shape the intensities of the same Bragg reflection and its Friedel mate, will be recorded in the detector with different values. This is especially significant at low energies.
There are several methods to calculate the coefficient of transmittance over the crystal and its support. Although the theory of this calculation is very well known, so far there is no efficient method to calculate this factor in macromolecular crystallography for low redundancy data. It is also well known that the best methods to calculate this factor take into consideration the shape of the crystal. However, due to several constraints, especially the often tiny size and highly irregular shape of the crystals, it is often difficult to define a crystal shape.
Taking advantage of the standard resources available at all of the ESRF and ILL MX beamlines and following a strong computer vision and 3D reconstruction approach, this project is developing a method to calculate the abortion correction based on the actual crystal and support shape.

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An Image Processing Approach to Diamond Inspection and Evaluation, Moshe Porat, *Department of Electrical Engineering, Technion, Haifa, Israel.*
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Diamonds and other gemstones have always been thought to be the symbol of beauty, however, most of these gemstones still contain small natural inclusions and man-made defects. These defects interfere with the passage of light through the crystal and affect its brilliance and appearance, thereby influencing the quality and value of the crystal. Traditionally, diamond impurities are examined by experts with lens and tongs. Obviously, this kind of manual inspection is subjective and sometimes ends with misleading descriptions due to the varying standards. In addition, such expert-based examination or grading is costly and time consuming [1], [2].
In recent decades, new inspection tools, such as ultrasonic and X-ray, have been introduced to the crystal defects detection effort, however, it requires relatively expensive equipment and still cannot meet the demands. On the other hand, recent developments in image processing and computer vision offer an opportunity to use new tools in the gemstone inspection area, especially for diamonds. Understanding the defect type and other key features of a diamond can also be achieved by applying pattern recognition technology [3]. A computer vision inspection system offers a way to recognize the 3Cs (Clarity, Color, Cut-Style) features of diamonds, which are among the diamond's important 4Cs (adding 'Carat' to the above 3Cs). By applying expert evaluation knowledge, systems can readily grade diamonds. Furthermore, since the type, location and size of the defects are particular to each diamond, this inspection approach provides a means to identify a gemstone according to the feature records in a database, so that diamonds may be recognized and traced for future handling.
We focus on defect detection methodology and capturing major features of the diamond, including the structure and defects type. A new recognition approach is proposed to efficiently extract these features, to record their history, and to grade or classify the information in order to identify a gemstone. This approach includes shape analysis, color representation, pattern matching, spectral analysis, image retrieval and image registration. We investigated the use of wavelets and curvature measurement to approximate a diamond shape, and pattern recognition is used to help match the vertex points; Spectral localized descriptors are used to represent the crystal's shape, modified and normalized to cope with potential geometric transformations of the diamond due to various view points. The unique optical features of a crystal are extracted by computer vision operations, and de-noising tools are applied to remove noise. Similar patterns are retrieved by color and shape. Image registration and similarity measurement are also implemented. The system and its performance are presented along with practical results based on actual diamonds. Our conclusion is that the new approach to diamond inspection and recognition could be very helpful in the field of diamonds and similar gemstones evaluation.

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