

The background is a dark blue gradient with a subtle pattern of white dots. Overlaid on the left side are several concentric circles and arcs in a lighter blue color. Some of these arcs have degree markings, such as 40, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, and 260. There are also small arrows pointing in various directions, suggesting a sense of rotation or movement.

# MNIST DIGIT CLASSIFICATION USING NEURAL NETWORKS

A PROJECT BY SREENEHA S

# SUMMARY

- This project is customized version the implementation of neural networks from scratch from the book Neural networks and deep learning. It is an online book which can be referred here: <http://neuralnetworksanddeeplearning.com/> . This book gave me insight and knowledge on how to build neural networks from scratch . It also helped me get a very good understanding of Feed forward functions, back propagation functions, activation functions and cost functions. I have made a simplified version of the model in this book which is easy to understand and implement. The dataset which I have used can be downloaded from: <http://yann.lecun.com/exdb/mnist/> . You can also get the data from popular data science platforms like Kaggle(<https://www.kaggle.com/c/digit-recognizer/data>) and Analytics Vidhya(<https://datahack.analyticsvidhya.com/contest/practice-problem-identify-the-digits>).

# IMPLEMENTATION

- I have implemented two versions.
  - First version is using basic quadratic cost function and implementation of sigmoid activation function feed forward and back propagation functions.
  - The second version is the improvement of the 1<sup>st</sup> version by using a cross entropy function as cost function and also adding regularization techniques. We also added the evaluation of validation data which was not performed in previous version