

An automatic anatomy-based method for verifying the position of the patient during radiotherapy by continuously generating digitally reconstructed radiographs (DRR) and comparing them to lateral and anterior-posterior portal images is presented. Translation and rotation errors are quantified using a Fast-Fourier transform implementation of Pearson's correlation coefficient (PCC). The PCC algorithm is robust, independent of scaling in image amplitudes and does not require any anatomy identification or point pair selections in the portal and DRR images. Our method requires the user to select a feature for matching in the DRR, which is then compared throughout the portal image, providing a correlation value at each position. The method was first tested using DRR-to-DRR matching to reveal any deviations in our program using an ideal setup. Translation and rotation errors were introduced in the DRR test image and the program had no difficulty determining the parameters necessary to yield a matching DRR. No deviations from the correct position were encountered with this setup, thus assuring us of the robustness and high level of possible accuracy of this algorithm. DRR-to-portal matching shows that the program is able to match the DRR search mask with the portal image to within 0 to 10 pixels from the correct position. Its accuracy is dependent of the portal image's pixel size and its success rate is reliant on the visibility of the selected matching feature in the portal image. Results of accuracy and success rate will be discussed.