Matching Type Question Exercise - 3

27 minutes left

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PASSAGE

The Facial Recognition Technique

A Humans have always had the innate ability to recognize and distinguish between faces, yet computers only recently have shown the same ability. In the mid-1960s, scientists began work on using the computer to recognize human faces. Since then, facial recognition software has come a long way.

B Identix®, a company based in Minnesota, is one of many developers of facial recognition technology. Its software, FaceIt®, can pick someone's face out of a crowd, extract the face from the rest of the scene and compare it to a database of stored images. In order for this software to work, it has to know how to differentiate between a basic face and the rest of the background. Facial recognition software is based on the ability to recognize a face and then measure the various features of the face. Every face has numerous, distinguishable landmarks, the different peaks, and valleys that make up facial features. FaceIt defines these landmarks as nodal points. Each human face has approximately 80 nodal points. Some of these measured by the software are:

- Distance between the eyes
- Width of the nose
- Depth of the eye sockets
- The shape of the cheekbones
- The length of the jaw line
- These nodal points are measured creating a numerical code, called a faceprint, representing the face in the database.

C In the past, facial recognition software has relied on a 2D image to compare or identify another 2D image from the database. To be effective and accurate, the image captured needed to be of a face that was looking almost directly at the camera, with the little variance of light or facial expression from the image in the database.

D This created quite a problem. In most instances, the images were not taken in a controlled environment. Even the smallest changes in light or orientation could reduce the effectiveness of the system, so they couldn't be matched to any face in the database, leading to a high rate of failure.

E A newly-emerging trend in facial recognition software uses a 3D model, which claims to provide more accuracy. Capturing a real-time 3D image of a person's facial surface, 3D facial recognition uses distinctive features of the face -- where rigid tissue and bone is most apparent, such as the curves of the eye socket, nose, and chin -- to identify the subject. These areas are all unique and don't change over time. Using depth and an axis of measurement that is not affected by lighting, 3D facial recognition can even be used in darkness and has the ability to recognize a subject at different view angles with the potential to recognize up to 90 degrees (a face in profile).

F Using the 3D software, the system goes through a series of steps to verify the identity of an individual.

1. Detection: Acquiring an image can be accomplished by digitally scanning an existing photograph (2D) or by using a video image to acquire a live picture of a subject (3D).
2. Alignment: Once it detects a face, the system determines the head's position, size, and pose. As stated earlier, the subject has the potential to be recognized up to 90 degrees, while with 2D, the head must be turned at least 35 degrees toward the camera.
3. Measurement: The system then measures the curves of the face on a sub-millimeter (or microwave) scale and creates a template.
4. Representation: The system translates the template into a unique code. This coding gives each template a set of numbers to represent the features on a subject's face.
5. Matching: If the image is 3D and the database contains 3D images, then matching will take place without any changes being made to the image.

G However, there is a challenge currently facing databases that are still in 2D images. 3D provides a life, moving variable subject being compared to a flat, stable image. New technology is addressing this challenge. When a 3D image is taken, different points (usually three) are identified. For example, the outside of the eye, the inside of the eye and the tip of the nose will be pulled out and measured. Once those measurements are in place, an algorithm will be applied to the image to convert it to a 2D image. After conversion, the software will then compare the image with the 2D images in the database to find a potential match.

H In verification, an image is matched to only one image in the database (1:1). For example, an image taken of a subject may be matched to an image in the Department of Motor Vehicles database to verify the subject is who he says he is. If identification is the goal, then the image is compared to all images in the database resulting in a score for each potential match (1: N). In this instance, you may take an image and compare it to a database of mug shots to identify who the subject is.

I The image may not always be verified or identified in facial recognition alone. Identix® has created a new product to help with precision. The development of FaceIt®Argus uses skin biometrics, the uniqueness of skin texture, to yield even more accurate results. The process, called Surface Texture Analysis, works much the same way facial recognition does. A picture is taken of a patch of skin, called a skin print. That patch is then broken up into smaller blocks. Using algorithms to turn the patch into a mathematical, measurable space, the system will then distinguish any lines, pores and the actual skin texture. It can identify differences between identical twins, which is not yet possible using facial recognition software alone. According to Identix, by combining facial recognition with surface texture analysis, accurate identification can increase by 20 to 25 percent.

J Identix isn't the only company with facial recognition systems available. While most work the same way FaceIt does, there are some variations. For example, a company called Animetrix, Inc. has a product called FACEngine ID® SetLight that can correct lighting conditions that cannot normally be used, reducing the risk of false matches. Sensible Vision, Inc. has a product that can secure a computer using facial recognition. The computer will only power on and stay accessible as long as the correct user is in front of the screen. Once the user moves out of the line of sight, the computer is automatically secured from other users.

Questions

Questions 1-8 Read the passage and select the correct heading for each paragraph **1-10** from the list of headings provided below:

Q.1 **1) Verification v/s Identification.**

Paragraph A

Q.2 **2) Early Facial Recognition Technique**

Paragraph A

Q.3 **3) The Key to Recognising Faces**

Paragraph A

Q.4 **4) Face Recognition by Skin Texture**

Paragraph A

Q.5 **5) Matching 3D with 2D Imagery**

Paragraph A

Q.6 **6) The Facial Recognition Process**

Paragraph A

Q.7 **7) Benefits of 3D Imaging**

Paragraph A

Q.8 **8) Early Challenges in Facial Recognition**

Paragraph A

Q.9 **9) Features Available in Facial Recognition Tech**

Paragraph A

Questions

Questions 10-14 Read the passage and select the correct product for each function from the list of function provided below:

Q.10 **10) Identify a face in a crowd**

Identix ▾

Q.11 **11) Use skin texture to identify faces.**

Identix ▾

Q.12 **12) Eliminate false matches by correcting light conditions**

Identix ▾

Q.13 **13) Distinguish faces of identical twins**

Identix ▾

Q.14 **14) Convert facial features into computer recognisable nodes**

Identix ▾

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