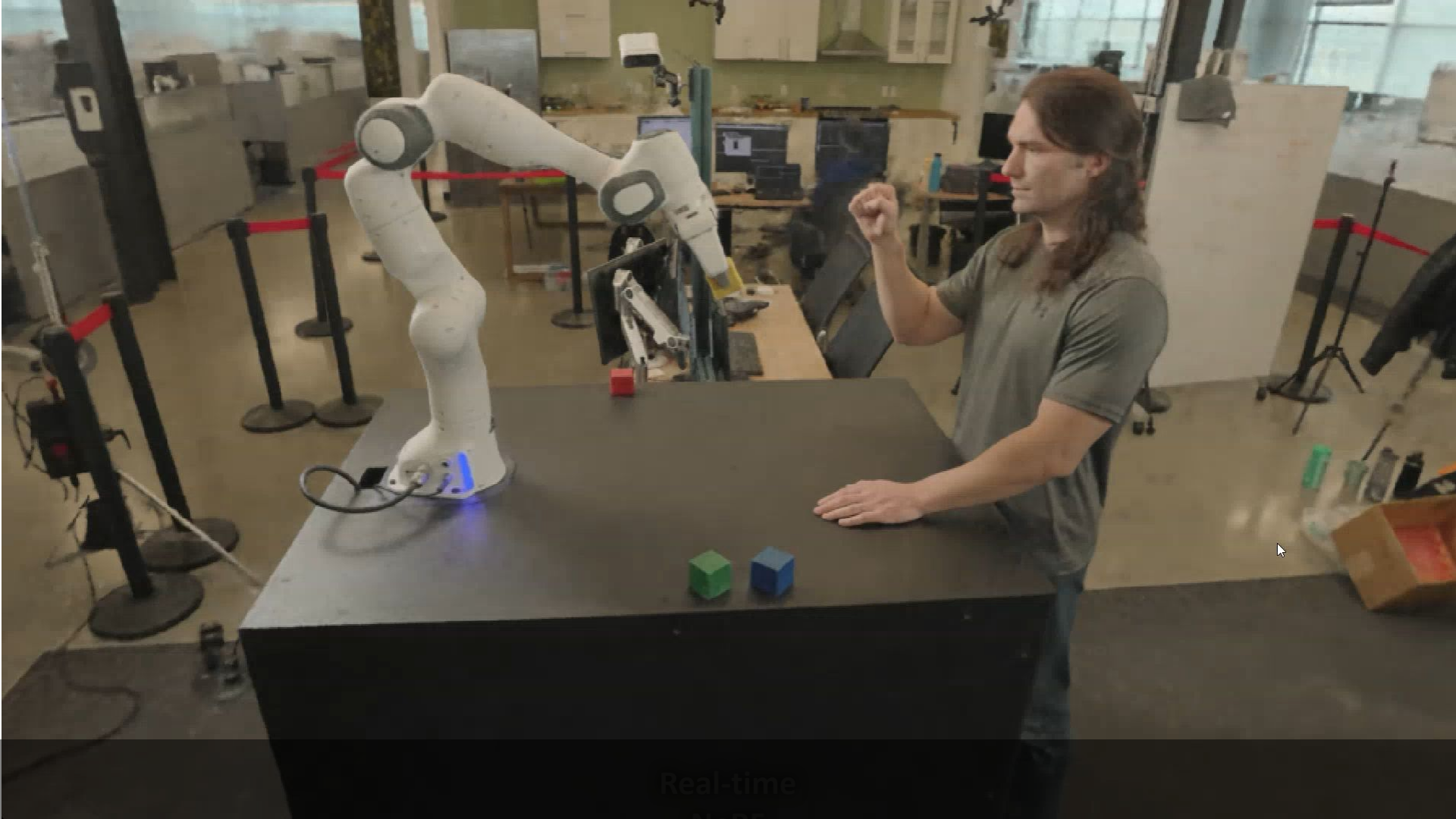
TECH RETREAT 2024

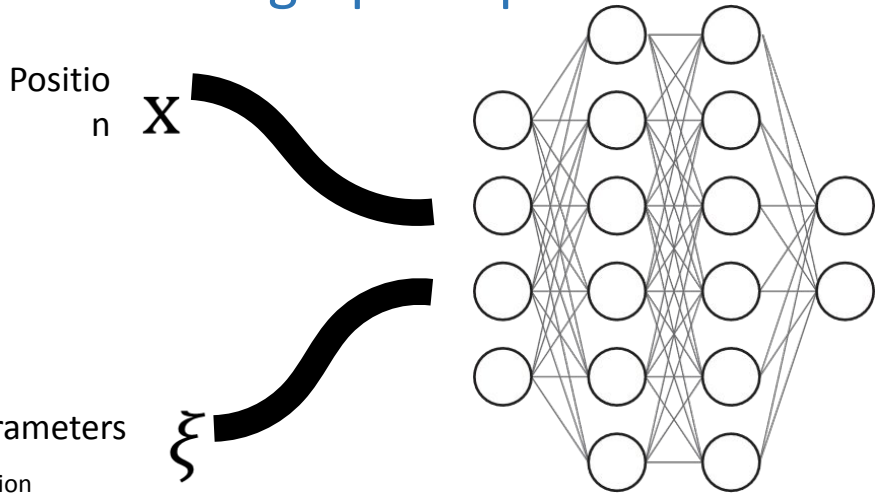
Technical Breakdown:

Neural Graphics Primitives

Thomas True, NVIDIA

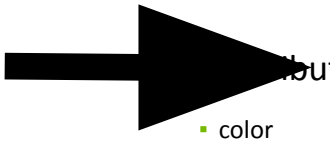

Real-time

What's a Neural graphics primitive?



Extra parameters

- view direction
- albedo & roughness
- displacement

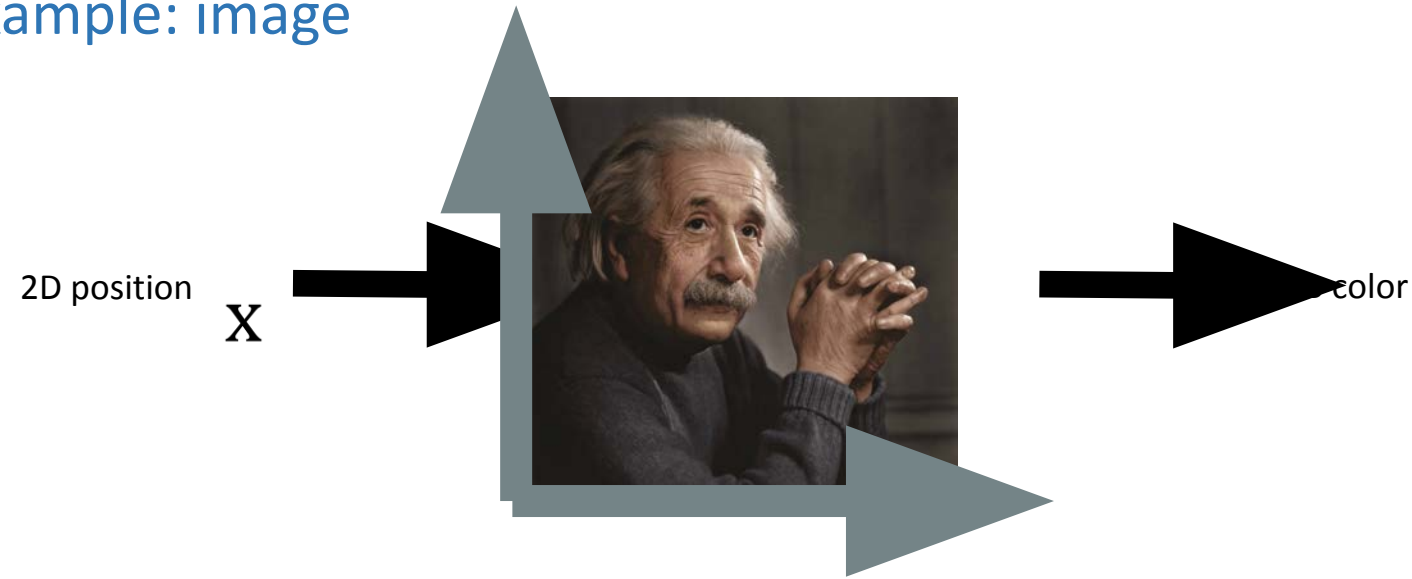


butes"

- color
- density
- signed distance

NVIDIA.

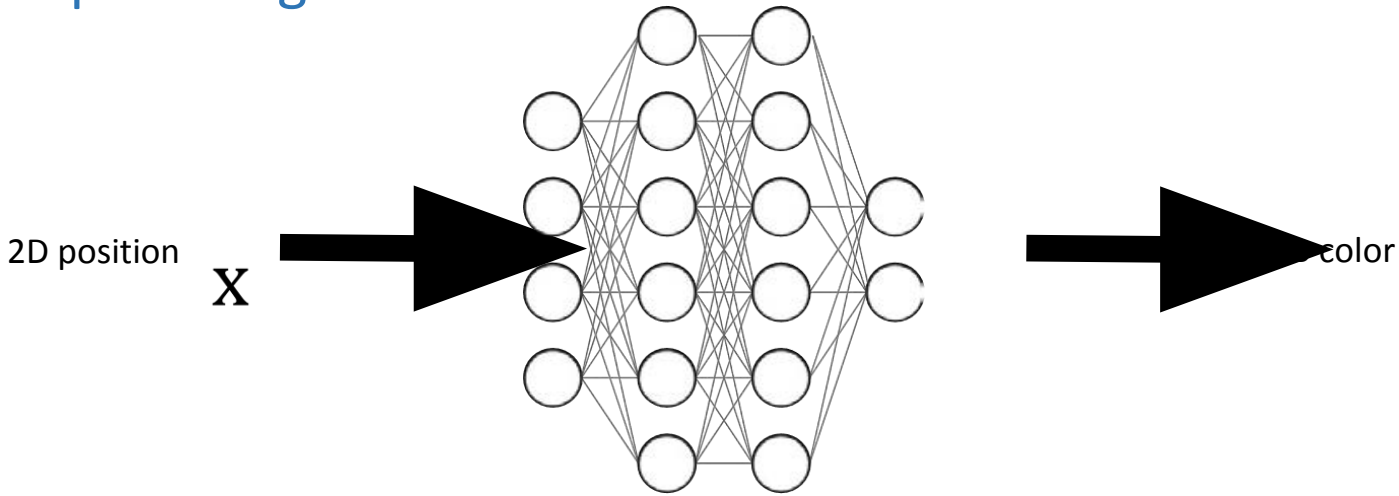
Example: image



“What’s the pixel color at X?”

NVIDIA.

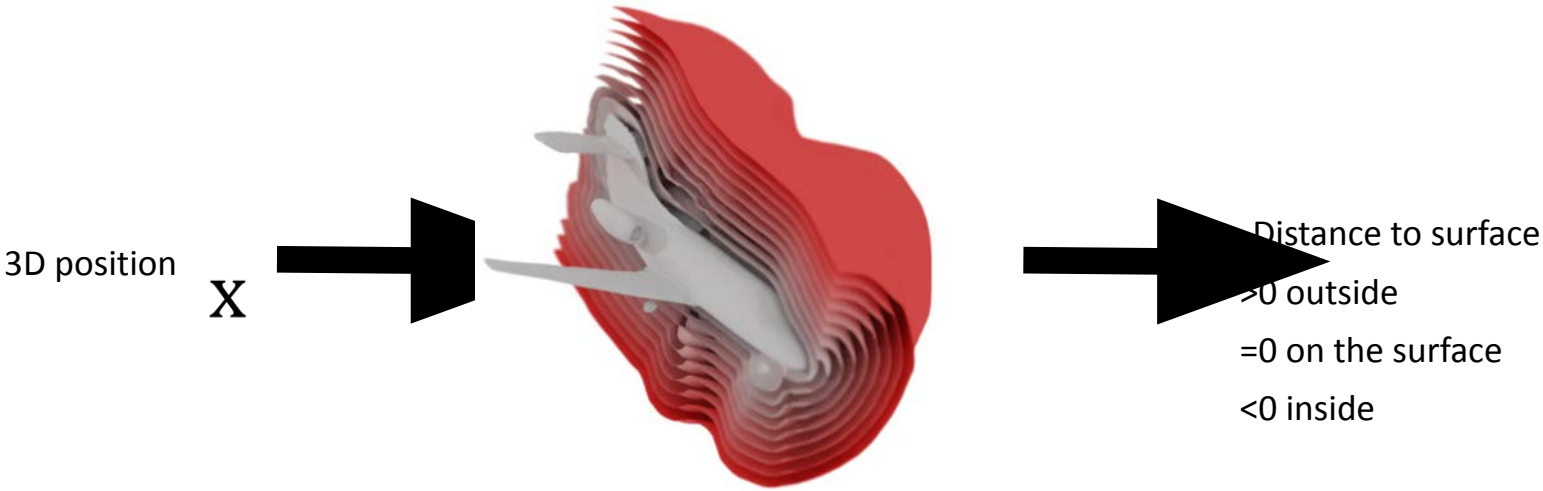
Example: image



“What’s the pixel color at X?”

NVIDIA.

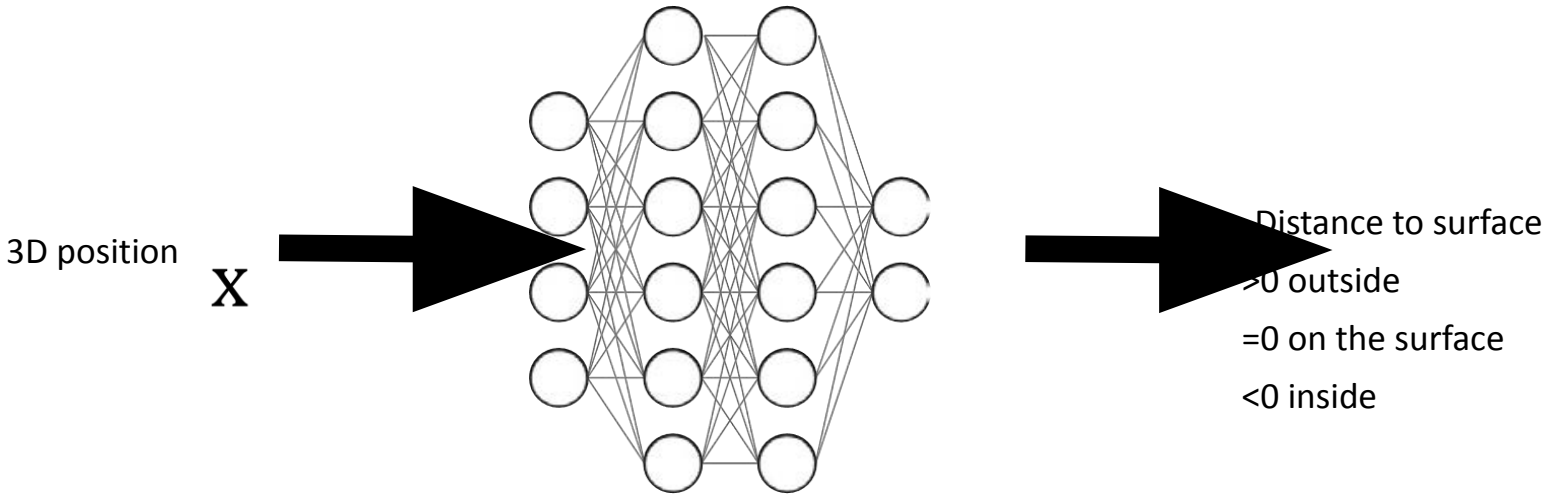
Example: Signed Distance Function



“How far away from surface is X?”

NVIDIA

Example: Signed Distance Function



"How far away from surface is X?"

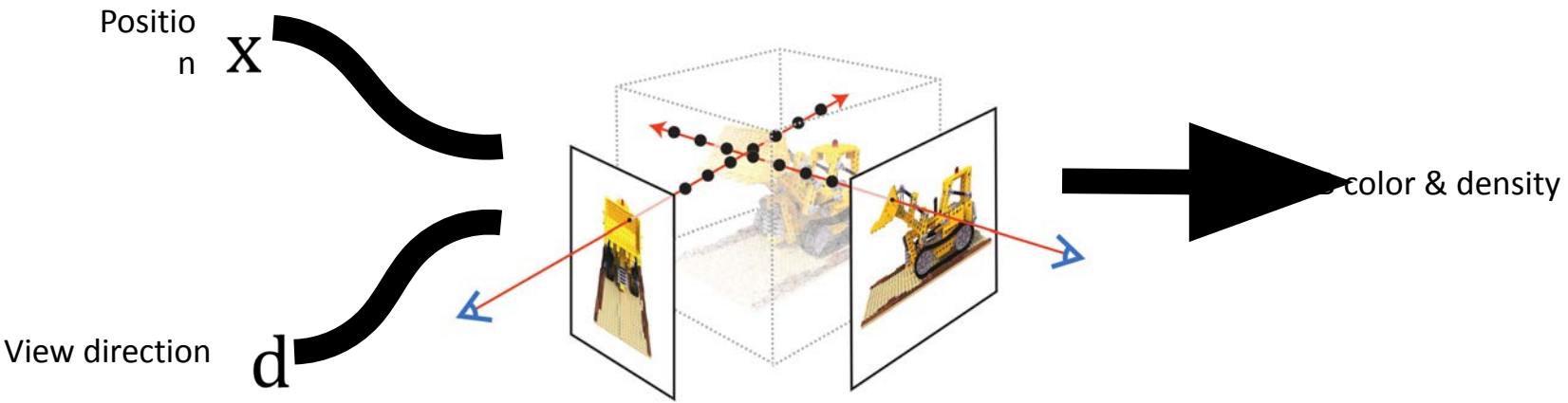
NVIDIA

Example: Radiance & Density Field (NeRF)

"How much stuff is at X and what color does it have when viewed from d?"

NVIDIA.

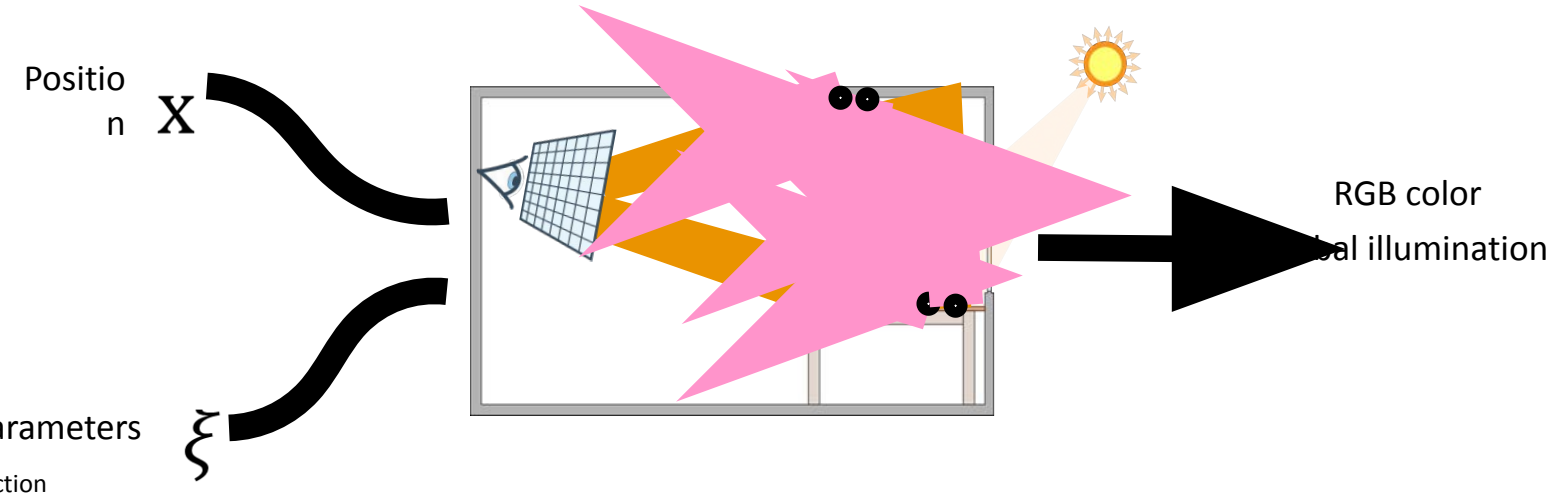
Example: Radiance & Density Field (NeRF)



"How much stuff is at X and what color does it have when viewed from d?"

NVIDIA.

Example: Radiance Caching



- view direction
- surface normal
- specular
- albedo & roughness

“What color does the object at X have when viewed from d?”

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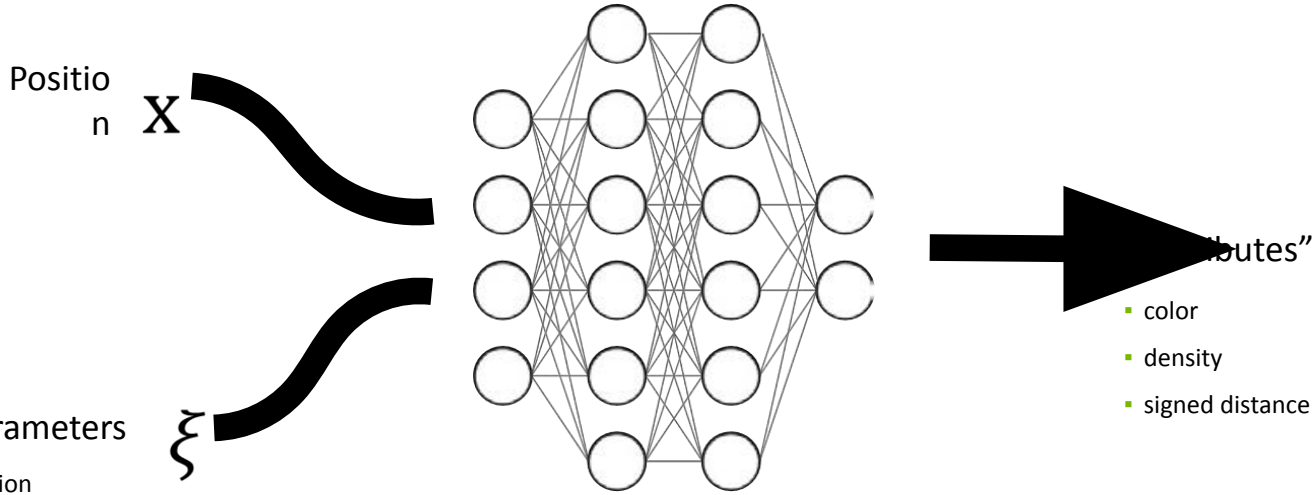
An object represented by queries to a neural network!

What's a Neural graphics primitive?



- view direction
- albedo & roughness
- displacement

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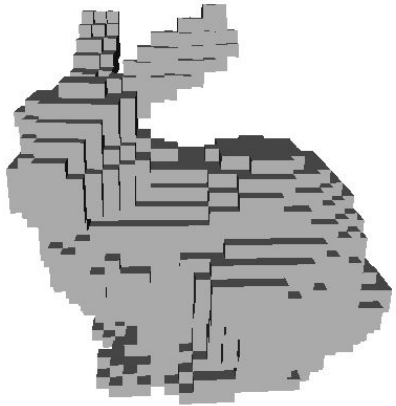
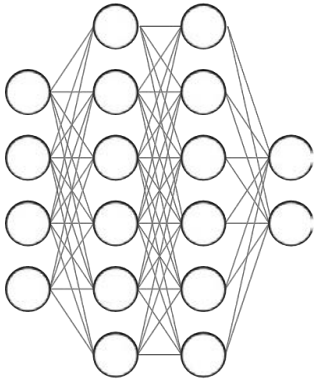
Why neural networks?



versus



- Large memory footprint
- Rigid; limited to ~3D
- But really fast

- Trades memory for compute
- Mutable; nD inputs
- Reputation for being slow

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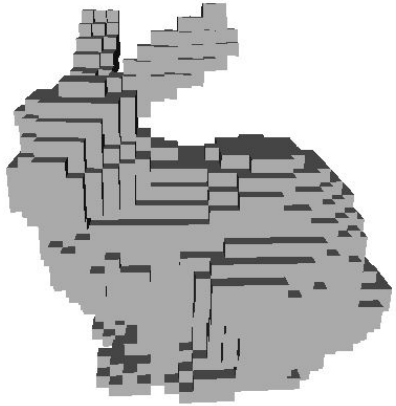
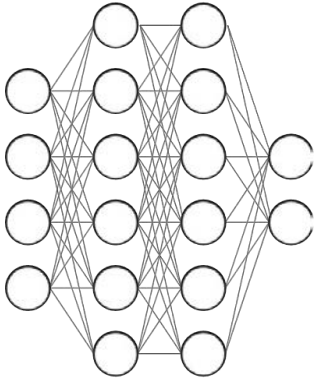
Why neural networks?



versus



- Large memory footprint
- Rigid; limited to ~3D
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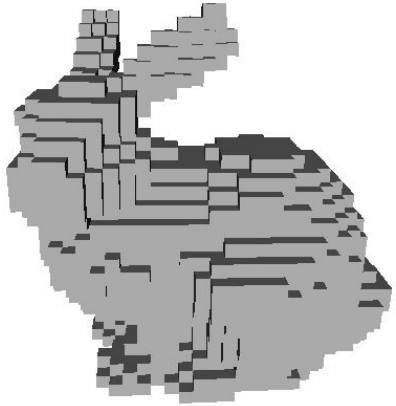
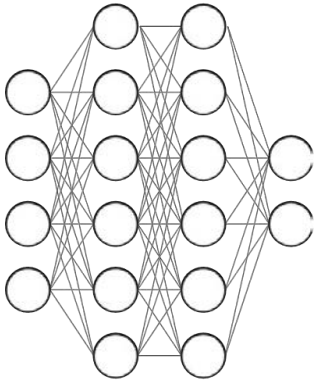
- Trades memory for compute
- Mutable; nD inputs
- [redacted]
- Competitively fast!

NVIDIA.

Why n



combined with



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NVIDIA.

HPA

TECH RETREAT 2024

Tim Porter, MOD

About Me

TIM PORTER
Founder & CTO | MOD Tech Labs
Recovering: Pipeline TD & Tech Artist

- Career Technologist
  - Games: AAA, Mobile, AR/VR
  - Immersive: Training, Edu, Med Device
  - Film: SPI, VP, VFX
- Full Sail University- BS Computer Animation
- Cred
  - NVIDIA Inception
  - Intel Launchpad
  - Autodesk Dev Network

What's the deal?

Photogrammetry

-VS-

NeRFs

-VS-

Splats

MOD TECH LABS

modtechlabs.com

Photogrammetry

VIRTIGO

MOD TECH LABS

modtechlabs.com

NeRF > Polygon

MOUNTAIN HOUSE MEDIA

MOD TECH LABS
modtechlabs.com

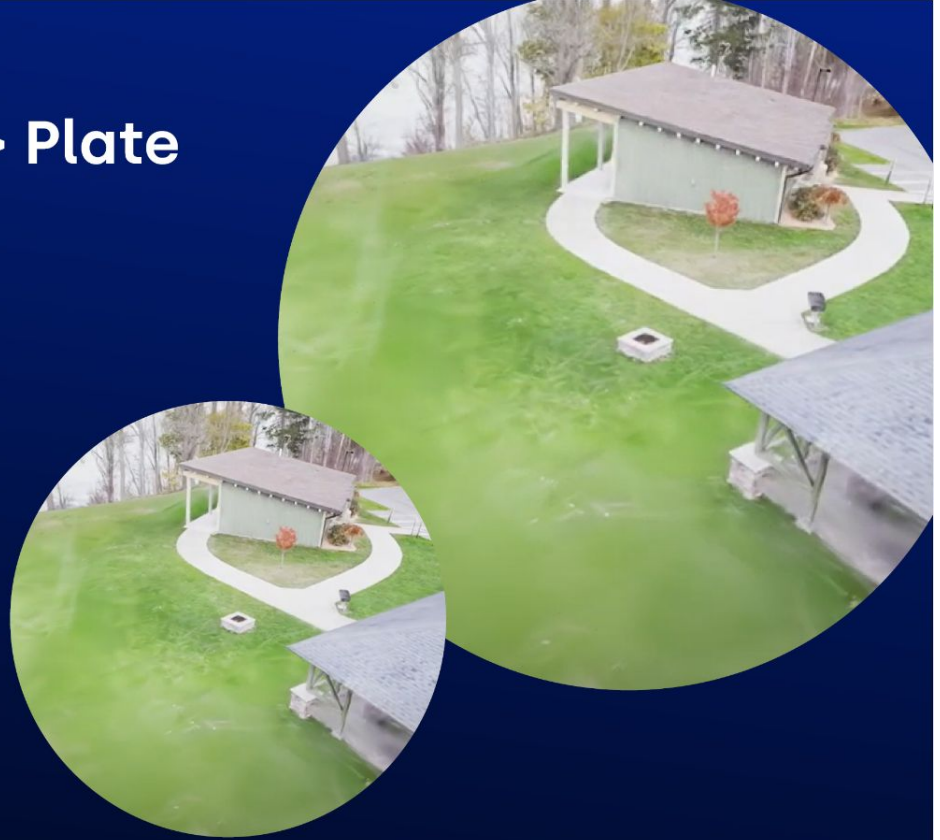
NeRF > Polygon In Motion

PIYA
PROJECTCHIMERA

FearlessProductions.tv

MOD TECH LABS
modtechlabs.com

NeRF + Splats > Plate



Optic Sky

MOD TECH LABS
modtechlabs.com

Use Cases

VFX

Virtual Production

Plates

Location Scouting

Collaboration

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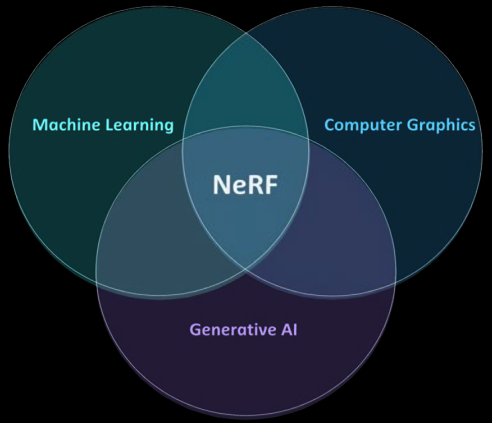
DISGUISE
Nerds that
NeRF
HPA 2024

The promise of Radiance fields

- Removes significant resource barrier- Very quick, relatively good quality
- Mimics traditional 3D computer generated environments without the weight and complexity
- Cost savings, typically 90% savings over traditional photogrammetry



VP Content flexibility

Driving Plates

Photoreal
Relatively simple
No parallax
Requires offline stitching or a powerful media server solution
Suitable at all levels of production

2D Plates

Photoreal
Relatively simple
No parallax
Little to no content prep required
Straightforward content workflow

2.5D

Photoreal
More complex
Parallax simulated
Requires segmentation and in-painting. Cuebric can help.
Can be animated or static, flat or full depth depending on budget and 3D skill

NERFs

Photoreal
Emerging technology, not simple yet
Full Parallax
Experimental at the moment. Tools emerging all the time. Volinga.
Supports both game engine and media server workflows

3D Game Engines

Photoreal with the right talent
Most complex
Full Parallax
Requires full 3D asset creation. NVidia Picasso leading the way with asset generation from AI.
SuperSampling like DLSS can help

VP Use cases

- Very Photoreal with low effort
- Adds Parallax
- Lightweight and easy

Car Process

Bus, Planes, Spaceships too!

Natural Landscapes

Windows, Roofs, Open Environments

VP + NeRFs today

- Gaussian Splats is a better Radiance Field tech-

  Higher quality
  Rasterizable to some level

- Capture to Stage in hours (local training on GPU)
- Motion is not yet available

Capture rig

Resulting nvol

DISGUISE

Upcoming improvements

- Motion (i.e. video NeRFs)
- Relighting - changing lighting in post
- Editable - add or delete environment features
- Higher resolution and less artifacts

DISGUISE