Introduction

MRI has become one of the most widely used imaging modalities because of its capacity to produce high-resolution images of soft tissue contrast. However, MRI suffers from geometric distortions arising from gradient non-linearity, $B_0$ inhomogeneity, chemical shift, the magnetic susceptibility and eddy currents [1, 2]. These distortions can lead to pixel shift in acquired images [3, 4]. Our work is to eliminate the geometric distortions caused by gradient non-linearity. The basic idea is obtaining the uncorrected images using a cube phantom, and calculating correct position of all control points. Finally, BP neural network was used to train data sets.

Purpose

The purpose of this study is to develop a post-image processing method to correct the geometric distortions due to gradient non-linearity.

Materials and Method

A cube phantom is used to acquire MRI data sets, characterizing the scanner distortion, Figure 1a,1b. All MRI images of this study were acquired on a 1.5T whole body scanner (Superscan-1.5T, XGY, China). Parameters of experiments are as follows:

- Pulse sequence: SE pulse sequence with TR=630ms, TE=10ms
- Image matrix: 512*512
- FOV: 512*512
- Phantom size: 375mm*375mm*158mm

Results & Conclusion

A new distorted image was used to test the validity of correction model. In order to obtain the final corrected image, bilinear interpolation was used for interpolating the image intensity. The distortion was almost eliminated, especially near edges, Fig.5. This method is based on phantom images and BP neural network instead of the analytical expressions so that it can eliminate the distortion due to both gradient non-linearity and other causes.

Reference