# LinuxWorld Informatics Pvt. Ltd.

CIN: U72900RJ2012PTC039171

**Ref : LWIPL-JPR-2020-1875** **Date**:28th Aug, 2020

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the project work and report entitled **" MLOps Training - Applying Machine Learning On DevOps "** embodies the original work of **Mr. Naitik Nilesh Shah** from **Shah And Anchor Kutchhi Engineering College** (B.Tech – Computer Engineering) at **LinuxWorld Informatics Pvt Ltd**

The duration of the project undergone as mentioned above, under the mentorship of **Mr. Vimal Daga, Technical Head** was from **10th July 2020 to 13th September 2020**.

**Project Description:** This project "**Chest X-Ray Medical Diagnosis with Deep Learning** " AI is transforming the practice of medicine. It's helping doctors diagnose patients more accurately, make predictions about patients' future health, and recommend better treatments. In this project we have created convolutional neural network image classification and segmentation models to make diagnoses of lung and the diagnoses our model can detect are:

- Cardiomegaly
- Emphysema
- Effusion
- Hernia
- Infiltration
- Mass
- Nodule
- Atelectasis
- Pneumothorax
- Pleural Thickening
- Pneumonia
- Fibrosis
- Edema
- Consolidation

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In today's world of **automation**, we have to find the ways which can help doctors in their work, checking if the patient is diagnosed with one of the 14 diseases mentioned above, this approach is reliable, quick, works 24/7 without getting stressed. The best part about this model is that it not only detects if the person has been diagnosed with the disease or not, but it maps it out to where that particular disease is, and it even detects that if the person is diagnosed with more than one disease.
The data he used was from the National Institutes of Health (NIH)

**Technologies Used:** He has used **Deep Learning** as the data contains images on which we train our model. I even used data augmentation, so that even if we have a small dataset, the model performs better.

- **Deep learning:-** For better accuracy of the model, because accuracy is the most important thing in Medical.
- **DenseNet:-** We used DenseNet121 which we have used as a pre-trained model, and then we have added two layers on top of it.
- **Pandas:-** To read the CSV file.
- **Keras:-** Keras is a high-level API built on TensorFlow (and can be used on top of Theano too). It is more user-friendly and easy to use as compared to TF.
- **ROC Curve And AUROC:-** For model evaluation.
- **GradCAM:-** To visualize where the model detects the diagnoses.
- We have even used NumPy, seaborn, matplotlib.pyplot, ImageDataGenerator, Dense, GlobalAveragePooling2D

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**Conclusion**: He has built a state of the art chest X-Ray classifier using Keras, which will help doctors in detecting if the patient has been diagnosed with 14 different lung diseases.

**Future Scope**: Yes, it has a future scope as we can train the model with the different datasets to detect different diseases, like **COVID-19,** and a GUI version can be made or even a **Mobile App** can be made. With the world experiencing different diseases, which are unheard of before, this model can be trained and tuned to detect them too.

We wish him all the success for his future

Regards

LinuxWorld Informatics Pvt Ltd

**Mr. Vimal Daga – Technical Head**


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