

Milestone Progress Evaluation

Synthetic Data Pipeline for Pose Estimation

Members:

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Faculty advisor and Client: Dr. Ryan White (rwhite2009@fit.edu)

1. Progress of current Milestone (progress matrix)

Task	Completion %	William	Nate	Stephane	Hanibal	To do
Incorporate Movement	75%	37%	0%	38%	0%	Add more complex path options
Add Background	100%	95%	0%	0%	5%	Correct location on camera and add to config file
Configuration file	75%	0%	75%	0%	0%	Addition of movement options
Lighting	100%	75%	25%	0%	0%	Test reflections
Pose Information for each frame	100%	80%	0%	20%	0%	
Investigate Nvidia Omniverse	0%	0%	0%	0%	0%	Scrapped

2. Discussion (at least a few sentences, ie a paragraph) of each accomplished task (and obstacles) for the current Milestone:

- Task 1: We figured out how the coordinate system works. We are able to accept user input for any access. There is also the ability to add linearly interpolated paths. This should work for both the camera and any objects.
 - Task 2: The user is now able to select an image png or jpg. That image will be uploaded and used in the rendering process as a background.
 - Task 3: Using the Tomli package we were able to create a configuration file. This file is where the user can easily change settings for rendering. Currently this allows for lighting settings, and file selection satellite models.
 - Task 4: We were able to understand how to correctly adjust the lighting type, strength, and location. These features can be adjusted from the configuration file.
 - Task 5: We were able to get the pose information out using a simple blender command. The information was then added to a csv where one line corresponds to one frame of animation.
 - Task 6: We decided no to continue investigating Nvidia Omniverse software. We found that it was much easier to do everything in Blender. With Blender there is much more documentation and we are able to easily run it on our own computers which makes development very easy. Nvidia Omniverse requires high spec computers and there is also much less documentation on it then for Blender which makes development much harder.
3. Discussion (at least a few sentences, ie a paragraph) of contribution of each team member to the current Milestone:
- William Stern: I tried to use blender in a docker environment. I put this on hold for now to get some other stuff done and to evaluate if this is the best course of action. I also made a demo incorporating all the stuff from this milestone. I've also been able to print out the quaternion of the xyzw coordinates for every frame. I also added code for adding the background.
 - Nate Pichette: I worked to understand the tomli python package. This I used to set up a configuration file that allows for easy access to altering our python program. This can change lighting location and power, satellite model, background image, and a few other features.
 - Stephane Baruch: I now understand how to properly use Blender and how to use Python in conjunction with Blender. I've been able to figure out how the rotation of the satellite works and came up with the idea of asking

the user to provide the x,y,z coordinates as well as whether or not to rotate the satellite model clockwise/counter clockwise for each axis.

- Hanibal Alazar: Researched how to include background.

4. Plan for the next Milestone (task matrix)

Task	William	Nate	Stephane	Hanibal
1. Complex movement along path	develope	demo	test	test
2. Enable movement interaction through configuration file	test	develope	demo	develope
3. Implemete compatibility among os	demo	test	develop	test
4. Extract poses as coco type annotations	Dev	Test	demo	test

5. Discussion (at least a few sentences, ie a paragraph) of each planned task for the next Milestone

- Task 1: Allow the user to input mathematical functions for the flight path. Functions will be used to implement nonlinear movement. This will allow for more complex satellite movement. It will still have the option for coordinate based linearly interpolated movement. We will also add these options for the camera and any other secondary objects that the user might want to insert.
- Task 2: Expand the current use of the configuration file to account for more user centric parameters such as camera lens angle, camera movements, and light movement. We will add parameters for increased customization and ease of use.

- Task 3: Make code compatible with Windows, Mac, and Linux. Currently there are some problems getting it to work on different os when running in the console and when installing external pip packages. It is currently working on Windows but it also needs to be tested on Linux. It would also be great if it was able to work on Mac os. We also want to make it so that it can be easily installed on any of these operating systems.
- Task 4: For the next milestone we should put the output in coco format. The coco is a popular dataset for machine learning so all the major machine learning libraries can already read the file format easily. The coco format is mostly a text file linking the labels to the images.

6. Date(s) of meeting(s) with Client during the current milestone:

1. 10/25/2022
2. 10/29/2022

7. Client feedback on the current milestone

- see Faculty Advisor Feedback below

8. Faculty Advisor feedback on each task for the current Milestone

- Task 1: See for the next milestone if we can make functions that take time as an input and output xyz coordinates as an output. This will allow them to do some more unique types of movement.
- Task 2: He said the current background is too noisy but looks good. The background can be switched for any jpg or png image file. We can also test some animated backgrounds
- Task 3: He said the configuration file looks like a good idea since it is easy to use but also flexible for adding different parameters.
- Task 4: He said the lighting function looks good. For the next milestone we should do some more testing of the lighting to make sure things like reflections and objects that have lights are working properly.
- Task 5: He said that the quaternion output we have looks good. He said for the next milestone it would be great if we can output the annotation file as a coco type annotation. This would increase its compatibility and usability with a lot of machine learning models.

9. Faculty Advisor Signature: _____ Date: _____

10. Evaluation by Faculty Advisor

- Faculty Advisor: detach and return this page to Dr. Chan (HC 214) or email the scores to pkc@cs.fit.edu
- Score (0-10) for each member: circle a score (or circle two adjacent scores for .25 or write down a real number between 0 and 10)

William Stern	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Nate Pichette	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Stephane Baruch	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Hanibal Alazar	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10

■ Faculty Advisor Signature: _____ Date: _____
