Edge Detection and Image Processing

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Abstract

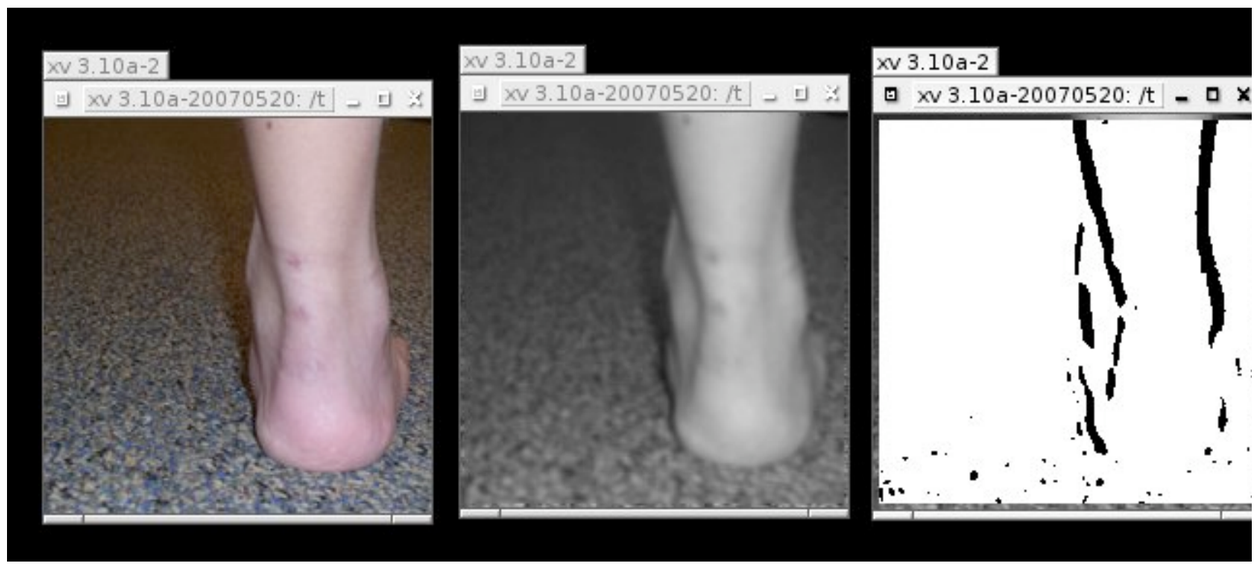
The biomechanical features of a runner in an image can be analyzed by using certain image processing techniques, the primary method being edge detection. By constructing an accurate, two-dimensional model of a runner's lower body from a rear angle, it is possible to extrapolate the underlying qualities of that runner's biomechanics.

Background

The most common runner injures can be remedied by prescribing the right type of shoe, which cannot be done unless certain biomechanical aspects of the runner can be determined. This project will focus on determining the degree of pronation associated with a given runner's biomechanics.

Methods

To get a two-dimensional model for a runner's lower body, an edge detection algorithm must determine the outline of the foot and lower leg. Once an accurate outline has been constructed, the ankle and lower leg, as determined by the position of the lower fibula, are separately analyzed. The alignment of the two parts are compared, giving an accurate estimation as to the degree of pronation in the given leg.



The edge detection process is the most important step in creating the two-dimensional model. It is imperative to that only the human leg is depicted in the model. Thus, it is necessary to eliminate outside edges and lines in the edge detection process. Flat edge detection, simply looking for raw differences in pixel brightness, does not work in this situation. Consider the photo to the left, which shows how noise can confuse a flat edge detection algorithm into thinking detecting a false edge.