



A Review of Determination and analysis of arthritis using digital image processing

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Abstract— A frequent illness that affects your joints is arthritis. It may result in pain and inflammation, making it challenging to move or continue being active. This may occasionally result in chronic illness and disability. MRI scans of the knee were examined in this investigation. The volume or thickness of the knee cartilage must be estimated in order to diagnose arthritis. The image is preprocessed by creating B-Splines before segmentation. After that, the edges are refined using canny and log edge detectors. Finally, the distance between the edges is calculated to measure cartilage thickness. The thickness is determined by counting the pixels between edges. The thickness value is then used to determine the abnormalities of the arthritis. This is quick and easy approach to evaluate if you have arthritis depending on the thickness of your cartilage.

Index Terms: Arthritis B-Spline, Anisotropic diffusion, Articular-cartilage

I. INTRODUCTION

Soft tissues support and cushion joints, preventing your bones from rubbing against one another. A crucial component is a connective tissue known as articular cartilage. Your joints can move pain-free and without friction with its assistance. A synovial membrane, a cushioned fluid pocket that lubricates the joints, is present in some joints. Tendons and ligaments provide support for a number of joints, including your knees. While ligaments link bones to other bones, tendons link muscles to your bones. The umbrella word "arthritis" covers more than 100 distinct joint disorders. The most prevalent forms of arthritis consist of Osteoarthritis, Ankylosing spondylitis, Juvenile arthritis, Gout, Psoriatic arthritis, Rheumatoid arthritis.

A. DEFINITION

Arthritis is a common disorder that affects your joints. It can cause pain and inflammation, making it difficult to move or stay active. This may sometimes lead to disability and chronic ill-health.

B. PROBLEM

Arthritis may be difficult to diagnose. Arthritis comes in more than 100 different forms. The various ailments that affect the joints share a lot of symptoms. Degenerative arthritis, inflammatory arthritis, metabolic arthritis, and infectious arthritis are the four main types of arthritis. The most prevalent kind is osteoarthritis, commonly referred to as degenerative arthritis. Other, more prevalent kinds include gout and rheumatoid arthritis. A medical professional might need to: in order to deliver an accurate diagnosis:

C. SOLUTION

Input Image: Image acquisition is the first and prominent step in the Image Processing. Image quality can be defined as the attribute of the image that influences the clinician's certainty to perceive the appropriate diagnostic features from the image visually. **Selecting Control Points:** Control points selector is a toolbox in image processing. The toolbox includes an interactive tool that enables you to specify control points in the images you want to register. The tool displays the images side by side. **B-Spline Output:** In Image Processing, computer-aided design and computer graphics, spline functions are constructed as linear combinations of B-splines with a set of control points.

Anisotropic Diffusion Algorithm: In image processing and computer vision, anisotropic diffusion, also called Perona–Malik diffusion, is a technique aiming at reducing image noise without removing significant parts of the image content, typically edges, lines or other details that are important for the interpretation of the image. **Canny Edge Detection:** The Canny edge detector is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images. **Log edge detection:** The Laplacian is often applied to an image that has first been smoothed with something



approximating a Gaussian smoothing filter in order to reduce its sensitivity to noise, and hence the two variants will be described together here. **Control Point Adjustment:** There are three ways of modifying the shape of a curve, namely modifying control points, modifying knots, and modifying the weights of control points. The first works for all four types of curves, the second can be applied to B-spline and NURBS curves, and the third can be used with rational Bézier and NURBS curves. **Thresholding:** Thresholding is a type of image segmentation, where we change the pixels of an image to make the image easier to analyse.

II. OBJECTIVES

Using image processing techniques such as anisotropic diffusion, b-spline, cannon edge detection, log edge detection, and control point adjustment, the thickness and state of arthritis are detected.

III. RESEARCH METHODOLOGY

Acquisition of image: Own photos can be acquired and used to test algorithms, which has the benefit of allowing the algorithm to adjust to the properties of the acquired photographs.

Edge detection technique: Edge detection is a method of image processing used to locate areas in a digital image with sharp changes in brightness, or, to put it another way, discontinuities. The edges (or boundaries) of the image are those regions where the brightness of the image fluctuates dramatically.

IV. SCOPE OF THE PROJECT

In this project, we use image processing to determine whether a person has arthritis or not. Although we are now using human thresholding, there is potential for automated thresholding in the future for improved outcomes and less processing time. In the future, artificial intelligence algorithms could be used to determine diseases more accurately.

The output size won't be reduced.

BENEFITS

- There was no significant information loss, particularly at the margins of the input image. unable to detect noise.
- Real-time response is simple to build. takes very little time.
- It responds quickly, provides accurate localization, and is unaffected by background noise. edges and their orientations are easily discernible.
- results are accurate when given.

V. CONCLUSION

The analysis and determination of the arthritic illness are aided by the visualisation of quantitative results. The technique achieves the goal of early arthritis detection based on cartilage thickness in a straightforward and effective manner. By using an automatic threshold selection method, this algorithm can be made much better. This method can also be used to measure the distance between the tibia and femur in the knee for a more precise diagnosis of arthritis.

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