

| Project Report |

AI for Healthcare Project using NVIDIA Jetson Nano 2GB Developer kit



TEAM Members:-

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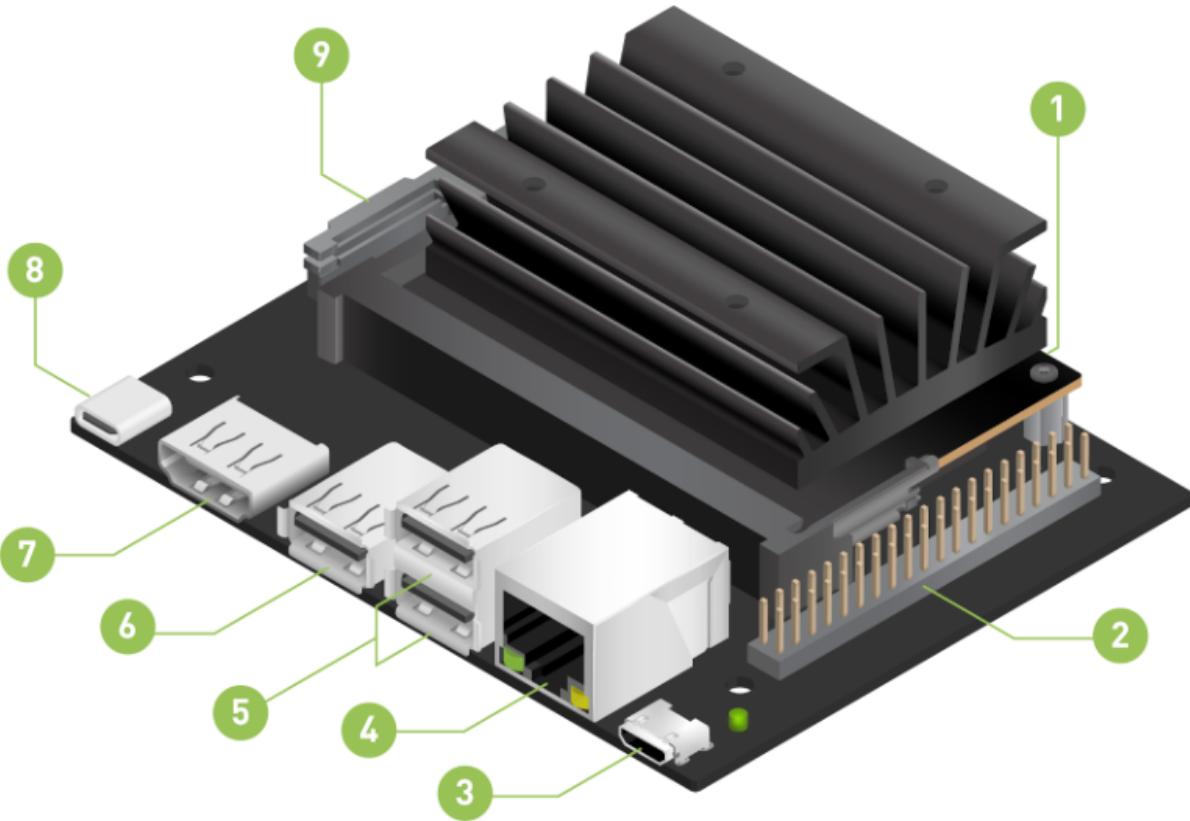
Mentor:-

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REVA University

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Project Topic:- To create a Project helpful in Healthcare Industry using Deep learning in Python with the help of Jetson Nano Developer kit



- | | |
|---|--------------------------------------|
| 1 microSD card slot for main storage | 6 USB 3.0 port [x1] |
| 2 40-pin expansion header | 7 HDMI output port |
| 3 Micro-USB port for Device Mode | 8 USB-C for 5V power input |
| 4 Gigabit Ethernet port | 9 MIPI CSI-2 camera connector |
| 5 USB 2.0 ports [x2] | |

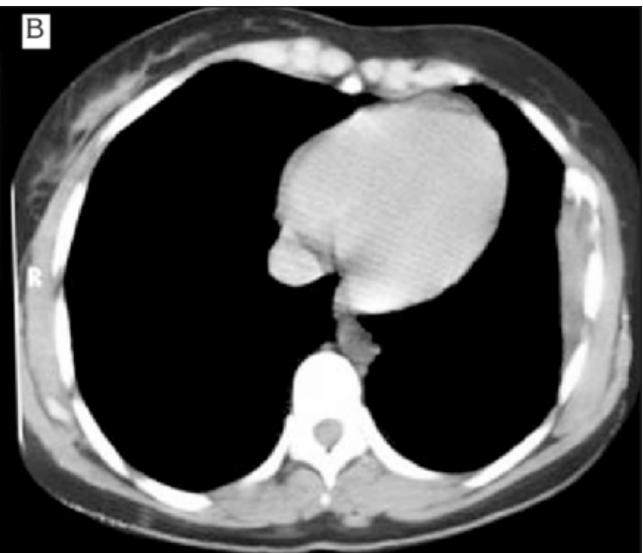
Fig:- Jetson Nano Developer kit

Project Brief:-

- This project uses Deep learning concept in detection of Various Deadly diseases
- It can Detect 1) **Lung Cancer** 2) **Covid-19**
3)**Tuberculosis** 4) **Pneumonia**
- It uses **CT-Scan** and **X-ray** Images of chest/lung in detecting the disease
- It has a Accuracy between 50%-80%
- It can take input in any Image format or through Live videos and provide accurate output results



| X-ray Image of chest |



| CT-Scan Image of Chest |

Accessories & Resources Used:-

- Jetson Developer Kit (2gb kit)
- Type C power (5V) supply
- Ethernet cable
- HDMI Cable
- Monitor with HDMI cable
- Camera (Logitech C270 HD WEBCAM)
- Keyboard & Mouse (wireless)
- Memory card (more than 32 GB)
- Optional: cooling fan, micro-USB cable(for headless mode)
- Jetson-Inference With Docker File:
<https://github.com/dusty-nv/jetson-inference>
- Datasets:
 - CT-Scan:-https://www.kaggle.com/moha_mehanyyy/chest-ctscan-images/download
 - X-ray:-<https://www.kaggle.com/jtiptj/chest-xray-pneumoniacovid19tuberculosis/download>

Steps=>

1] Gathering all the Accessories:-

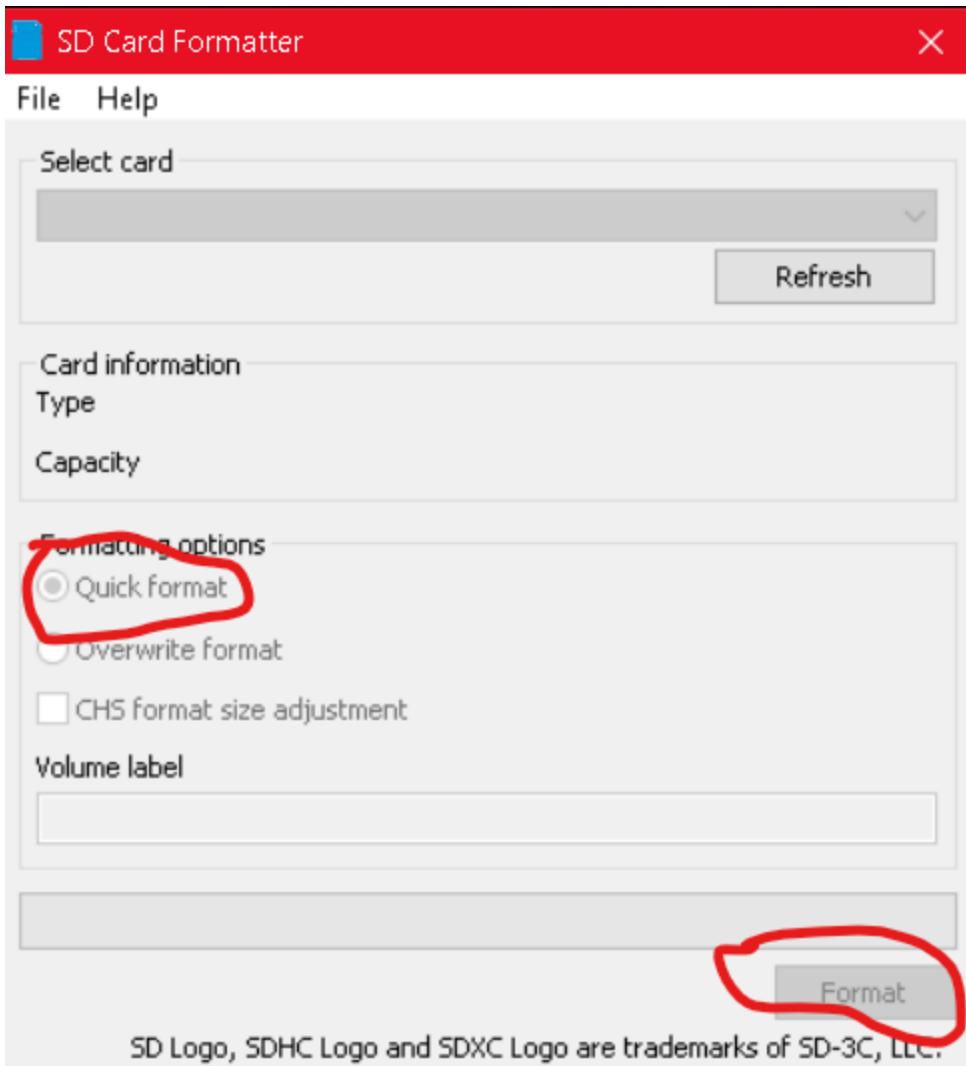
We gathered all the Accessories mentioned above from the local market and collected 2GB Developer kit.

2] Preparing for Setup:-

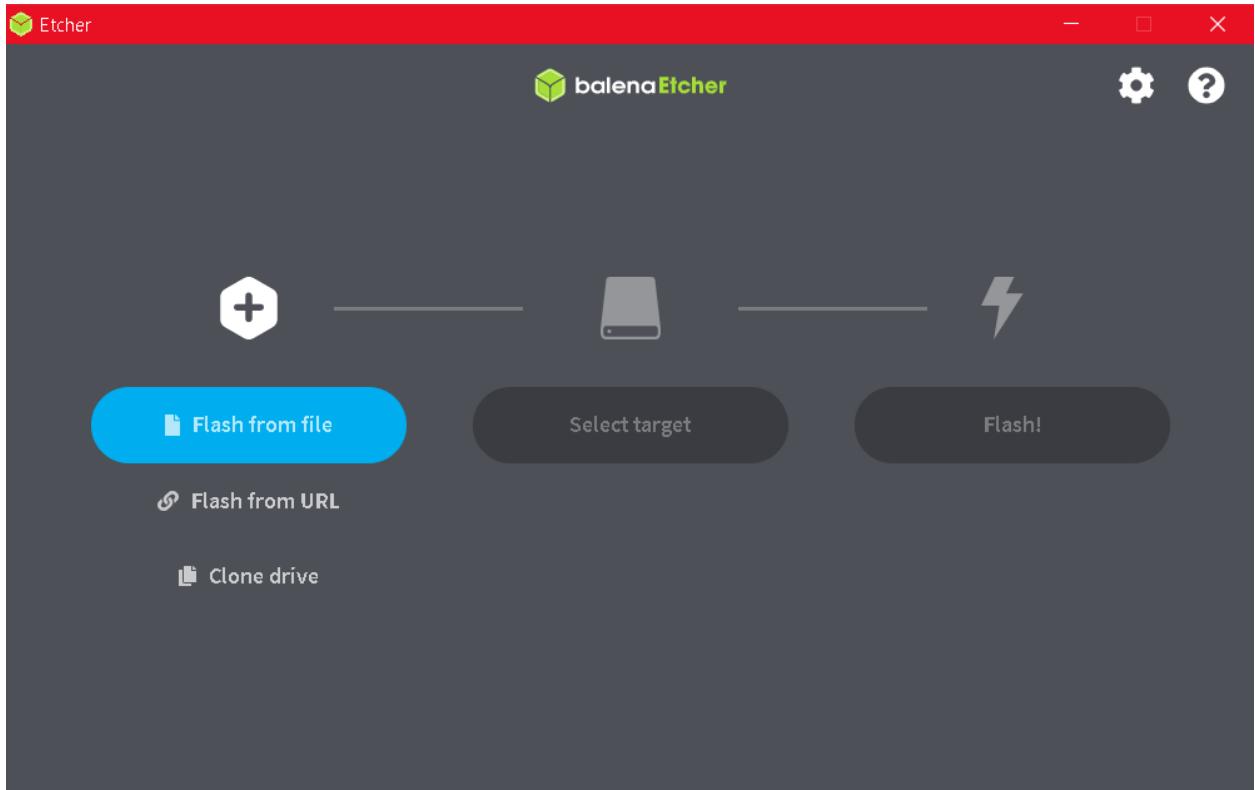
- connect SD card to PC/Laptop
- Download [SD card Image](#) (For 2 GB kit)
- Download [SD Card Formatter](#) & Install it.



- Quick format the SD card



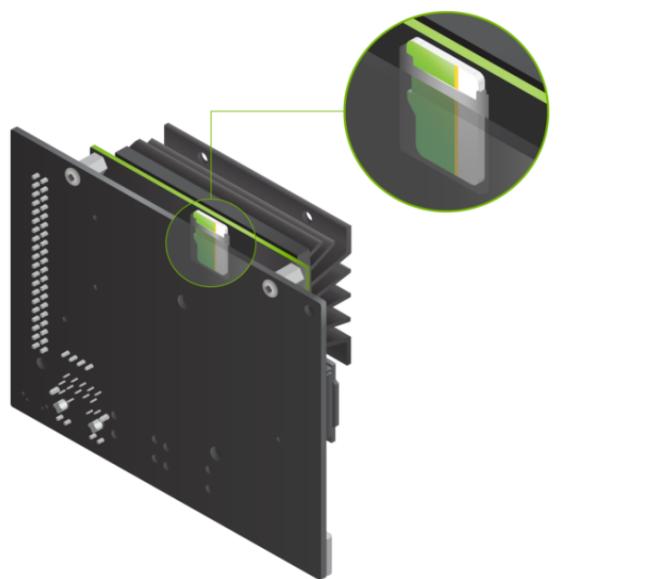
-Download , Install & Launch [ETCHER](#)



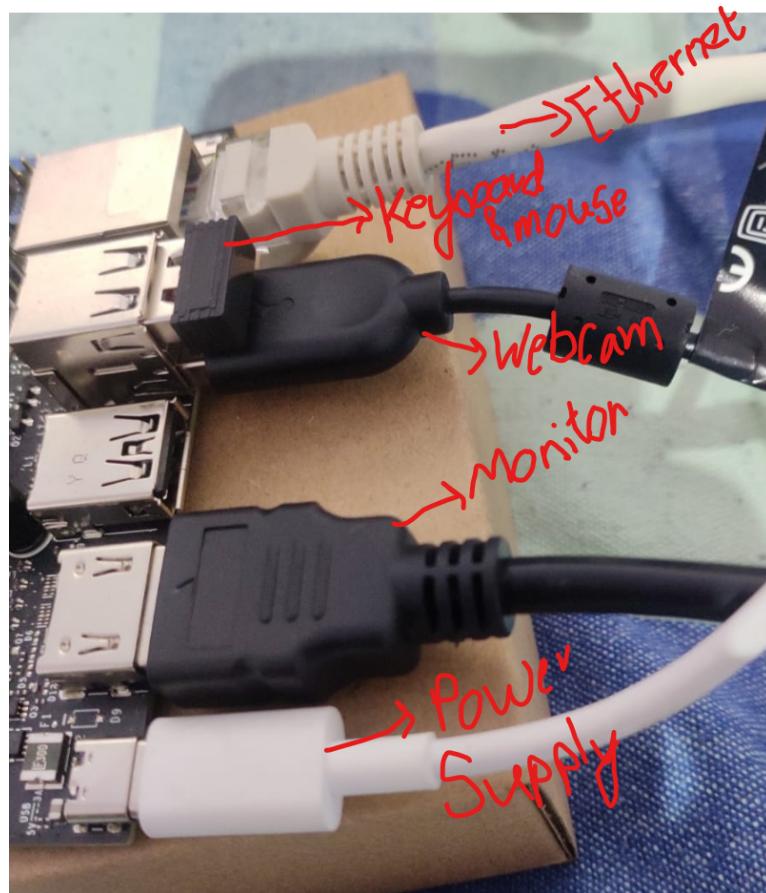
-Select Downloaded image, select target device as Memory card then flash (takes more than 10 min)

3] Setting up Kit:-

- Insert the SD card in kit



- Attach the Accessories in slots of kit as shown below



- Turn On power supply & wait for system to boot
- When you boot the first time, the developer kit will take you through some initial setup, including:
 - Review and accept NVIDIA Jetson software EULA
 - Select system language, keyboard layout, and time zone
 - Create username, password, and computer name
 - Optionally configure wireless networking
 - Select APP partition size. It is recommended to use the max size suggested
 - Create a swap file. It is recommended to create a swap file

3] Welcome screen:-



4] Downloading Jetson Inference with Docker Container:-

- Open Terminal and type following command

```
>git clone --recursive https://github.com/dusty-nv/jetson-inference
```

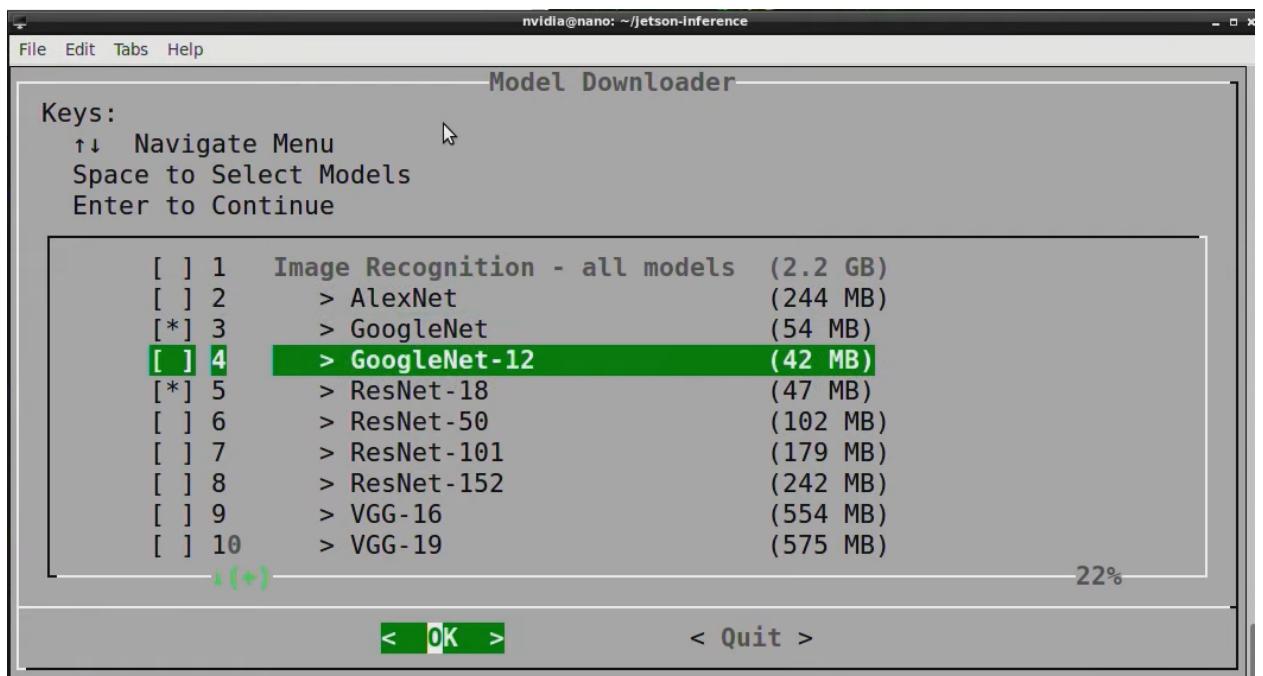
- Wait until it downloads the container(May take 10-15 mins on slow connection)
- Change Directory to jetson-inference using below command

```
>cd jetson-inference
```

- Run the Docker container command, It will ask for the password of your kit. Enter password(in Linux the password you type is not shown) and press enter

```
>docker/run.sh
```

- It may take time in First time running the docker command and ask for models that you want to download. Download default models and presss ok



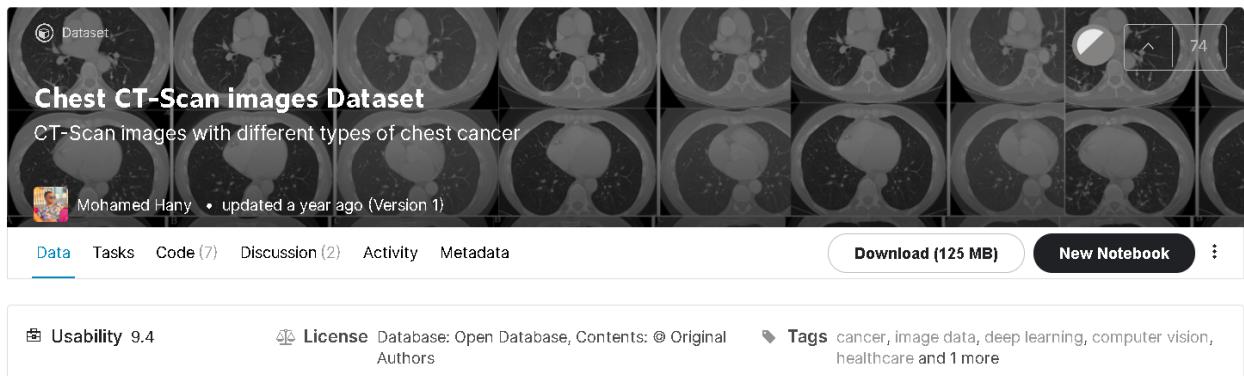
5] Now download the trained dataset from kaggel, we used the following datasets:-

CT-Scan:-<https://www.kaggle.com/mohamedhanyy/chest-ctscan-images/download>

X-ray:-<https://www.kaggle.com/jtiptj/chest-xray-pneumoniacovid19tuberculosis/download>

- CT-Scan:-

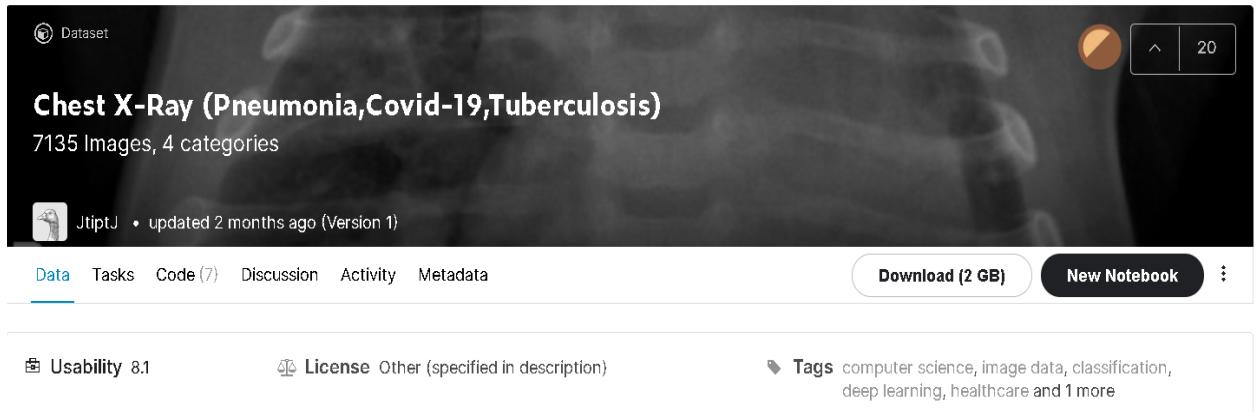
It has CT-scan Images of lung of Cancer Patients and Normal People



- X-ray:-

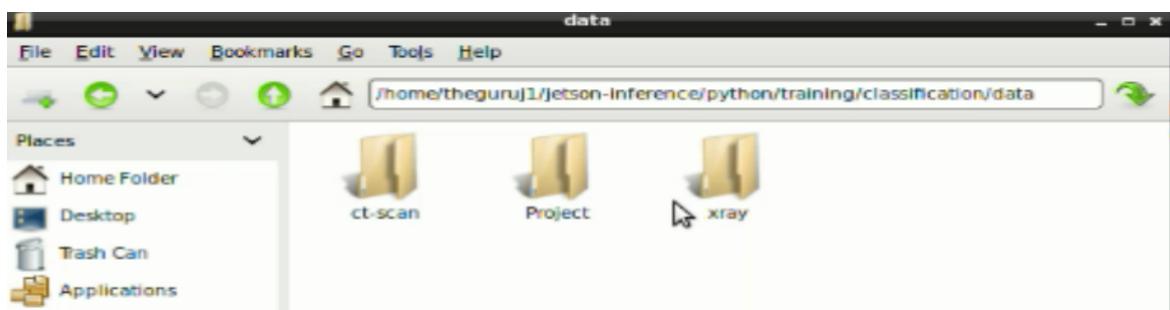
This dataset consist of lung x-ray images of

Covid-19 patient, Pneumonia patient, Tuberculosis patient and Normal people



- Now Extract the dataset in location:
Jetson-inference/python/training/classification/data/

With dataset name. In that folder create a label.txt file and name all the things that your kit gonna detect



6] Training our Dataset:-

- Enter following command

```
>python3 train.py --model-dir=models/ct-scan --batch-size=4 --workers=1  
--epochs=35 data/ct-scan
```

It will take around 8-10 hours for training and Kit gets hot so don't touch it.

7] Now export the trained model in onnx file

```
>python3 onnx_export.py --model-dir=models/ct-scan
```

8] Do the same thing with other dataset

9] Now test the project:-

```
>imagenet --model=models/ct-scan/resnet18.onnx --input_blob=input_0  
--output_blob=output_0 --labels=data/ct-scan/labels.txt (input location) (Output location)
```

For webcam based detection:

```
imagenet --model=models/ct-scan/resnet18.onnx --input_blob=input_0  
--output_blob=output_0 --labels=data/ct-scan/labels.txt /dev/video0
```

10] you can Train the model once more to increase the accuracy or Go ahead and try it with different models to create awesome project. For any help Contact:- abhishekbandare92@gmail.com

=>Model Accuracy:-

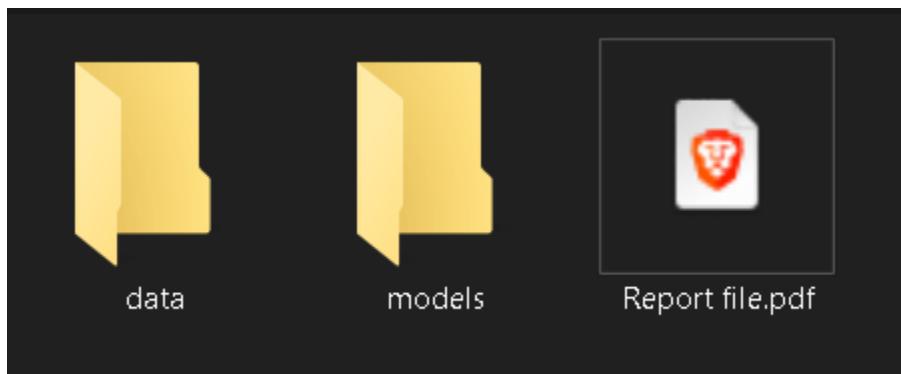


=>Resources:

We have enclosed all the project required and processed files in the folder.

Replace this data folder with
jetson-inference/python/training/classification/data
&

Models folder with
jetson-inference/python/training/classification/models



 **LIVE DEMO** 