**Highlights:**

- A new optimizer was introduced to reduce loss in deep learning models from a kinematic point of view.

- To evaluate the performance of the proposed algorithm, VGG16 and VGG19 architectures and MNIST, Fashion-MNIST, CIFAR-10, and CIFAR-100 datasets were used in the high level API of TensorFlow, Keras.

- To compare the proposed algorithm with common optimizers, the performance of Adam and RMSProp on the same dataset and architecture was investigated.

- The results showed that the performance of the proposed algorithm is more stable than Adam and RMSProp.

- As the number of the output classes of the model increases, for example in the CIFAR-100 dataset, the Gravity performs better than others.