

# Bricks Sorter

By Ikram Ikramullah (All rights reserved: ikrambabai@gmail.com)



## Problem Statement

Educating smaller kids through fun and well-engineered games has proven to be a crucial defining factor for their education success in life. One of the most fascinating of these are the bricks/Legos. Legos teach kids on how to train their brains on starting with smaller building blocks and then proceeding to constructing bigger projects. From a simple toy car to a sophisticated spaceship that kids love to make, bricks and Legos can be fun and very educational especially towards their STEM skills – *if* done in an organized manner. Bringing this order is where my project comes into play.

A parent's experience with organizing and sorting hundreds of these pieces of bricks can be overwhelmingly, daunting and time-consuming. The 'learning' can really easily go down the ditch for kids if all they were looking for was a 3x2 brick they cannot find in a pile of hundreds of unsorted bricks. Suddenly all the excitement they had started the project with can go levels down. Learning needs a continuous level of excitement – or else it becomes just another chore.

## Solution Statement

Wouldn't it be cool if each *type* of these bricks were sorted into separate jars for the kids to pick from every time they embarked on a new exciting project? My Brick Sorter is here to here for the rescue.

All the parents / kids would do is to feed the mixed pile of bricks to a machine, let the machine know *how* they like to sort the bricks – and there, in a few moments – you have jars filled with separate type of bricks in each. Doesn't that look awesome (hope I do complete it ☺).

## Domain Background

I think I will put in Educational / STEM category since its helping with the basic idea of learning from building blocks. However, this is just my classification – one may also classify it as toys/games categories. I've passion for STEM and I will rather go with my bias here.

Domain: Education

Subdomain: STEM (Science Technology Engineering Math)

## Datasets and Input

The primary input to my ML Based Brick Sorter application will be an (image of) a brick it needs to sort. Another input will be to let the application know the type of sorting needed – by color, shape or a combination of the two. The ‘shape’ based on which the application will sort the image can be those like 2x2 squared, 2x6 rectangles or other more complicated figures like L shaped Legos. The application will be intelligent to differentiate between all these shapes (if the input of shape-based sort WAS chosen).

The input to our learning model to get trained on to make those fascinating decisions will be many raw images of various colors of those bricks / Legos – each brick will be captured in various angles (normal position, turned sideways, turned upside down and so on) for the machine to properly learn.

## Benchmark Model

Unfortunately, I don't know if anything of this nature exists. But image recognition in general of course has many applications. Maybe I could use the dog-breed-identifier project we did in Deep Learning as a benchmark for this?

## Evaluation Metrics

The best evaluation matrix for this project would be to see the accuracy of the output of the machine that puts an object in its class.

## Design Outline

I will be using a convolutional neural network with pooling layers support followed by fully connected layers to classify a brick into the intended class.

Following are the two diagrams showing the design outline – the first one is classification based purely on color, the second one uses more sophisticated classification putting color, shape and dimensionality of the brick into consideration

