01-dataset-tutorial

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0.1 A Brief Tutorial on Using the Dataset

The Virginia Tech Natural Motion Dataset contains .h5 and .mvnx files with unscripted human motion data collected in real-world environments as participants went about their day-to-day lives. This is a brief tutorial in using the dataset and our library.

We will cover how to extract data from the .h5 files and visualize motion with forward kinematics.

[1]:
```
# Setting up the notebook
%load_ext autoreload
%autoreload 2
%matplotlib notebook

import torch
import numpy as np
import glob

from common.data_utils import read_h5
```

0.1.1 Creating a small dataset

We will assume that part of the dataset is downloaded and stored in the root directory of this project in a folder titled data.

[2]:
```
filepaths = glob.glob('../data/*.h5')
```

With a list of file paths, we can then make a request to extract data from the files.

[3]:
```
requests = {'orientation' : ['T8', 'Neck', 'Head'],
            'acceleration': ['T8', 'Neck', 'Head']
            }
dataset = read_h5(filepaths, requests)
```

Now we will have a dataset dictionary mapping our filenames to the orientation and acceleration of the T8 (sternum), Head and Neck.

[4]:
```
filename = filepaths[0].split('/')[-1]
dataset[filename]['orientation'].shape
```

[4]:
```
(678456, 12)
```

The dataset will contain 678456 frames of orientation data for our first file for the three segments we requested. The orientation data are stored as quaternions, so there are 4 values for each segment.

0.1.2 Visualizing motion

To visualize motion, we wrote a forward kinematics class called Skeleton.

[5]:
```
from common.skeleton import Skeleton
skeleton = Skeleton()
```

To read in data for the entire human body that we'd like to visualize, we can use the ['all'] request.

[6]:
```
requests = {'orientation' : ['all']}
dataset = read_h5(filepaths, requests)
```

We can now visualize human motion using the skeleton and dataset.

[7]:
```
azim, elev = 0, 0

human_motion = torch.Tensor(dataset[filename]['orientation'][620000:621000:10])
line_ani = skeleton.animate_motion(human_motion, azim, elev)
```

[7]:
```
<IPython.core.display.Javascript object>


<IPython.core.display.HTML object>
```