Abstract— Image registration is the process of matching the coordinate systems of two or more images. Medical image registration has been used in a variety of applications such as segmentation, motion tracking and etc. Recently, the use of deep neural networks has been demonstrated as a useful approach to registration problems. In this article, we propose two separate novel Convolutional Neural Network (CNN) architectures for multi-modal rigid and affine registration of the CT-MRI images of the brain. A dataset consisting of CT-MRI images of 37 subjects was used for training and evaluation of the networks. For both networks, the proposed models achieved high mutual information value between predicted CT images and their corresponding MRIs and a mean dice score of 0.984 for rigid registration.