Here we investigate the application of convolutional neural networks (CNNs) to predict the survival time of patients with Glioblastoma Multiforme (GBM) brain tumor. Our dataset consists of T1-weighted high-resolution MRI images of just 68 GBM patients. We compare two analytic methods for predicting survival time. The first consists of training a small convolutional neural network (CNN) and the second uses extracted deep features from a pre-trained CNN. Our method is completely automated, except for tumor region segmentation. In addition, we utilize a snapshot ensemble approach to boost test accuracy when dealing with limited availability of medical images for CNN training purposes. Our approach achieves an accuracy of 72.06% using a trained small network and 66.18% using a pre-trained deep CNN. Our results compare favorably with the accuracy of 54.41% using histogram of oriented gradients (HOG) features and a non-neural network classifier.