



# Deep Learning Project

## – Mechanical Tools Image Classification

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# Problem

- ❖ DIY fans need a lot of tools
- ❖ Space and cost dilemmas



# Solution

- ❖ Sharing platform
- ❖ Tools image classification to improve user friendliness

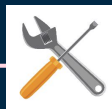
# Method

- Download data from Kaggle
- Data EDA
- Data Augmentation
- Split dataset into train, validation and test groups



Data  
Collection

Basic CNN



- Xception
- VGG16
- Mobilnetv2

Transfer  
Learning



Model  
Comparison



# Data Sample

Sample Image for Each Class

Gasoline Can



Hammer



Screw Driver



Wrench



Rope



Pebbles



Toolbox

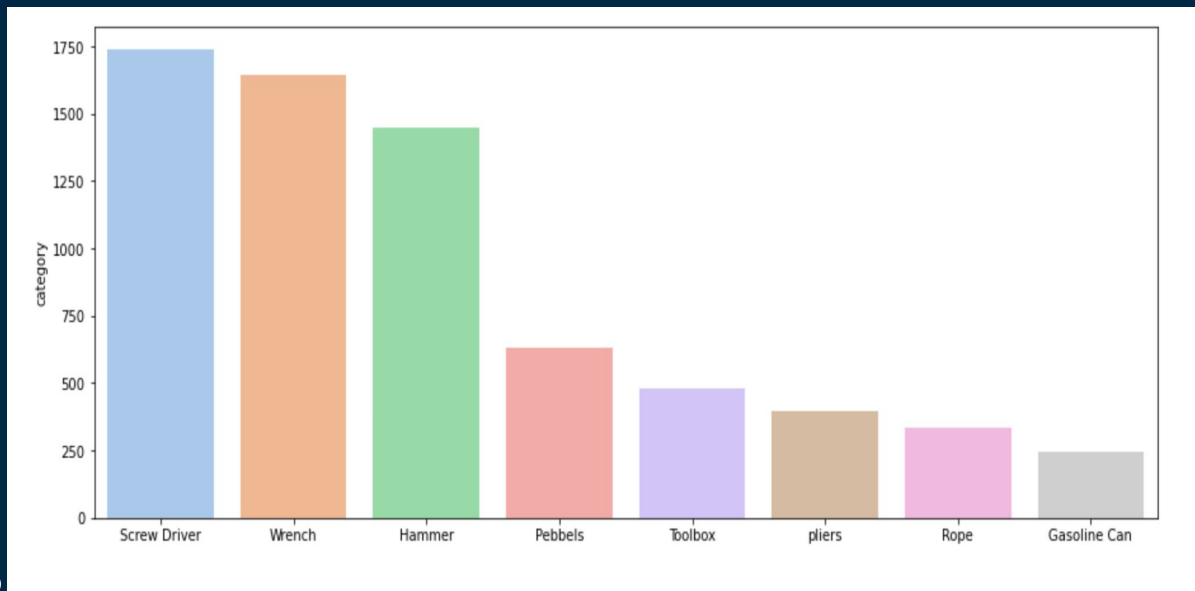


pliers



# Data EDA

6916 Images  
8 Categories



# Data Augmentation

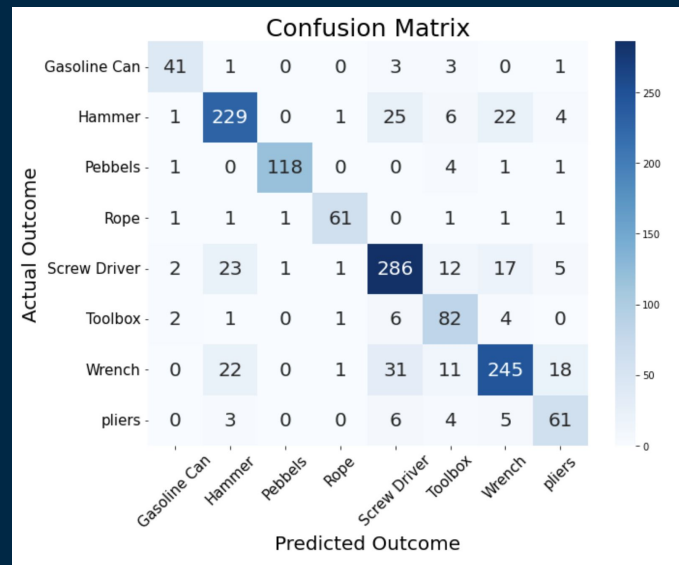
- Limited dataset
- Imbalanced data



# Model Result Comparison

	accuracy	recall	precision	f1	run_time
<b>mobilnetv2_trainable_array.h5</b>	0.251632	0.125000	0.031454	0.050261	15.846468
<b>vgg16_model_array_trainable.h5</b>	0.651922	0.648371	0.638844	0.638828	83.624269
<b>vgg16_model_array.h5</b>	0.691806	0.688188	0.683530	0.678469	91.981105
<b>mobilnetv2_base_array.h5</b>	0.814358	0.835475	0.820305	0.825591	15.702344
<b>Xception_model_array_trainable.h5</b>	0.817984	0.817621	0.845594	0.830277	33.692630
<b>cnn_model.h5</b>	0.527194	0.488033	0.595368	0.518424	4.929572
<b>Xception_model_array.h5</b>	0.808557	0.808584	0.843299	0.823239	34.079014

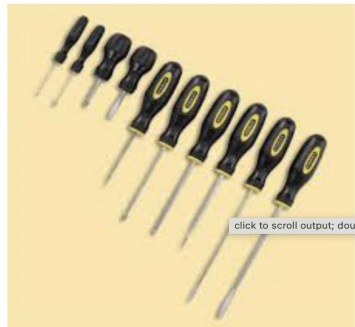
Mobilnetv2 wins !



# Result Check

misclassified label

The plot is a : Wrench  
But classified as a : Screw Driver



The plot is a : Screw Driver  
But classified as a : Hammer



The plot is a : Hammer  
But classified as a : Screw Driver



The plot is a : Wrench  
But classified as a : Screw Driver





# Result Check

Multiple Tools in one image / Noise

The plot is a : Screw Driver  
But classified as a : Toolbox



The plot is a : Hammer  
But classified as a : Screw Driver



The plot is a : Toolbox  
But classified as a : Wrench



The plot is a : Screw Driver  
But classified as a : Hammer



The plot is a : Pebbles  
But classified as a : Rope

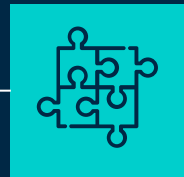


The plot is a : Screw Driver  
But classified as a : Wrench



" GIVE ME ANYTHING BUT A SCREWDRIVER. "

# Insight



01

Data need to be further cleaned to improve model performance



02

Future platform should allow one tool/item each image



03

- Mobilenetv2 is fast and with good metric values
- 
- May try other models

# THANKS & questions



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