Project Proposal:

Domain Background:
Deep learning has revolutionised the operations of many industries. Advancements in computer vision, natural language processing and speech recognition have been beneficial to many companies that are using this technology to help or change their ways of working.

In computer vision the problem process of identifying and localising objects in an image is called object detection. One application is in distribution centres where the use of robotics to carry out tasks is prevalent. The ability of these robots to accurately select objects and choose the correct number of items for delivery enables fast operations and helps track inventory.

Problem statement:
Using deep learning methodologies, an object detections algorithm will be built to classify the number of objects in bins.

The datasets and inputs:
To complete this project we will be using the Amazon Bin Image Dataset. The dataset contains 500,000 images of bins containing one or more objects. We have been provided with a subset of this data. Within this there are 5 classes referring to the number of objects in each image. For each image there is a metadata file containing information about the image like the number of objects, it's dimension and the type of object.

Solution statement :
A convolutional network will be employed , we will use a pretrained network then apply transfer learning to create a bespoke solution to this problem.

Benchmark model **:**
There are many network architectures that have been developed for the purpose of object detection including VGGNet, ResNet, Inception, MobileNet and many more. The benchmark will be the results from the selected pretrained model without applying transfer learning. Any performance increases will be attributed to transfer learning.

Evaluation metrics **:**

- Accuracy of the trained model
- F1 score of the multiclass model on the test data

Project design**:**

1. Download and process the data and upload to S3 into train and test folders.
2. Use a pretrained network to observe benchmark metrics. Only F1 score will be noted.
3. Apply transfer learning and train a model.
4. Test and evaluate the model.