Blood-Brain Barrier (BBB) is a membrane in the blood vessels of the brain that functions to protect the central nervous system from foreign substances in the blood that are potentially harmful and not needed by the brain while inhibiting drug transport to the brain, making the membrane very difficult to penetrate by drug compounds. Currently, the measurement of BBB penetration is carried out with an in vivo approach, but it requires large costs, complex operations, and long time. An alternative method that can be implemented is in silico because it is able to quickly and reliably predict BBB permeability using the currently popular method of machine learning implementation. The aim of this study is to develop a predictive model of BBB penetration of drug candidates using an Artificial Neural Network (ANN) model optimized by the Sine Cosine Algorithm (SCA). Based on the results, the best ANN model was obtained with 4 hidden layers, ReLU activation, and Adam optimizer, resulting the accuracy value and F1-score value at 0.89 and 0.75 respectively.