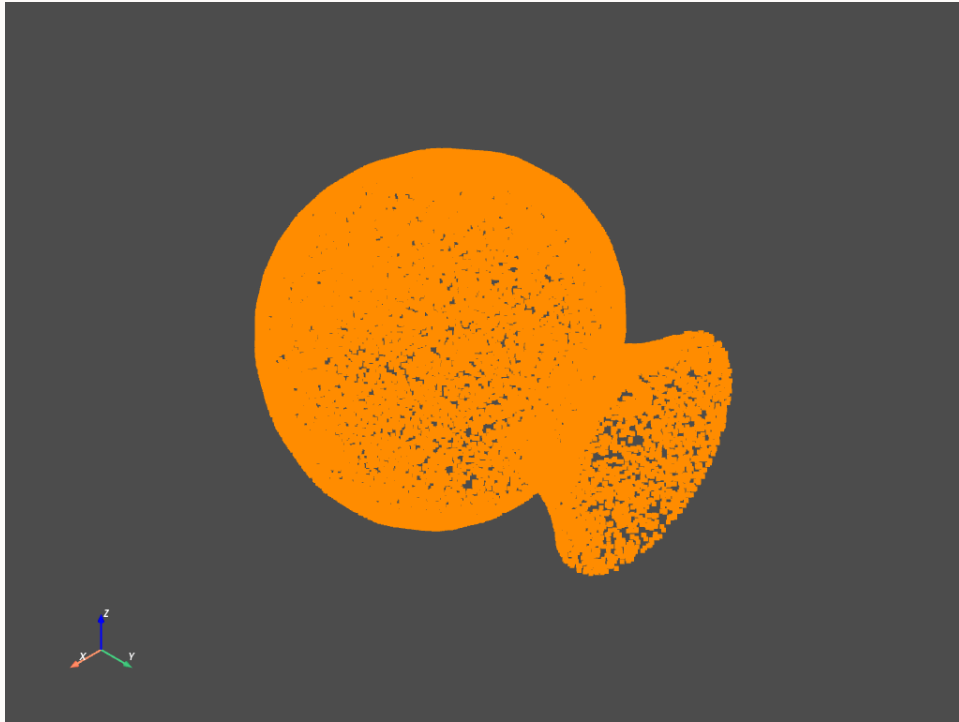




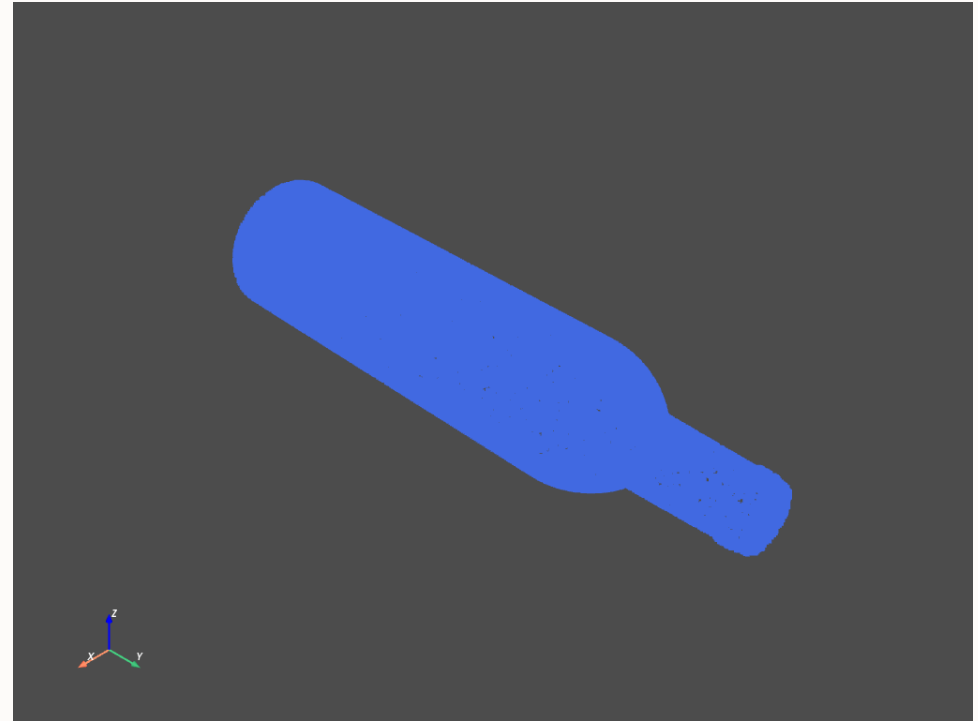
3-D Style Transfer

Jui Shah and Yamini Kashyap

Original point clouds

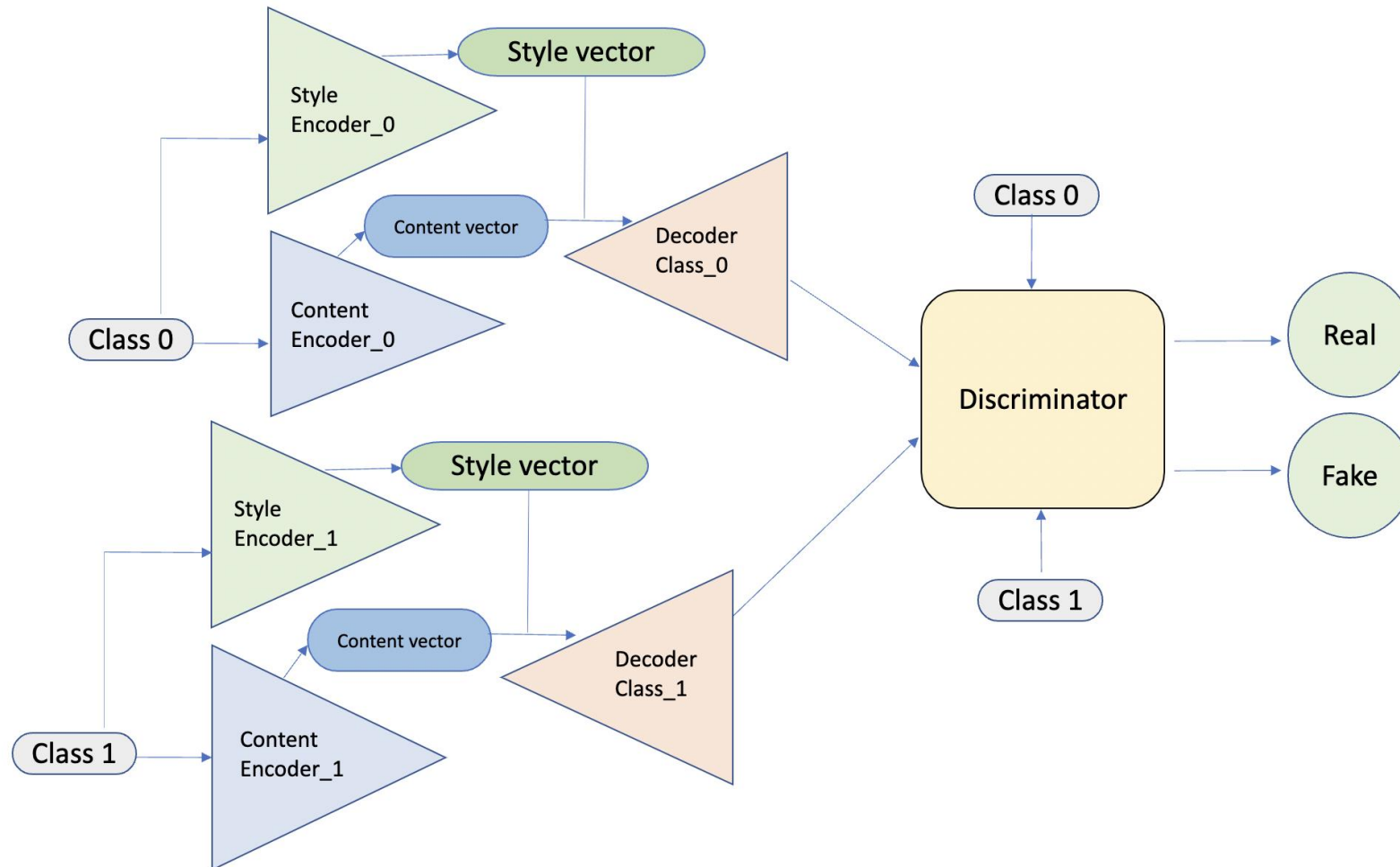


Jug



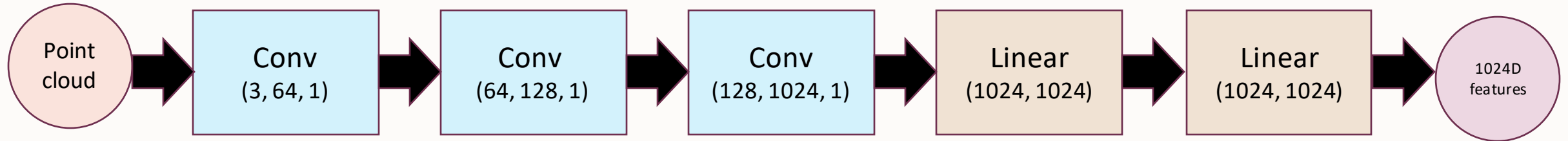
Bottle

High-level architecture

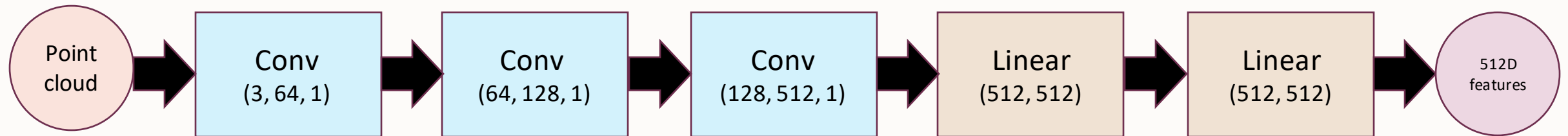


Low-level architecture (Encoder)

- Content Encoder (CNN PointNet w/ BatchNorm and LeakyReLU)



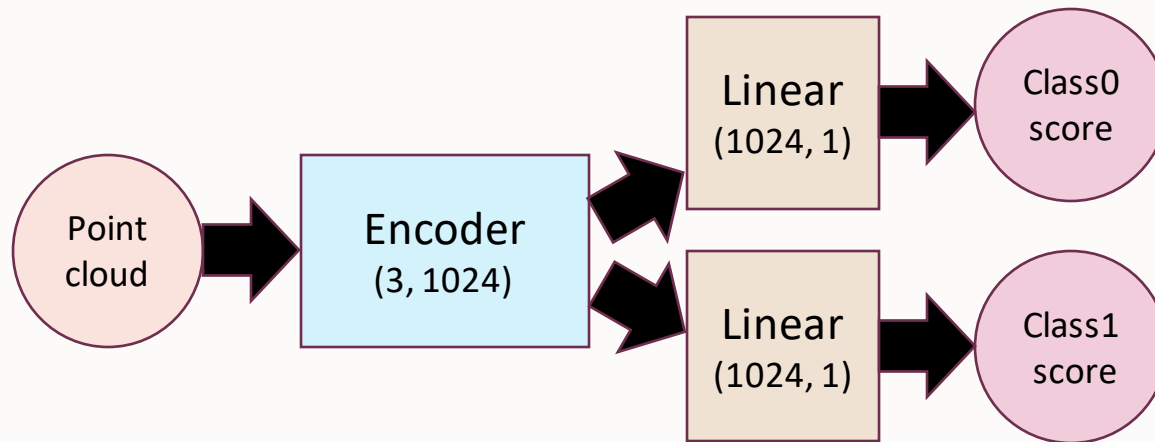
- Style Encoder (CNN PointNet w/ BatchNorm and LeakyReLU)



[Architecture reused and modified from
3DSNet by Mattia Segu et.al.]

Low-level architecture (Decoder and Discriminator)

- Decoder
 - StyleAtlasNet [Architecture reused from AtlasNet by Thibault Groueix et.al.]
- Discriminator (Encoder architecture same as content encoder)



[Architecture reused and modified from 3DSNet by Mattia Segu et.al.]

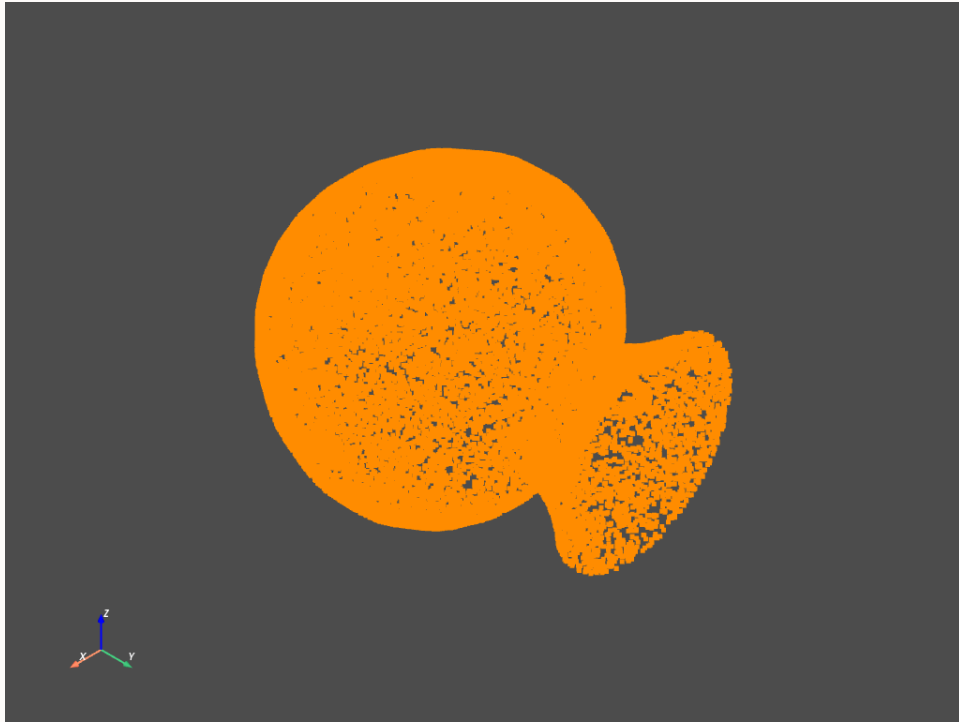
3DSNet Proposals

- Encoder
 - Exclusive content encoder for each class w/ BatchNorm and ReLU
 - Style encoder shared among both classes
- Decoder
 - Exclusive AtlasNet for each class w/ Adaptive BatchNorm
- Discriminator
 - Shared encoder among both classes
 - Exclusive MLP for each class

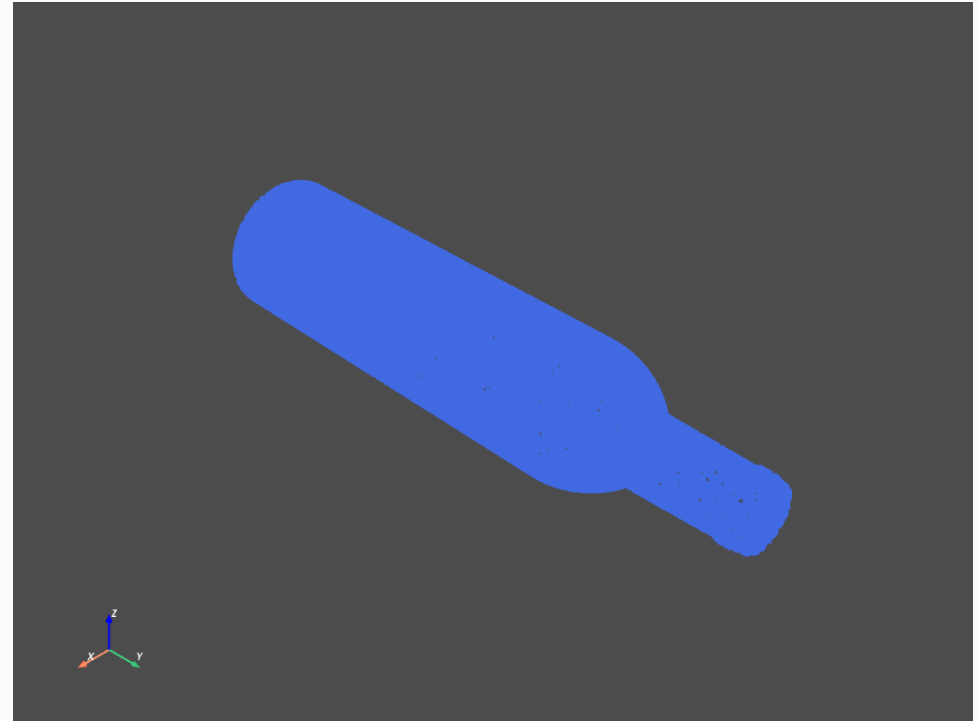
• Deviations(highlighted in red)

- Encoder
 - Exclusive content encoder for each class w/ BatchNorm and Leaky ReLU
 - Style encoder shared among both classes(implementation 2)
 - Separate style encoders for each class(implementation 1)
- Decoder
 - Exclusive AtlasNet for each class w/ BatchNorm
- Discriminator
 - Shared encoder among both classes
 - Exclusive MLP for each class
- We have added style and content encoder reconstruction loss

Original point clouds



Jug



Bottle

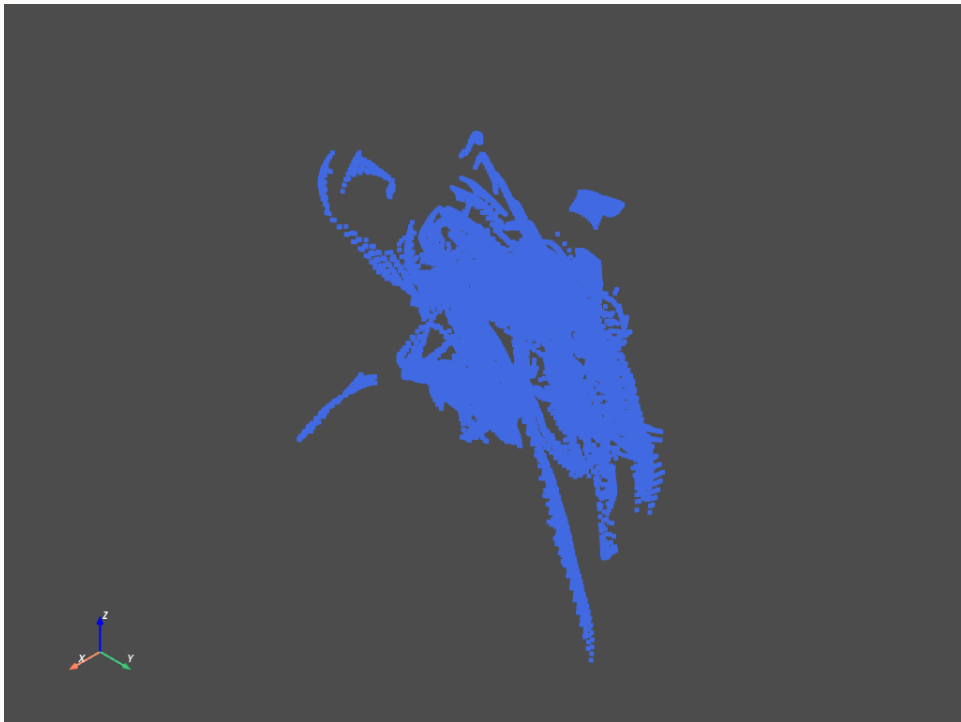


Implementation 1

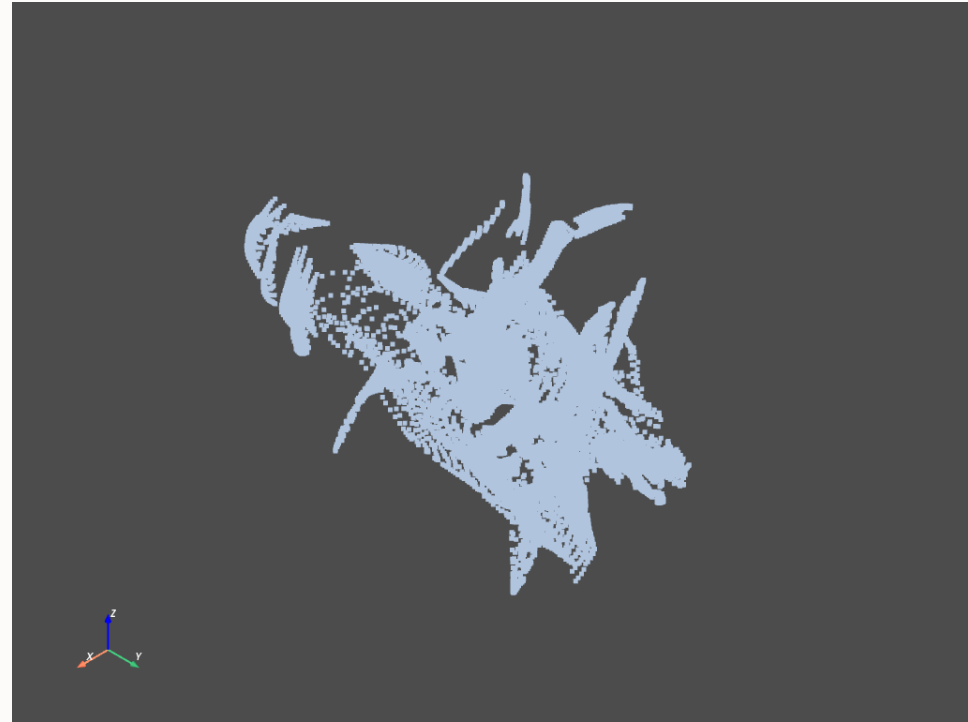
- Observed exclusion of features across classes



Reconstructed bottle via style transfer



Content: bottle
Style: bottle

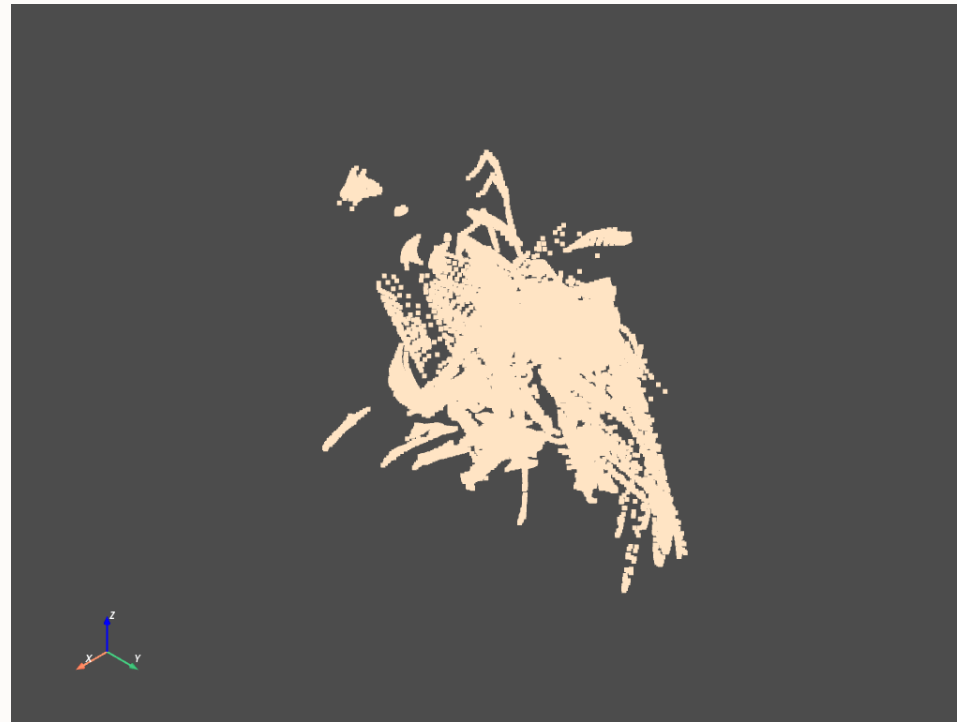


Content: bottle
Style: jug

Reconstructed jug via style transfer



Content: jug
Style: jug

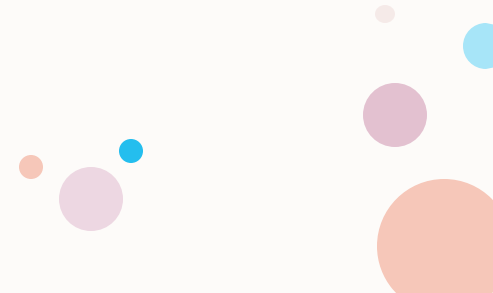


Content: jug
Style: bottle

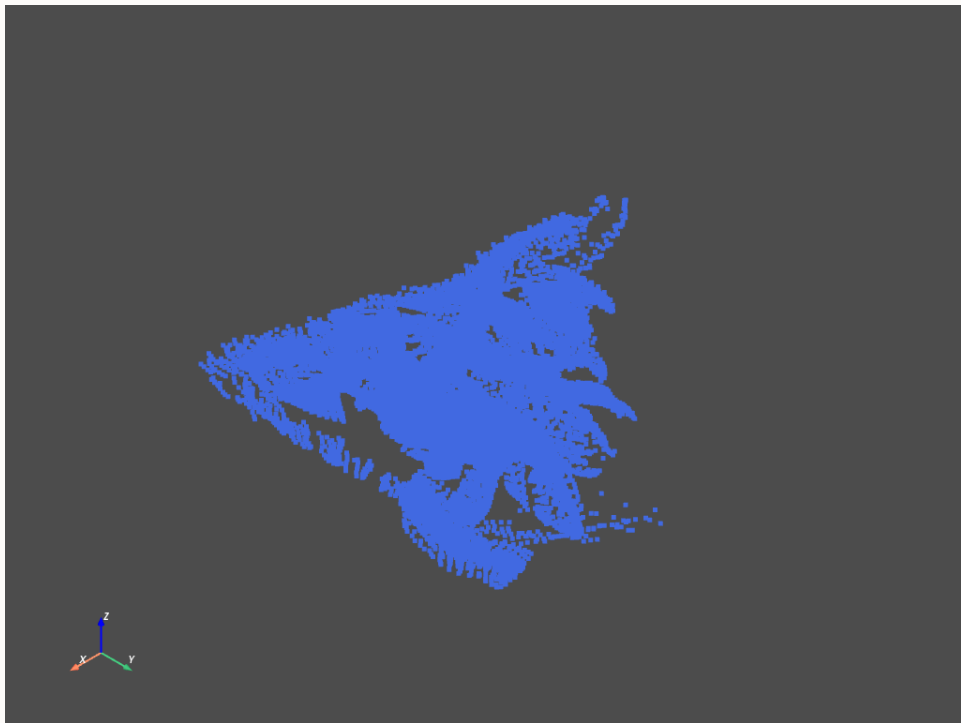
A cluster of decorative circles in the top-left corner, including a large light purple circle, a small yellow circle, a small pink circle, and a small light blue circle.

Implementation 2

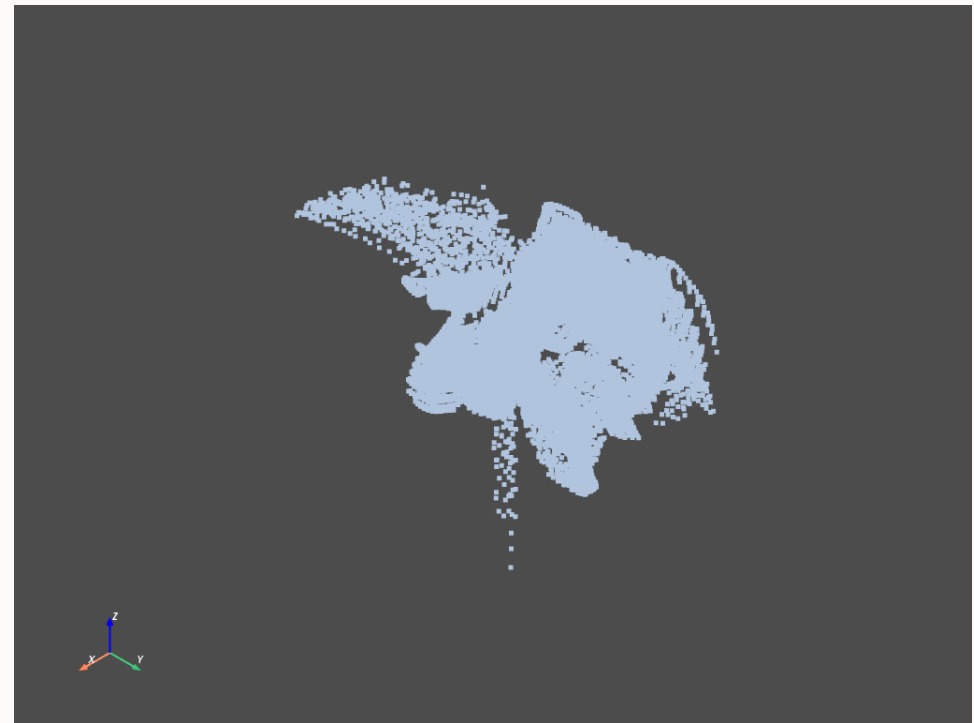
- Observed intermixing of features across classes – possibly due to shared style encoding latent space



Reconstructed bottle via style transfer



Content: bottle
Style: bottle



Content: bottle
Style: jug

Reconstructed jug via style transfer



Content: jug
Style: jug



Content: jug
Style: bottle



Conclusion

- Style Transfer with different style encoder is better than with common encoder
- A stark bottleneck - 30000 points via our decoder because of computational limitations.
- So, it certainly is not farfetched to say that with adequately hyper parameterized code and better computational resources, a really good style transfer can be achieved for 3D point clouds using our implementation as an inspiration.

The slide features a light gray background with decorative elements in the corners. The top-left corner contains a large light purple circle, a small yellow circle, a small pink circle, a small blue circle, and a tiny dark purple dot. The top-right corner has a large pink circle, a small yellow circle, and a medium pink circle. The bottom-right corner is decorated with a small orange circle, a medium light purple circle, a small blue circle, a medium light purple circle, a small light gray circle, a medium light purple circle, a small blue circle, and a large orange circle.

Thank you!