

A PORTABLE SYSTEM AND METHOD FOR 3-DIMENSIONAL SURGERY PLANNING USING CONVENTIONAL 2-DIMENSIONAL X-RAY IMAGES

The technology provides a method for obtaining a 3-dimensional image using at least one conventional 2-dimensional x-ray image. Said method comprising the steps of:

- Acquiring at least an x-ray image of a bone of interest;
- Determining camera model, of said acquired at least an x-ray image, using known parameters to at least determine spatial values of source and to determine at least one spatial value of bone;
- Extracting a contour of said bone from said image, said contour comprising distinct anatomical regions;
- Identifying anatomical values in terms of 2-dimensional anatomical values from said extracted distinct anatomical regions of said contour;
- Importing a pre-created 3-dimensional template corresponding to said bone along with pre-determined anatomical values and pre-determined anatomical values;
- Extracting silhouette vertices of said pre-created 3-dimensional template and their projections, for each silhouette vertex projection, according to said camera model and default initial alignment of said pre-created 3-dimensional template;
- Aligning said pre-created 3-dimensional template of said bone with respect to said input x-ray image using a pre-determined method;
- Projecting said pre-created 3-dimensional template on to said acquired image plane, using said camera model, to obtain a 2-dimensional projection model;
- Modifying said aligned template to match said identified 2-dimensional values using at least an anatomical value from said image to 2-dimensional projection of corresponding identified anatomical values of said pre-created 3-dimensional template;
- Determining a best matching point on said extracted contour, for each of said extracted silhouette vertex projection, for 2-dimensional to 2-dimensional correspondence, of silhouette vertex projection and said extracted contour;
- Back-projecting each of said best matching points according to said camera model to form a back projected ray, said ray being formed by said source and said best matching point;
- Determining a target position, said target position being a position, on each of said back projected rays, that is closest to a corresponding silhouette vertex; and
- Deforming said pre-created 3-dimensional template such that said extracted silhouette vertices achieve positions of their corresponding target positions in order to obtain a 3-dimensional reconstructed image.