**Problem Statement**

**Business Understanding**

A classic problem in the field of pattern recognition is that of **handwritten digit recognition**. Suppose that you have an image of a digit submitted by a user via a scanner, a tablet, or other digital devices. The goal is to develop a model that can correctly identify the digit (between 0-9) written in an image.

**Objective**

You are required to develop a model using Support Vector Machine which should correctly classify the **handwritten digits** based on the**pixel values given as features**.

**Results Expected**

1. Write all your code in one well-commented R file; briefly, mention the insights and observations from the analysis.

You need to submit the only the **R commented file.**It should include detailed comments and should not contain unnecessary pieces of code.

**Downloads:**

For this problem, we use the **MNIST data** which is a large database of handwritten digits where we have pixel values of each digit along with its label.

You can download the dataset from below:

**[MNIST Dataset](https://cdn.upgrad.com/UpGrad/temp/7940b364-7140-4e70-b76d-b95034fecb67/SVM%20Dataset.rar" \o "SVM Dataset.rar" \t "_blank)**

[file\_download](https://cdn.upgrad.com/UpGrad/temp/7940b364-7140-4e70-b76d-b95034fecb67/SVM%20Dataset.rar" \o "SVM Dataset.rar" \t "_blank)**[Download](https://cdn.upgrad.com/UpGrad/temp/7940b364-7140-4e70-b76d-b95034fecb67/SVM%20Dataset.rar" \o "SVM Dataset.rar" \t "_blank)**

**Note:**

It would take a lot of time for modeling on the full MNIST data, So you can sample the data and build the model which would make the computation faster.

**Packages required (Suggested):**

install.packages(“caret”)

install.packages(“kernlab”)

install.packages(“dplyr”)

install.packages(“readr”)

install.packages(“ggplot2”)

install.packages(“gridExtra”)