**INTRODUCTION**

In the continuous changing and evolving field of retail, the demand for an efficient system for the management of stock or inventory is escalating daily. Traditional retail stores face significant labor costs to monitor shelf inventory regularly, often postponing this operation until off-peak hours. A delay in inventory monitoring causes high sales losses when a particular item is gone from the shelf though additional stock existed in the warehouse. An ordinary convenience store faces out-of-shelf stockout rates of 5–10%, which results in a loss of up to 4% of sales retail stores. The prime challenges faced here are efficient restocking of items which further involves accurate real time detection of stock levels. This real time detection can provide us with valuable insights like popularity of a particular product, efficiency of staff in restocking the items, and may also provide us analytics regarding the gross sales of a particular store. Data shows that when a product is not available on the designed shelf space, 31% of consumers buy the product from a different store, 26% of them buy a different brand, 19% of them buy a different size of the same brand, 15% of them buy the same product at a later time, and 9% of them buy nothing [1]. There are two ways in a broader view to detect the stocks, one is to detect the amount of products present and the other is the simpler method of detecting the empty shelves. Both the techniques traditionally involve Image Processing algorithms. Though these algorithms are simple and easy to execute they need real time images to give satisfactory results. The images have to be captured either directly (which is again time consuming and costly) or taken through a CCTV footage. Hence the shift towards Machine learning algorithms, where once the model is trained real time data is no longer needed to detect the missing objects or empty shelves. While numerous methods/algorithms are implemented (detailed analysis is given in section 2), there are various drawbacks of each of

2nd Keerti Kulkarni

Dept. of ECE

BNM Institute of Technology Bangalore, India keertikulkarni@bnmit.in

them. Some of the drawbacks are insufficient data (images from all categories of the retail market scene), lesser efficiency and more time consuming. Taking all these factors into account the proposed work has the following objectives. 1. Design an efficient and cost-effective method for detecting empty shelves in the retail market scene. 2. Efficiency should be achieved without compromising the privacy of the customers. The system uses pre trained Faster RCNN model which is well know for its object detection capability. This approach combines the traditional CNN model with the ResNet-50 architecture and hence it is appropriate for binary classification tasks like detecting empty shelves. The use of RCNN has proven to be the best approach because of its balance between the accuracy and lesser computation than other models, reason of its accuracy is directly related to its unique approach of region proposals and object classification. This dynamic approach is truly a game changer and will elevate the shopping experience to new heights, this approach of inventory management is not bounded to just retail stores but can extend to all the domains that involve inventory management irrespective of size of the business. The major contributions of this works are 1. Design of a Faster RCNN algorithm for detecting empty shelves which gives an accuracy of 99%. 2. This work also provide us with valuable insights like time taken to restocking of items and staff management. This is achieved as the location of the empty shelf is also indicated which in turn helps in reducing staff strength and thus being a cost-effective solution. This paper is organized as follows. Section II contains the background of similar works or the Literature Survey. section III explains the methodology used, section IV explains the results, section V discusses the results obtained followed by conclusions in section VI.