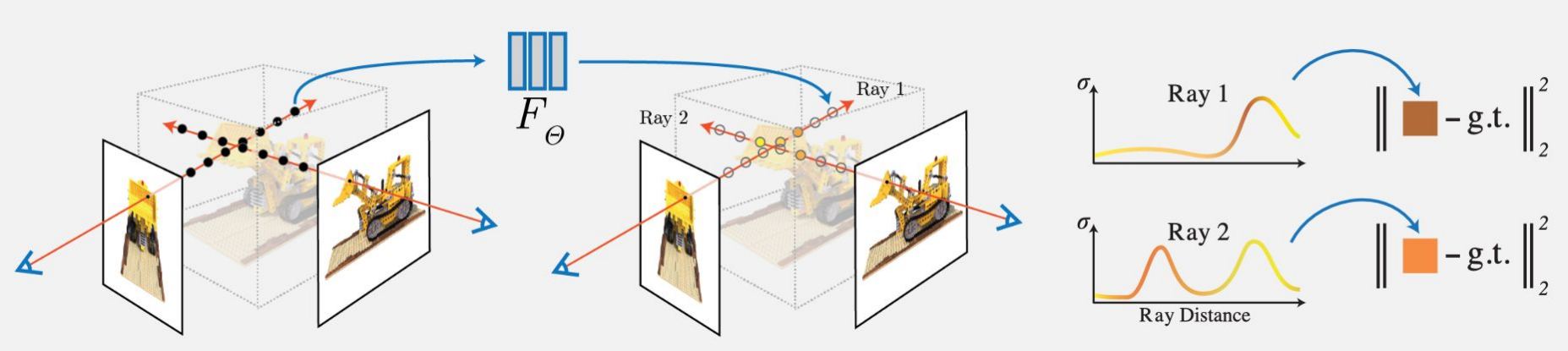
Stylized Dynamic NeRFs

Karl Chahine, Ryan Chhong, Codey Sun

Neural Radiance Fields (NeRFs)



- Synthesize novel view of complex scenes
- Sample points along multiple rays on input images

Source: https://www.matthewtancik.com/nerf

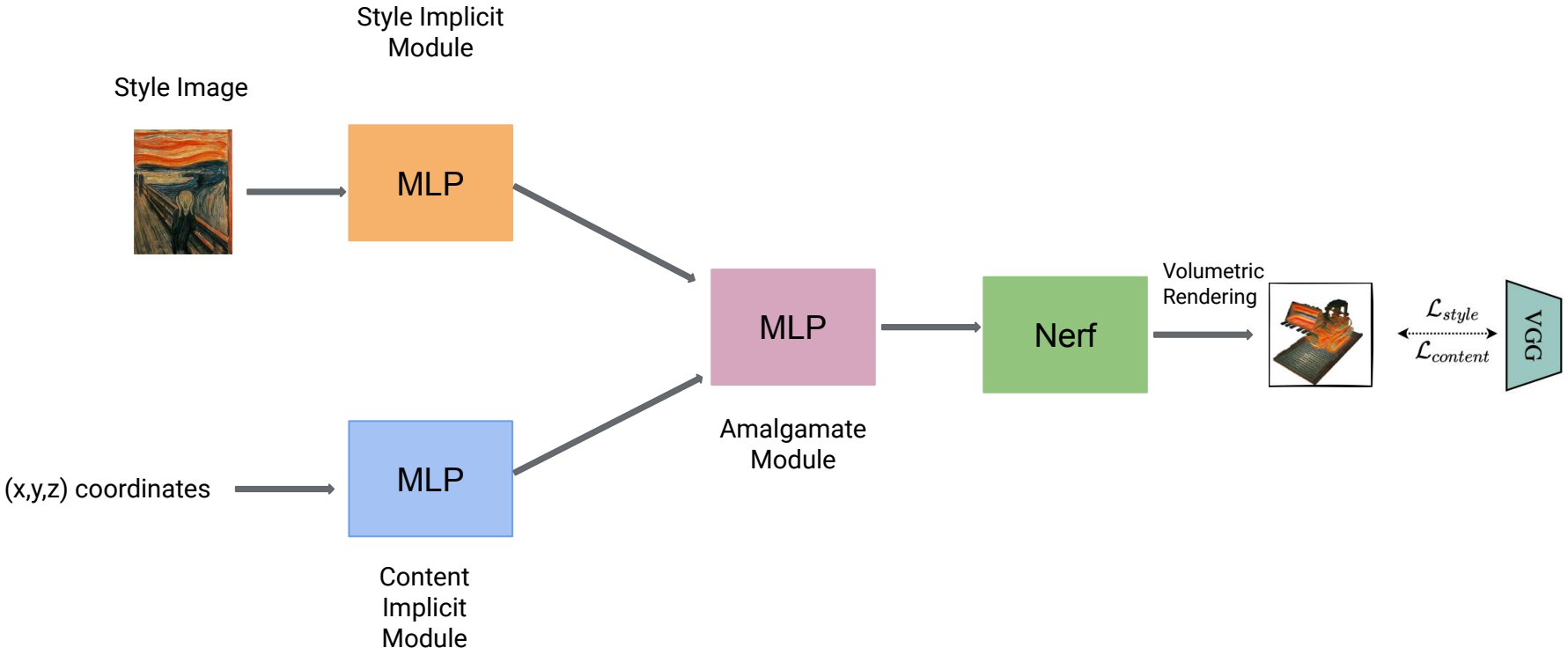
Dynamic NeRFs

- Neural radiance fields that change across time
- Novel view synthesis of dynamic objects

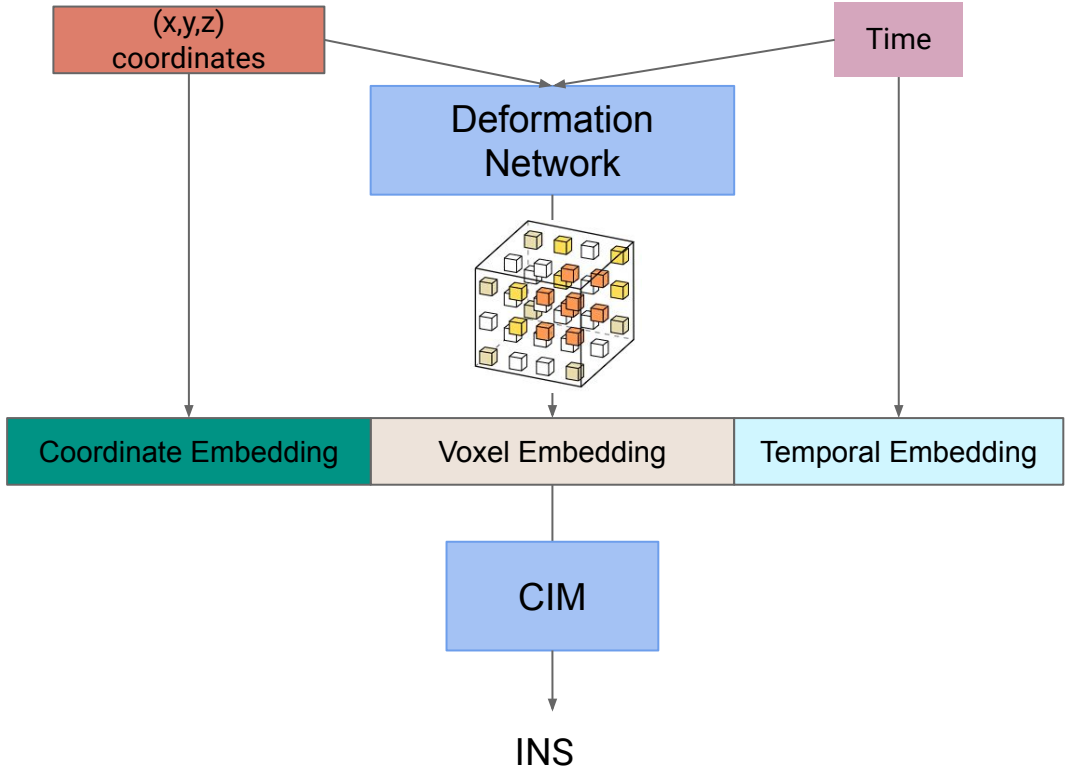
- Prior works
  - Nerfies (Park et al., ICCV 2021)
  - D-NeRF (Pumarola et al., CVPR 2021)
  - TiNeuVox (Fang et al., SIGGRAPH 2022)

Source: https://www.albertpumarola.com/research/D-NeRF/index.html

Unified Implicit Neural Stylization (Fan et al., ECCV 2022)



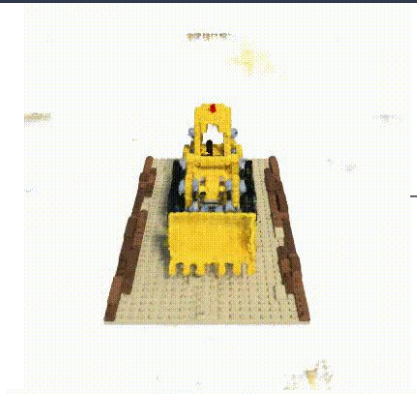
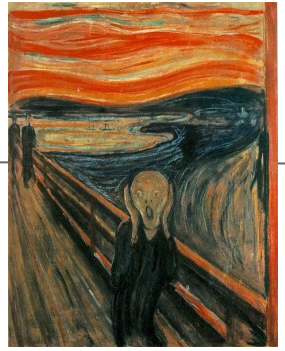
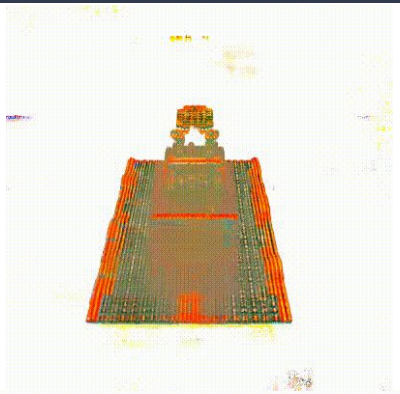
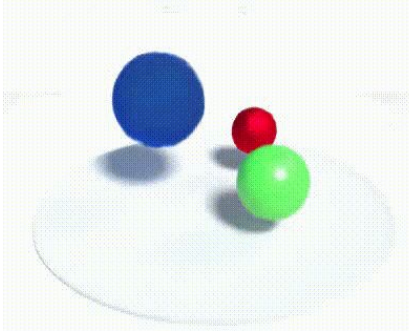
Model

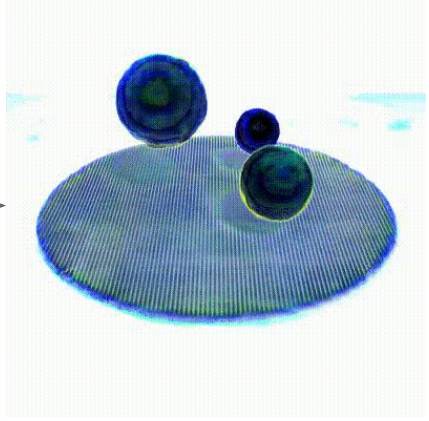

(x,y,z)
coordinates
Time
Deformation
Network
Coordinate Embedding
Voxel Embedding
Temporal Embedding
CIM
INS

Training

- Synthetic blender-generated dataset
  - From D-NeRF
- Loss Function with 4 separate terms
  - Reconstruction Loss
  - Geometry Consistency Loss
  - Content Loss
  - Style Loss
- Teacher TiNeuVox Model trained for 100k iterations
- Stylized TiNeuVox models trained for 50k iterations

Results



Case study

- Note the orange lines on the moving arm

- Rather than following the arm, the lines stay in the same 3D space (field)

Conclusions

- Stylization dependent on patch size
  - Memory intensive
- Neural stylization is both view-consistent and time-consistent
- Style features tend to be fixed in space, rather than fixed to objects

Thank you