An Image Processing Based Approach for Assessing Wheelchair Cushions

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Abstract : Wheelchair users spend long hours in a sitting position, and selecting the right cushion is highly critical in preventing pressure ulcers in that demographic. Pressure mapping systems (PMS) are typically used in clinical settings by therapists to identify the sitting profile and pressure points in the sitting area to select the cushion that fits the best for the users. A PMS is a flexible mat composed of arrays of distributed networks of flexible sensors. The output of the PMS systems is a color-coded image that shows the intensity of the pressure concentration. Therapists use the PMS images to compare different cushions fit for each user. This process is highly subjective and requires good visual memory for the best outcome. This paper aims to develop an image processing technique to analyze the images of PMS and provide an objective measure to assess the cushions based on their pressure distribution mappings. In this paper, we first reviewed the skeletal anatomy of the human sitting area and its relation to the PMS image. This knowledge is then used to identify the important features that must be considered in image processing. We then developed an algorithm based on those features to analyze the images and rank them according to their fit to the users' needs.

Keywords : dynamic cushion, image processing, pressure mapping system, wheelchair
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