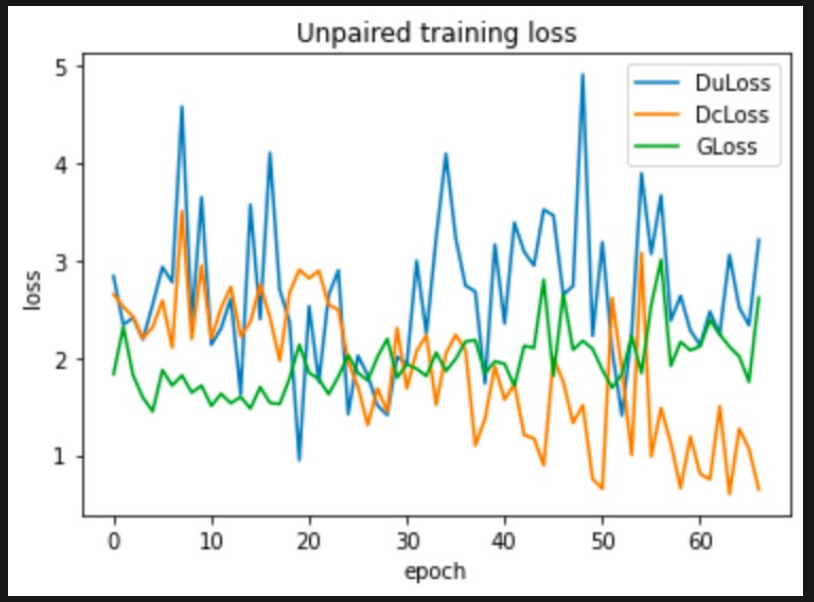
Experiments

- Unpaired
- Paired
- Alternate
- Evolve

1000, 5000 or 11,000 paired examples

Thank you to the Wisconsin Applied Computing Center's Euler Cluster!





Conclusion

- Summary
- Challenges
- Future directions