

Project Report: Sudoku Solver - Winter In Data Science

Week 1: Introduction to Google Colab and Python Basics

In the first week, the focus was on familiarizing participants with Google Colab and reinforcing Python programming skills. The introductory material covered the basics of Google Colab, connecting to Google Drive, and essential Python concepts. The participants were directed to tutorials and resources for hands-on tasks involving image processing using OpenCV.

Hands-On Task: Polygon Counting

Participants were given an image (1670993283171.jpg) containing various polygons, and they were instructed to use OpenCV techniques learned during the week to count the number of polygons with different numbers of sides. The task emphasized the application of contour detection and approximation.

Week 2: Basics of Neural Networks and CNNs

The second week delved into the fundamentals of neural networks and convolutional neural networks (CNNs). Participants were guided through online tutorials and courses covering the basics of neural networks and deep learning, as well as CNNs. Practical tasks included image classification using neural networks on the MNIST dataset.

Hands-On Tasks: Image Classification with TensorFlow

Two hands-on tasks were assigned, focusing on image classification using neural networks and CNNs on the MNIST dataset. Participants were directed to tutorials for implementing neural networks and CNNs using TensorFlow. An option to explore PyTorch for similar implementations was also provided.

Week 3 & 4: Sudoku Puzzle Extraction and Digit Recognition

The third and fourth weeks were dedicated to the main project tasks: Sudoku puzzle extraction and digit recognition. The step-by-step process involved extracting the Sudoku puzzle from an image, removing grid lines, and recognizing digits using a CNN. Pillows (PIL) library resources were suggested for creating a custom dataset to improve digit recognition.

Hands-On Tasks: Implementing Sudoku Solver and OCR

Participants were instructed to follow a pipeline for Sudoku puzzle extraction using OpenCV. Additionally, they were tasked with implementing digit recognition using a CNN and solving the Sudoku puzzle. Various implementations and resources were provided for reference, including alternative approaches to digit recognition.

Conclusion:

The project aimed to integrate various concepts in image processing, neural networks, and computer vision to develop a Sudoku solver without relying on deep learning or machine learning algorithms. Participants were encouraged to explore alternative solutions, deepen their understanding of CNNs, and apply the knowledge gained throughout the weeks. The report provided a roadmap for participants to follow, combining theoretical learning with practical hands-on tasks to reinforce the concepts covered in each week.