

PROJECT PROPOSAL

INVENTORY MONITORING AT DISTRIBUTION CENTRES

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The project proposal consists of these topics:

- The project's domain background
- The problem statement
- Datasets and Inputs
- Solution Statement
- Benchmark Model
- Evaluation Metrics
- Project Design

THE PROJECT'S DOMAIN BACKGROUND:

Traditional supply chain models focus on storing large quantities of product across different location, which is heavily relied on manual processes.

Supply chain model focuses on finding the right quantity of supply at the right time.

THE PROBLEM STATEMENT:

Manual processing of large quantities of supply can lead to loss of time, resources and manual labour.

Counting each element individually in a bin in delivery consignments can be very tiresome and there can be high chances of error.

DATASETS AND INPUTS:

The publicly available Amazon Bin Image Dataset will be used in this project. This dataset contains over 500,000 images, where each image contains one or more objects. In addition, the dataset contains JSM metadata from bins of a pod in an operating Amazon Fulfilment Centre, such as number of objects, it's dimension and the type of object. Given the dataset, the task is to classify the number of objects in each bin.



Fig: An image from the dataset

SOLUTION STATEMENT:

In this project, we will have to build a model that can count the number of objects in each bin. A system like this can be used to track inventory and make sure that delivery consignments have the correct number of items.

To build this project we will use AWS SageMaker and good machine learning engineering practices to fetch data from a database, preprocess it, and then train a machine learning model.

The machine learning model will be based on a pre-trained convolutional neural network, such as resnet 50. Then, it will be tuned on a few selected hyper parameters to improve model performance, for example, learning rate, batch size and number of epochs. Furthermore, model performance

assessment will be based on a few selected metrics, that are suitable to this use case, such as cross entropy loss.

BENCHMARK MODEL:

The benchmark is referred to the Abid Challenge, which the author obtained 55.67% accuracy and 93% RMSE.

EVALUATION METRICS:

- Accuracy
- RMSE
- AUC-ROC
- Confusion Matrix

PROJECT DESIGN:

The steps included in this project are:

1. Download the data and upload to S3 bucket
2. Complete training job in Sagemaker
3. Perform hyperparameter tuning
4. Model profiling and debugging
5. Use multi-instance training
6. Model deployment