Comparative study of 2D image reconstruction in X-Rays Tomography by analytical and iterative methods

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Abstract : Tomography is a technique for 2D and 3D image reconstruction of objects. It is based on taking projections according to several rotation angles of the object. These can be used to acquire information on the 3D volume of the object. In a great number of image reconstruction problems, an integral equation of the first kind (equation of convolution) has to be solved, which is an ill posed inverse problem. There are several mathematical methods for solving the image reconstruction problem: analytical and iterative methods. The analytical approach is presented in this work by the Filtered back Projection method (FBP). This approach is largely used and has the advantage of being fast. The second approach is based on a numerical method, which aims to obtain a solution close to the ideal one. In this work, we chose an iterative method using Least Squares algorithm with positivity constraint. A comparative study is made in order to examine the results of the two algorithms on synthetic 2D images and real 2D images taken by an X-rays radioscope

Keywords : Tomography, 2D, image reconstruction