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EXPERT SYSTEM TO DETECT SKIN DISEASE

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Abstract
Automatic detection of disease patterns in medical images can assist radiologists in image analysis. Automated image analysis can be assisted by incorporating into a program information and knowledge that is available to radiologists. In This paper we discuss about detection of various Skin diseases using Region of Interest Extraction using color.

1. INTRODUCTION

Anatomical features and landmarks are first extracted from the images. This information, together with the structure and regions of the focused area of the body that are stored in a model of the area is used in detecting disease patterns. Rules for recognizing different disease patterns are generated using machine learning. Based on World Health Organization (WHO) report in the 2011 Skin diseases still remain common in many rural communities in developing countries, with serious economic and social consequences as well as health implications. Directly or indirectly, skin diseases are responsible for much disability (and loss of economic potential), disfigurement, and distress due to symptoms such as itching or pain. There are five major symptoms which include blister, itch, scaly skin, fever, and pain in the rash. Dumpster-Shafer[7] theory has been used to quantify the degree of belief, our approach uses Java ROI to combine beliefs under conditions of uncertainty and ignorance, and allows quantitative measurement of the belief and plausibility in our identification result.

1.1 Pattern Recognition

In computer science, the imposition of identity on input data, such as speech, images, or a stream of text, by the recognition and delineation of patterns it contains and their relationships. Stages in pattern recognition may involve measurement of the object to identify distinguishing attributes, extraction of features for the defining attributes, and comparison with known patterns to determine a match or mismatch. Pattern recognition has extensive application in astronomy, medicine, robotics, and remote sensing by satellites and speech recognition.

In machine learning, pattern recognition is the assignment of a label to a given input value. An example of pattern recognition is classification, which attempts to assign each input value to one of a given set of classes (for example, determine whether a given email is "spam" or "non-spam"). However, pattern recognition is a more general problem that encompasses other types of output as well. Other examples are regression, which assigns a real-valued output to each input; sequence labeling, which assigns a class to each member of a sequence of values (for example, part of speech tagging, which assigns a part of speech to each word in an input sentence); and parsing, which assigns a parse tree to an input sentence, describing the syntactic structure of the sentence.

Pattern recognition algorithms generally aim to provide a reasonable answer for all possible inputs and to do "fuzzy" matching of inputs. This is opposed to pattern matching algorithms, which look for exact matches in the input with pre-existing patterns. A common example of a pattern-matching algorithm is regular expression matching, which looks for patterns of a given sort in textual data and is included in the search capabilities of many text editors and word processors. In contrast to pattern recognition, pattern matching is generally not considered a type of machine learning, although pattern-matching algorithms (especially with fairly general, carefully tailored patterns) can sometimes succeed in providing similar-quality output to the sort provided by pattern-recognition algorithms.

1.2 Machine Learning

As a broad subfield of artificial intelligence, machine learning is concerned with the design and development of algorithms and techniques that allow computers to "learn".

Learning means to make changes in a system that enables a system to do the same task more efficiently the next time At a general level, there are two types of learning: inductive, and deductive. Inductive machine learning methods extract rules and patterns out of the massive data sets.

The major focus of machine learning research is to extract information from data automatically, by computational and statistical methods. Hence, machine learning is closely related to data mining and statistics.

Machine Learning is part of Machine Intelligence but addresses a more specialized purpose and scope. Machine learning algorithms and applications adapt themselves to the behavior of a system usually through the discovery of time-varying patterns in the data. These algorithms typically fuse linear and nonlinear regression, adaptive control theory, neural networks, statistical learning theory, rule induction, and decision tree generation. Because of the very close relationship between learning and intelligence, nearly all machine intelligence systems incorporate some form of learning.

Learning denotes changes in a system that enables a system to do the same task more efficiently the next time. Learning works in two ways:

- Supervised
- Unsupervised.

Supervised learning has an objective function (a dependent variable) and uses historical data (called training data) to learn the rules that classify a set of independent variables into the class of the dependent variable.

Unsupervised learning discovers the implicit relationships between collections of data and evolves the rules that describe the changes of behavior in the variables that seem to have the greatest causal impact on other variables. The most common way is Supervised Learning. Learning algorithms can be:

- Static: A static learning algorithm discovers patterns and can make accurate predictions. In static learning algorithm the set of recognized patterns however remains unchanged over time (as the pattern remains unchanged, it is called static learning algorithm).
- Regenerative: A regenerative algorithm "forgets" its history and re-learns a set of patterns from a new (and often overlapping) set of data.
- Dynamic: A dynamic or adaptive algorithm involves both a continual training mechanism as well as a feedback mechanism that measures its modeling error rate and adjusts its internal controls to move closer and closer to a better and better model.

Machine learning capabilities create applications that are rugged, self-adapting, easier to maintain and often more fault tolerant than conventional systems. An adaptive feedback loop can tailor a system to changes in enterprise policies and make it more resilient. Learning systems also provide the core mechanism for powerful predictive and classification models that fine tune their abilities as they gather more and more experience. Machine learning deals with the issue of how to build programs that improve their performance at some task through experience.

Machine learning algorithms have proven to be of great practical value in a variety of application domains. Not surprisingly, the field of software engineering turns out to be a fertile ground where many software development and maintenance tasks could be formulated as learning problems and approached in terms of learning algorithms. Being able to measure the fault-proneness of software can be a key step towards steering the software testing and improving the effectiveness of the whole process.

2. A Frame Work for Skin Detection

Skin detection process has two phases: a training phase and a detection phase. Training a skin detector involves three basic steps:

1. Collecting a database of skin patches from different images. Such a database typically contains skin-colored patches from a variety of people under different illumination conditions.
2. Choosing a suitable color space.
3. Learning the parameters of a skin classier.

Given a trained skin detector, identifying skin pixels in a given image or video frame involves:

1. Converting the image into the same color space that was used in the training phase.
2. Classifying each pixel using the skin classier to either a skin or non-skin.
3. Typically post processing is needed using morphology to impose spatial homogeneity on the detected regions.

3. Objective:

"Expert system for detection of various Skin diseases using Region of Interest Extraction using color"

3.1 Java ROI

The parent class for representations of a region of interest of an image (currently only single band images with integral data types are supported). This class represents region information in image form, and can thus be used as a fallback where a Shape representation is unavailable. Where possible, subclasses such as ROI Shape are used since they provide a more compact means of storage for large regions.

The getAsShape() method may be called optimistically on any instance of ROI; however, it may return null to indicate that a Shape representation of the ROI is not available. In this case, getAsImage() should be called as a fallback.

Inclusion and exclusion of pixels is defined by a threshold value. Pixel values greater than or equal to the threshold indicate inclusion.

Typically, any image enhancement operation takes place over the entire image. While the image enhancement operation may improve portions of an image, other portions of the image may lose detail. You usually want some way of limiting the enhancement operation to specific regions of the image.

To restrict the image enhancement operations to specific regions of an image, a region-of-interest mask is created. A region of interest (ROI) is conceptually a mask of true or false values. The ROI mask controls which source image pixels are to be processed and which destination pixels are to be recorded.

JAI supports two different types of ROI mask: a Boolean mask and a threshold value. The ROI Shape class uses a Boolean mask, which allows operations to be performed quickly and with compact storage. The ROI class allows the specification of a threshold value; pixel values greater than or equal to the threshold value are included in the ROI. Pixel values less than the threshold are excluded.

The region of interest is usually defined using a ROI Shape, which stores its area using the java.awt. Shape classes. These classes define an area as a geometrical description of its outline. The ROI class stores an area as a single-banded image.

3.2 The ROI Class

The ROI class stores an area as a grayscale (single-banded) image. This class represents region information in image form, and can thus be used as a fallback where a Shape representation is unavailable. Inclusion and exclusion of pixels is defined by a threshold value. Source pixel values greater than or equal to the threshold value indicate inclusion in the ROI and are processed. Pixel values less than the threshold value are excluded from processing.

Where possible, subclasses such as ROI Shape are used since they provide a more compact means of storage for large regions.

3.3 Determining the ROI Bounds

The *getBounds* methods in the ROI class read the bounds of the ROI, as either a Rectangle or a Rectangle2D.

3.4 Determining if an Area Lies Within or Intersects the ROI

The *contains* methods in the ROI class test whether a given point or rectangular region lie within the ROI. The *intersects* methods test whether a given rectangular region intersect with the ROI.

4. Skin Detection Applications and Examples

Human face localization and detection is the first step in obtaining face biometrics. Skin color is a distinguishing feature of human faces. In a controlled background environment, skin detection can be sufficient to locate faces in images. As color processing is much faster than processing other facial features, it can be used as a preliminary process for other face detection techniques . Skin detection has also been used to locate body limbs, such as hands, as a part of hand segmentation and tracking systems,

Forsyth and Fleck demonstrated that skin filter can be used as part of the detection process of images with naked or scantily dressed people. Their technique has three steps. First, a skin filter, based on color and texture, was used to select images with large areas of skin-

5. CONCLUSION

.In this paper we have summarized some of them including our own work Apply ROI technique of image library. Fetch image from the database and put in other image buffer.

Apply ROI on that image buffer. Compare the two and analyze the result.

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