

# Autonomous Navigation

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## CONTENTS

<b>1</b>	<b>Local Machine</b>	<b>1</b>
<b>2</b>	<b>NVIDIA Server</b>	<b>1</b>
<b>3</b>	<b>Server Analysis</b>	<b>2</b>
<b>4</b>	<b>Optional</b>	<b>2</b>

### 1. LOCAL MACHINE

#### 1.1. Create virtual environment.

```
sudo pip install virtualenv
mkdir ugv
virtualenv ugv
source ugv/bin/activate
sudo apt install python3.9-venv
```

#### 1.2. Install required packages.

```
cd ugv
wget https://raw.githubusercontent.com/LokeshBadisa/Effectiveness-of-Computing-Engines-on-ML-Models/main/requirements.txt
pip install pip==22.1.2
pip install -r requirements.txt
sudo apt-get install python3-tk
```

If you face 'failed building dependency wheels on numpy', try changing version of package which you face error.

#### 1.3. Install required packages for nvidia(skip this if you dont have gpu on your local machine).

```
curl https://repo.anaconda.com/miniconda/Miniconda3-latest-Linux-x86_64.sh -o Miniconda3-latest-Linux-x86_64.sh
bash Miniconda3-latest-Linux-x86_64.sh
source ~/.bashrc
```

```
conda install -c conda-forge cudatoolkit=11.2 cudnn=8.1.0
export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$CONDA_PREFIX/lib/
mkdir -p $CONDA_PREFIX/etc/conda/activate.d
echo 'export LD_LIBRARY_PATH=$LD_LIBRARY_PATH:$CONDA_PREFIX/lib/' > $CONDA_PREFIX/etc/conda/activate.d/env_vars.sh
```

#### 1.4. Download the dataset from

```
https://drive.google.com/drive/folders/1scWy-myyAPP6MhZwJ2w9j9JuZrmdV4Mm?usp=sharing
```

#### 1.5. Unzip the dataset and download remaining codes.

```
unzip DataCollected.zip
mv DataCollected ugv/
cd ugv
svn co https://github.com/LokeshBadisa/Effectiveness-of-Computing-Engines-on-ML-Models
```

### 2. NVIDIA SERVER

This section demonstrates commands for using DGX2 Server.

#### 2.1. Login to DGX server

```
ssh username@ipaddress
```

#### 2.2. Repeat 1.3

#### 2.3. Create Anaconda Virtual Environment(skip this if you already have anaconda environment on server)

```
conda create --name venvname python=3.9
conda activate venvname
```

#### 2.4. Create the UGV Folder in Server

```
mkdir foldername
```

On local machine,

```
scp -r location serverid@ipaddress:
foldername
```

location refers to location of UGV folder on local machine.

#### 2.5. Install required packages and run the code

```
cd foldername
pip install -r requirements.txt
cd Lane
```

### 3. SERVER ANALYSIS

#### 3.1. Run the code on different computing engines. On local machine:

```
python3 trainingonlocalcpu.py
```

On Server GPU:

```
python3 trainingonservergpu.py
```

On Server CPU:

```
python3 trainingonservercpu.py
```

#### 3.2. Analyse the time taken on different computing engines

```
cd ../finalanalysis
python3 analysis.py
```

Fig. 3.2. Constant Batch Size (Batch Size=50)

Fig. 3.2. Constant Epoch (Epochs=128)

### 4. OPTIONAL

#### 4.1. Run runMain.py for visualizing the calculation of steering values.

```
cd ../Lane
python3 runMain.py
```