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INFORMATICS INSTITUTE OF TECHNOLOGY

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Gemstone Identification using Image Classification

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Abstract

Gemstone Identification is a complex and time-consuming process that presents a number of challenges. The identification process requires specialized equipment and expertise, which may not be available in all laboratories. Moreover, the identification of similar-looking gemstones poses a significant challenge. Inaccurate identification can lead to serious consequences, such as selling a gem instead of another gem. Furthermore, human errors can occur during the identification process due to a lack of experience, insufficient knowledge, or the presence of similar-looking gemstones. These challenges underscore the need for a modern solution that can make gemstone analysis more efficient and accurate.

The proposed solution is a website that utilizes Convolutional Neural Network in deep learning to improve the accuracy of the classification which classifies 12 types of gemstones accurately. CNN was chosen due to its ability to learn and recognize patterns in images. The network architecture consisted of several layers, including Convolutional Layers, Max Pooling Layers, and Dense Layers. These layers were carefully selected and fine-tuned to achieve the optimal performance of the network.

The result of the system is to design, develop, and test a system that utilizes a Convolutional Neural Network model was trained using a custom dataset of 12 gemstone classes, and several data science metrics were used to ensure the model's accuracy, including precision, recall, and F1-score. The model achieved an impressive overall accuracy of 98% without overfitting, making it a promising solution for automating gemstone classification. This system will be particularly useful for individuals without expertise in identifying gemstones, as well as merchants and gemologists.