



# C.V

## FINAL PROJECT BONE FRACTURE DETECTION

FINAL PRESENTATION

DATE : Jul-23-2021



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# CONTENTS

**01**

## **Introduction**

Giới thiệu Bone Fracture

**02**

## **Experiment Review**

Thực nghiệm nghiên cứu

**03**

## **Demo**

Demo Kết Quả

**04**

## **Q & A**

Trao đổi với Thầy Cô

# BONE FRACTURE - GÃY XƯƠNG



Bệnh Phổ Biến



Xử lý ảnh  
Xray



Ứng Dụng Cao



Tiết Kiệm  
TIME + COST



Áp dụng cho  
MRI, CT, ...

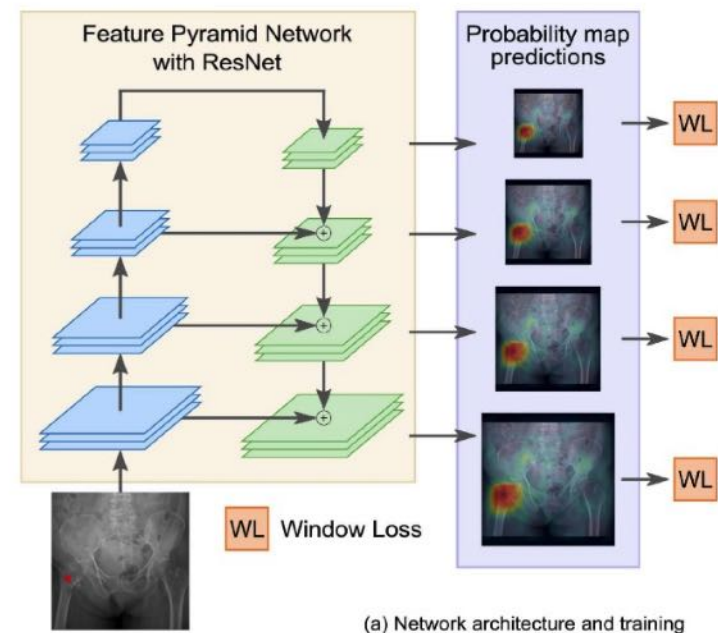


## REVIEW OF PAPERS

### 3 Bài

IMAGE ENHANCEMENT  
DEEP LEARNING: ANN, RESNET, RNN  
METRIC: ACC, Confusion Matrix, ROC

- Huấn luyện với label datasets
- Sử Dụng Mạng Neuron kết hợp
- Phân vùng ảnh (ROI)



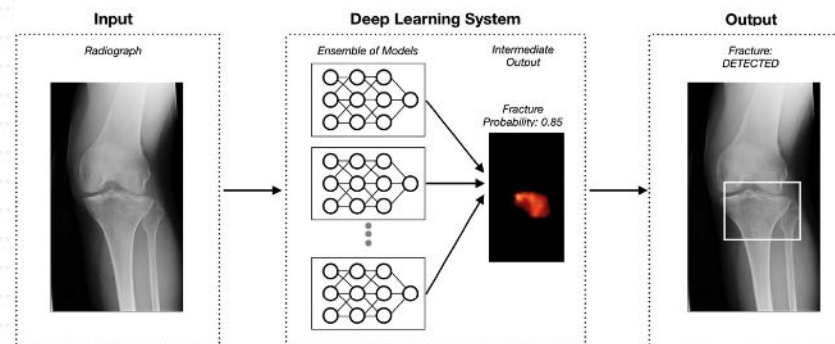
#### Bài Báo:

•Jones, R. M., Sharma, A., Hotchkiss, R., Sperling, J. W., Hamburger, J., Ledig, C., ... & Lindsey, R. V. (2020). Assessment of a deep-learning system for fracture detection in musculoskeletal radiographs. *NPJ digital medicine*, 3(1), 1-6.

•Zhang, X., Wang, Y., Cheng, C. T., Lu, L., Xiao, J., Liao, C. H., & Miao, S. (2020). A New Window Loss Function for Bone Fracture Detection and Localization in X-ray Images with Point-based Annotation. *arXiv preprint arXiv:2012.04066*.

•Yang, A. Y., Cheng, L., Shimaponda-Nawa, M., & Zhu, H. Y. (2019, December). Long-bone fracture detection using Artificial Neural Networks based on line features of X-ray images. In *2019 IEEE Symposium Series on Computational Intelligence (SSCI)* (pp. 2595-2602). IEEE.

(a)



(b)





# Cách Tiếp Cận



## OBJECT DETECTION

Định vị vật thể bằng R-CNN (2014),  
Faster RNN (2016), SSD (2016), YOLO v2 (2016).



## TRAIN với Custom Models

Sử dụng Tranfer Learning .



## Evaluation Metrics

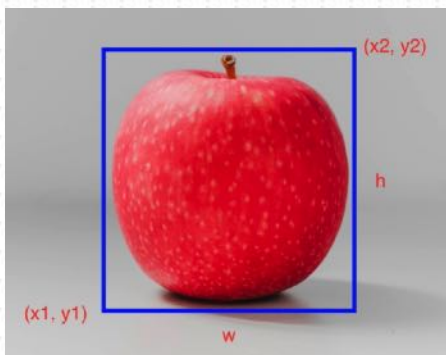
ACC, F1 Score,  
Confusion Matrix.

Predicted Labels	True	False
False		
Actual Labels		False



## DATASET LABELING

Tạo dữ liệu dán nhãn  
MakeSense.AI, Labellmg,  
VGG, image annotator,  
LabelMe, Scalable,  
RectLabel.



## Kiểm DATASET

GOOGLE, KAGGLE, ??? .





# DATA PREPARATION

## Chuẩn Bị Dữ Liệu



### DATASET

MURA(Stanford University),  
ImageCLEFmed  
(Aachen University of Technology)

### Data Augmentation

Flip: Horizontal, Vertical  
Rotation: Between  $-15^\circ$  and  $+15^\circ$   
Brightness: Between  $-30\%$  and  $+30\%$   
+ KERAS:  
ImageDataGenerator

### LABELLING

Classification  
Object Detection

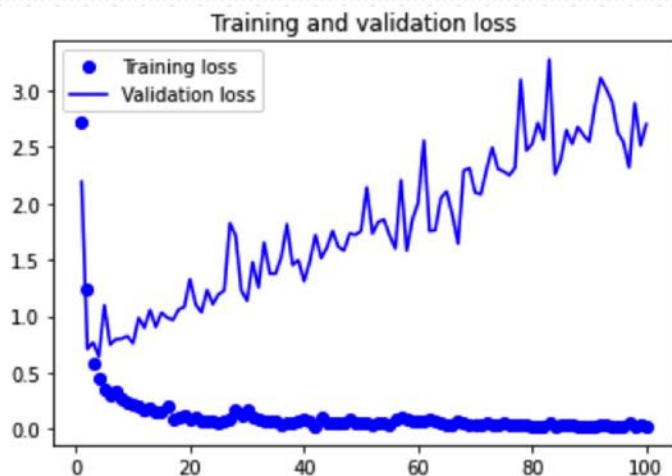
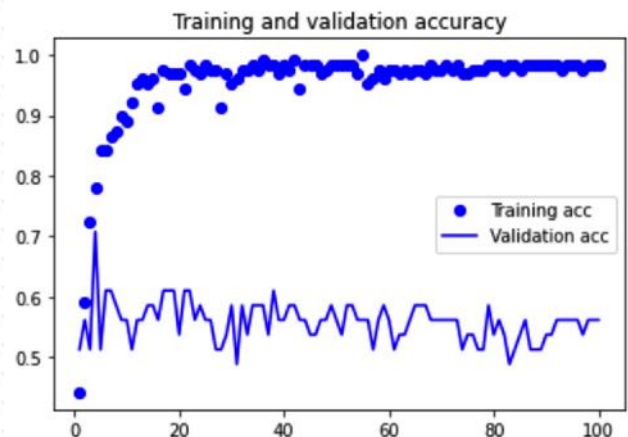
### Normalised Data

+ Colour  
+ Size  
+ Extension

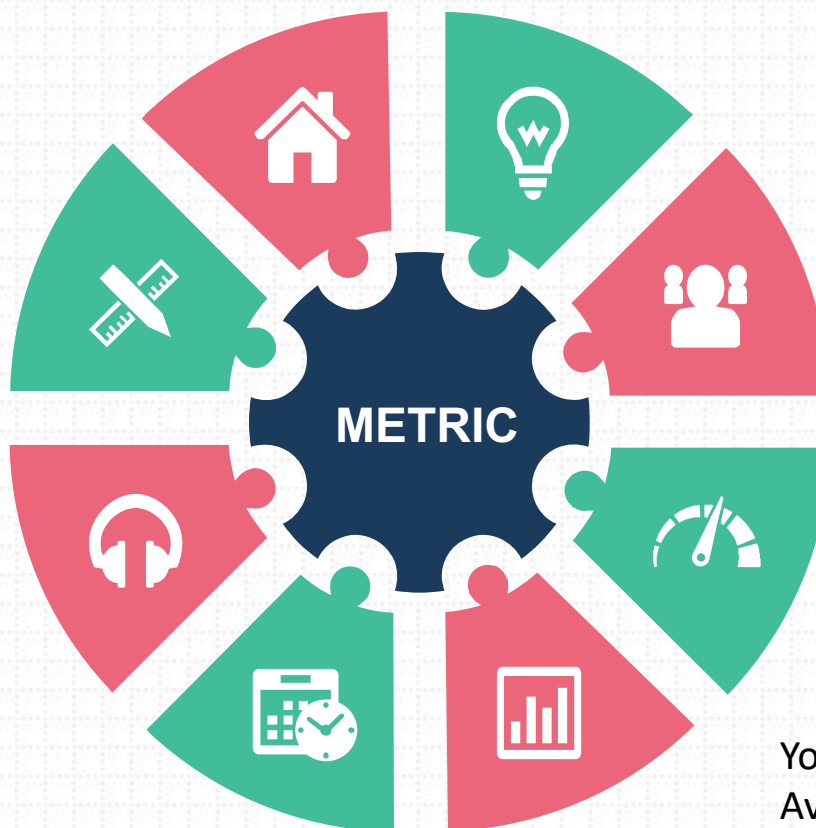




## CLASSIFICATION



# EXPERIMENT REVIEW



## DETECTION



Faster R-CNN ResNet-50 FPN  
Loss: 0.16



YoloV4 Darknet  
Avg Loss: 2.22, 1.71  
Class Loss: 0.45  
IOU Loss = 0.188  
Total Loss = 0.64





# PLAN & DEMO



CODE WITH PYTHON.



MODEL ON TENSORFLOW 2.0.



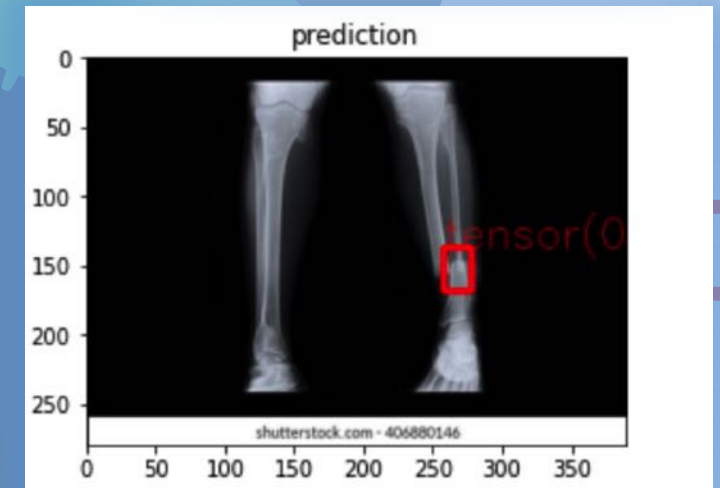
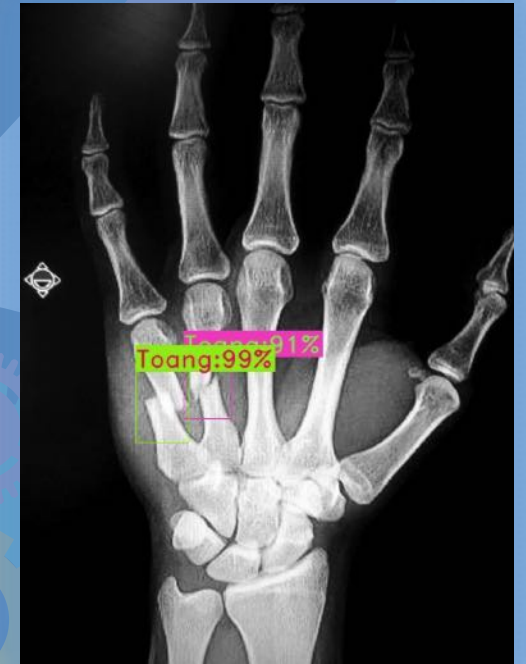
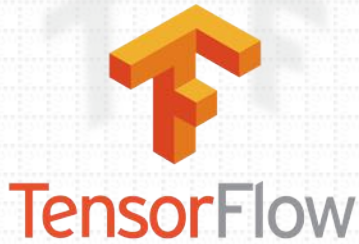
DEPLOY ON WEBSITE APP.



FRONTEND: HTML5, CSS.



BACKEND: JS, NodeJs, React.





# THANKS!

## CẢM ƠN THẦY CÔ VÀ CÁC BẠN!

