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SHAPING INDIA'S TECHSCAPE

TEAM INTRODUCTION

Title: Smart Vision for Quality Assurance in Ecommerce

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Team Members:

Harsh Meena (Deep Learning, Generative AI) , **Harsh Singh** (Natural Language Processing, Convolutional neural network training, Computational Resources Management) , **Priyanshu Dwibedi** (Frontend Developer Streamlit) , **Abhijit Mukharjee** (Natural Language Processing, Convolutional neural network training, Computational Resources Management) , **Lucky Jaiswal** (Computer Vision)

College/University: IIIT bhubaneswar , SIRT bhopal

Date: 20th October 2024

EXECUTIVE SUMMARY

Our solution addresses the challenge of automating the quality and quantity assessment of ecommerce shipments using advanced camera vision technology. By integrating machine learning and image processing, we provide a fast, accurate, and scalable system for real-time product inspection.

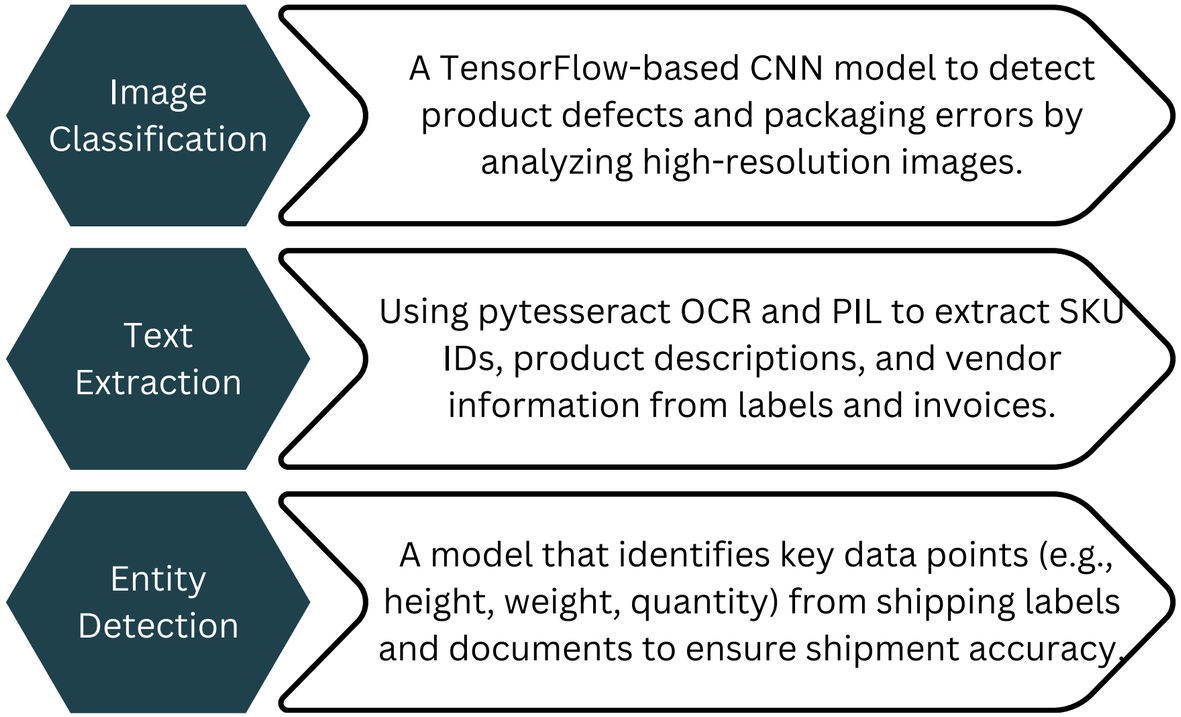
Problem:

Automating the quality and quantity assessment of ecommerce shipments using smart vision technology.

Objective:

To develop a system that utilizes camera vision and machine learning to detect product defects and validate shipment accuracy in real-time.

Key Components:



TECHNICAL APPROACH

Hardware Specifications:

Cameras	High-resolution cameras with controlled lighting for image acquisition.
Computing Platform	GPU-based server for model training (e.g., NVIDIA Tesla/RTX GPUs).
Other Equipment	Storage for image datasets

Data and Model Training:

Dataset	Images of e-commerce products, labeled for classification
Preprocessing	Images of ecommerce products, labeled for classification
Training Process	Split data into training, validation, and test sets (80-10-10 split)

Tech stack:

Image Classification

Entity Detection

Text Extraction

+

Other tools

Code snippets:

Text Extraction (OCR): Code using pytesseract for extracting text from product labels.

```python
model = Sequential([
    Conv2D(32, (3, 3), activation='relu', input_shape=(150, 150, 3)),
    MaxPooling2D(2, 2),
    # Additional layers...
    Dense(1, activation='sigmoid')
])
model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])
```

Image Classification (CNN): Key code for building the convolutional neural network in TensorFlow.

```python
import pytesseract
from PIL import Image

img = Image.open('sample_image.png')
text = pytesseract.image_to_string(img)
print(text)
```

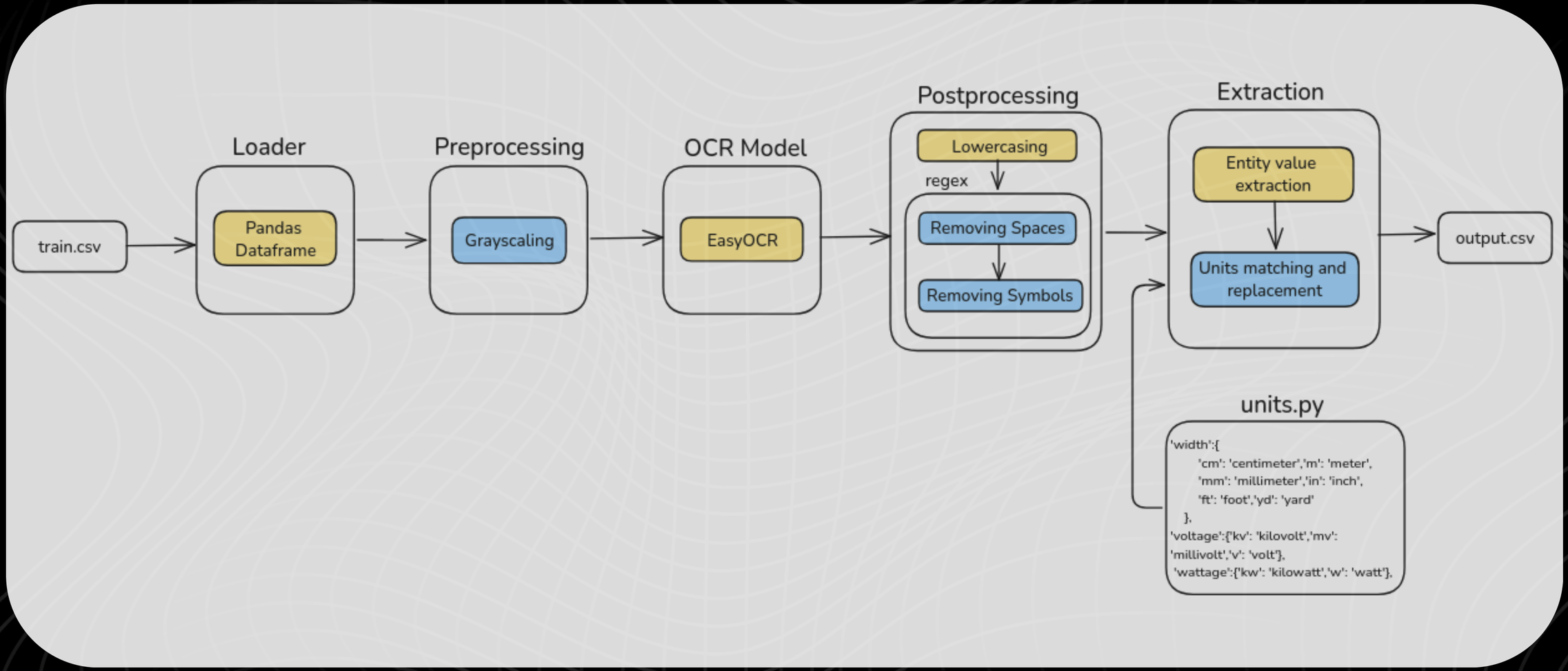
Freshness analysis

```python
# load VGG16 model + higher level Layers
base_model = VGG16(weights = 'imagenet', include_top=False, input_shape=(150, 150,
3))
#Freeze the base model
base_model.trainable = False

#Craete the hybrid model

model = Sequential(
  base_model,
  Flatten(),
  Dense(256, activation = 'relu'),
  Dropout(0.5),
  Dense(len(train_generator.class_indices), activation = 'softmax') #Output layer
)
```

```python
import re

text = "Product Height: 20cm, Weight: 500g"
height = re.search(r'Height: (\d+)', text).group(1)
weight = re.search(r'Weight: (\d+)', text).group(1)
print(f"Height: {height}, Weight: {weight}")
```

Entity Detection (Height/Weight): Example NLP code to detect numeric entities.

WORKING FLOWCHART



EXPECTED OUTCOMES

1. ***Accuracy***:
   - The smart vision system should achieve a high level of accuracy in detecting defects, misclassifications, and packaging errors in ecommerce shipments.
   - Target: At least 95% accuracy in identifying defective or incorrect items.
2. ***Efficiency***:
   - The solution must streamline the quality control process, significantly reducing the time taken for inspections compared to manual checks.
   - Outcome: Increase inspection throughput by up to 50%, allowing for quicker order fulfillment without compromising quality.
3. ***Cost-Effectiveness:***
   - The implementation of this solution should lead to lower operational costs by minimizing manual labor, reducing error-induced losses, and ensuring faster processing times.
   - Outcome: Decrease the need for manual inspections and reduce product returns due to inaccurate shipments.
4. ***User Experience Improvements:***
   - By ensuring high-quality and correctly packaged products, the system will enhance customer satisfaction and reduce returns, leading to better reviews and repeat business for ecommerce companies.
   - Outcome: Improved customer experience through reduced shipping errors and faster deliveries.

KEYPOINTS:

- Real-world applicability, expected benefits for ecommerce businesses, reduction in operational inefficiencies.
- Robustness of algorithms, scalability of the system, ease of implementation within existing logistics and warehouse workflows.
- Originality of approach, novelty in applying smart vision systems for ecommerce quality control.

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Thank You