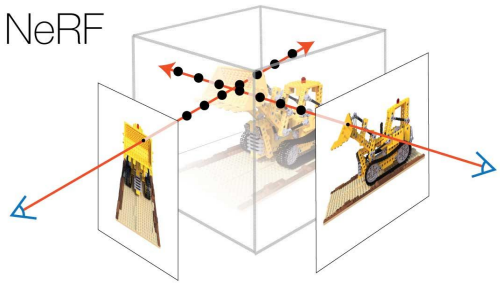
Project Title
NeRF or Nothing



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Project Description

In the last two years there has been an explosion of research surrounding NeRFs, or Neural Radiance Fields, as a new way to render 3D scenes from a set of 2D images. This technology is rapidly developing, and it may be the best path forwards to photorealistic rendering of viewpoints never before seen before by a camera. Many large research labs like Facebook AI and Google research are pursuing this technology in order to render realistic simulations for self-driving cars and to improve the usability of 3D scans. Our project, NeRF or Nothing, will be a web application based on this technology that allows people to input videos or collections of photos and render novel realistic views of the scene they captured. This will include the ability for users to create “flythroughs” or move virtual cameras through scene’s they have captured to create videos from unseen perspectives.

Goals

To create an application that simplifies the use of NeRFs to make it as easy as possible for anyone to create realistic 3D renders captured with smartphone cameras. The end goal is to have the process be as simple as video to novel view synthesis with NeRF.

Plan

The approach will be to fork recent research papers on NeRFs and potentially integrate multiple projects into the backend to create the best application possible. The GUI application for viewing and editing NeRFs (such as creating camera fly throughs) will be created simultaneously so the team is not held up by technical challenges in the backend. The team will timebox the development and move in small increments to make consistent progress for RCOS. The backend algorithm will be independent from the front end so development on both can occur simultaneously. Our team will pursue a MVP as soon as possible and then optimize the algorithm so it gives desirable results.

OSS contributions:

Eric Nelson: Since I will be working on this project for OSS and RCOS I will be submitting all of my documentation (issues, PR comments, readme and formal code documentation) as commits for OSS while all code centered commits will be for RCOS. I will keep these commits separate or very explicitly note which part of the the commit is for which class. Other then this my plans for the project are the same as this document and I will primarily be focusing on integrating NeRF into the backend. As of now, I hope to have TensoRF (one implementation of NeRF) integrated for the MVP by the end of July and a fully featured version (custom video flythroughs with TensoRF + another implementation by the end of the semester.

Jane Zou: I'm working on this project for OSS. It's the first time I join this team, I'm excited to contribute to the team. I'll be working on backend because I don't have many experience with the front-end. But, if we need people to do Vue for front-end, maybe I can help because I was working on HASS pathway front-end using Vue in Yacs.n team last semester. Hopefully, I will understand the code structures, and add some new features to NeRF-or-Nothing. Also, I want to create a GUI for NeRF-or-Nothing if it's possible.

Weiting Ye: I will be working on a project for OSS. The idea of rendering the images into 3D models is a very new-frontier topic. And the idea with web application using the easily accessed cell phone camera are quite a improvement of this technology. I worked on the web application in the team Argument Diagram using typescript before. I want to first got the general idea of the work and making some external link for the project. Also documenting along the way. And probably work on and improve the images files formatting of the I/O. And hopefully adding some more features like dynamic frame captures from open source like colmap. I hope to work with the team and get the web running this semester.

Zetong Pan: I am working on this project for OSS. My intention is to work for the back-end and develop on algorithm part. I have worked on Shuttle Tracker's server team so I am pretty confidence that I can handle this. My target this semester is first getting familiar with the whole

project and existing work and then working for the algorithm. It will be a good chance for me to learn training algorithms for NeRF.

Milestones

June

- Get the backend producing usable results
    - Program can take in a video input and output novel viewpoints
- Initial setup of website
    - Project landing page
    - Setup learning resource page
- Data collection using camera

July

- Mid-July before break the MVP should be done
    - Website allows users to upload videos and render predetermined flythrough views
- Website is functionally complete for the MVP
- Allow users to control the novel views to be rendered and synthesized
    - First single image captures then full video keyframing

August

- Optimization
    - Choosing optimal photos for NeRF from a video
    - Automatically determining parameters
- Adding/enhancing web features
- Stylizing website
- Whole application integration

Stack

Front End:

- Vue.js

Backend:

- Python
- Flask
- Pytorch
- Hosting: Google Cloud

Spaces

- Discord: https://discord.gg/sNZ7xrnFc2
- Google Drive: https://drive.google.com/drive/folders/1eMEn_p2sJ5gG5Tmtjy_8S5Rr9rhlS8Tr

- Project Github: https://github.com/NeRF-or-Nothing
- Github repo: https://github.com/NeRF-or-Nothing/vidtonerf