1. In a modern high school, Mr. Anderson decided to implement an iris recognition attendance system for his class of 30 students. He obtained consent from the students and collected their iris samples. After training the system, he set up an iris scanner at the classroom entrance. Now, each student's iris scan automatically marked their attendance, streamlining the process, enhancing security, and impressing both students and parents with this innovative solution. How would you go about implementing an iris recognition attendance system for a class of 30 students, ensuring that it is efficient and secure?
2. Imagine you are working in a biometrics research laboratory with access to specialised equipment for iris recognition. Your goal is to develop a system that captures and generates iris codes for both the left and right irises of individuals and then calculates the Hamming distance between them. Now, it's time to put your knowledge into practice. Can you implement this system, detailing the practical steps and considerations required for its successful operation?
3. In a research setting dedicated to advancing iris recognition technology, you're given the task of using the Iris Integral Differential operator to perform iris segmentation. Your mission is to compare the performance of this technique on an eye image captured under natural lighting conditions and on an eye image captured using an external source of Near-Infrared (NIR) light. Can you implement iris segmentation in both scenarios, highlighting any differences in the process?
4. In a biometrics research project, you are presented with a dataset of 20 iris images captured at different sizes. Your task is to perform iris normalisation and generate a 512-bit iris code from each of these images. Can you implement the necessary steps involved in this process, demonstrating your expertise in iris recognition and biometric technology?
5. In a tech workshop focused on image processing, you are tasked with an intriguing project. You have access to left and right eye images from 15 individuals. Your goal is to perform feature-level fusion on both eyes for each person to generate iris codes. Following this, you need to take an eye image of one person from the original 15 and identify the person using rank-level fusion with three different classifiers. Can you guide us through the step-by-step implementation of feature-level and rank-level fusion, demonstrating the potential of this approach for accurate identification?
6. Imagine you're in a technology lab where you've been assigned an intriguing task. You have an eye image at your disposal. Your challenge is to use the Geodesic Active Contour (GAC) method for iris segmentation. Additionally, you need to visualise the iris in both pseudo-polar and Cartesian coordinates, with the conversion carried out according to Daugman's rubber sheet model. Can you walk us through the steps involved in GAC-based iris segmentation and the conversion process, demonstrating the practical application of this technique?
7. In a technology innovation lab, you have an exciting project ahead. You're tasked with implementing a feature-level fusion system that combines a person's fingerprint, iris, and face data for enhanced biometric authentication. Can you demonstrate the practical implementation of this system, showcasing how it effectively improves security and authentication in real-world applications?
8. In an advanced computer vision project, your challenge is to work with facial data captured from three different angles. Your task is to create a combined face image that integrates the information from these three captures, resulting in a comprehensive facial representation. Additionally, you're asked to generate a 3D image in RGB format, which will provide a multi-dimensional view of the individual's face. Can you demonstrate the implementation of this process, showcasing the practical applications of such a composite facial image and a 3D representation in various fields like facial recognition and virtual reality?
9. In a biometrics research scenario, you have access to two fingerprints from the same person and the same finger. Your objective is to integrate the information from these fingerprints through both sensor level fusion and feature level fusion. Following this integration, you are required to calculate the Hamming distance between the output obtained from feature level fusion and the features acquired from the output of sensor level fusion. Can you demonstrate how to practically implement sensor level and feature level fusion for these fingerprints and calculate the Hamming distance, highlighting the significance of this biometric analysis?
10. In a biometrics study, you have access to four fingerprints from both the left and right hands of an individual. Your task is to perform feature-level fusion separately for the left and right hand fingerprints. After integrating the features for each hand, you need to calculate the Hamming distance between the resulting feature sets for both hands. Can you demonstrate how to implement feature-level fusion for the left and right hand fingerprints and then calculate the Hamming distance, highlighting the significance of this biometric analysis?