The paper titled "Computerised Image Processing and Pattern Recognition by Using Machine Algorithms" delves into the world of digital image processing and its wide-ranging applications, with a primary focus on the field of pattern recognition. Here is an extended summary of the paper, providing more information on each section:

Introduction:
- The paper commences by introducing the concept of digital image processing, which encompasses the use of computer algorithms to manipulate digital images. It underlines the advantages of digital image processing over analog methods, including the ability to apply a broader range of algorithms and the avoidance of issues like noise buildup and signal distortion during processing.
- The paper emphasizes that digital image editing is one of the most common forms of digital image processing, demonstrating its relevance and prevalence.

Key Concepts:
- The authors provide key definitions, starting with an image defined as a two-dimensional function (x, y) with spatial (plane) coordinates, where the intensity or gray level at any point (x, y) is the image's intensity at that location.
- They distinguish between analog images, which can be mathematically represented as a continuous range of values representing position and intensity, and digital images, which are constrained both in spatial coordinates and allowed intensities.
- The paper highlights the term "pixel" as the most commonly used term to denote the elements of a digital image, emphasizing its fundamental role.

Origins of Digital Image Processing:
- The historical context of digital image processing is explored, tracing back to its early applications in the newspaper industry, where images were transmitted via submarine cables. The introduction of the Bart lane cable picture transmission system significantly reduced the time required to transport images across the Atlantic.
- The paper outlines key advancements that paved the way for the use of computers in digital image processing, such as the invention of the transistor, the development of high-level programming languages like COBOL and FORTRAN, and the creation of integrated circuits (IC).
- The invention of the microprocessor and the progressive miniaturization of components were key developments in this field.
- Concurrently, developments in mass storage and display systems, essential for digital image processing, were also underway.

Active Application Areas:
- The paper delves into specific application areas of digital image processing, including gamma-ray imaging, which plays a major role in nuclear medicine and astronomical observations. It describes how gamma rays emitted by radioactive isotopes are collected by detectors to create images.
- X-ray imaging is another area explored, commonly used in medical diagnostics and extensively in industry and astronomy.

- Imaging in the ultraviolet band is discussed, highlighting its diverse applications, from lithography and industrial inspection to biological imaging and astronomy.
- Imaging in the visible and infrared bands is given special attention due to its wide scope of application.
- The paper also touches on the use of digital image processing in geographic information systems, where techniques are used for satellite imagery manipulation, terrain classification, meteorology, weather observation, and prediction.

Fundamental Steps in Digital Image Processing:
- The authors elaborate on the fundamental steps involved in digital image processing. These steps include image digitization, image classification, noise reduction, image enhancement, image restoration, compression, morphological processing, segmentation, and representation and description.

Components of an Image Processing System:
- The paper provides an insight into the components of a typical image processing system. These include physical devices for image sensing and digitization, computer hardware, specialized software modules for specific tasks, mass storage capabilities, hardcopy devices for recording images, and networking components. The authors emphasize the importance of networking in image transmission due to the large data volume inherent in image processing applications.

Application Areas of Image Processing:
- The authors present an extensive list of application areas where digital image processing is applied. These include television, signal processing, satellite image processing, medical image processing, and more.
- Pattern recognition is identified as a critical subfield of image processing. Commercial applications range from automated speech recognition and fingerprint identification to optical character recognition, DNA sequence identification, and printed text analysis.

Conclusion:
- The paper concludes by underscoring the significance of digital image processing in contemporary technology, noting that its applications go beyond aesthetics, extending to various domains.
- It emphasizes the importance of pattern recognition and its role in critical areas such as medical diagnosis, machine diagnostics, and industrial inspection.

In summary, the paper provides an in-depth exploration of digital image processing, tracing its historical evolution, explaining fundamental concepts, and demonstrating its broad range of applications. The emphasis on pattern recognition underscores its crucial role in diverse fields.
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