

ABSTRACT

A brain tumor is the growth of abnormal cells or masses of tissue within the brain. Medical imaging for brain tumor patients in Indonesia is still not affordable for some patients due to the high cost of technology. The development of ECVT (Electrical Capacitance Volume Tomography) is one of the solutions in medical imaging tools. ECVT can detect brain tumors by depicting brain activity volumetrically and 3D in real-time without exposure to radiation. The image reconstruction process in brain tumor imaging involves the normalization of capacitance data before it becomes an image. This is an important process in medical imaging applications to improve accuracy, such as brain tumor detection for effective diagnosis and treatment. In this research, we compare the Exponential Moving Average (EMA), Traditional Moving Average (TMA), and Weighted Moving Average (WMA) through simulation. In this research, the Exponential Moving Average (EMA) method was proven to be the most effective for normalizing ECVT capacitance data compared to Triple Moving Average (TMA) and Weighted Moving Average (WMA). The correlation test results show the EMA with the highest value of 0.594. In the Error Index (IE) test, the EMA has the lowest value of 0.656, and the RMSE test shows the lowest error value for the EMA of 0.83. In addition, the standard deviation of the EMA method shows the distribution of data that is closest to the average. Thus, EMA reduces variability and improves prediction accuracy and image stability, although a sampling time interval of 10 may not be optimal for capturing image dynamics.

Keywords: Brain, ECVT, Moving average, Normalization.