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presents

Deep Computation Models for Big Data Feature Learning

by

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Feature learning is a fundamental topic in big data analytic and mining. Many challenges are posed on feature learning by the characteristics of big data: volume, variety, and velocity, which refer to large scale of data, different types of data, and the speed of streaming data, respectively. Aiming at these challenges, deep computation models are developed for big data feature learning. First, a basic deep computation model is designed for learning the features of heterogeneous data by extending the deep learning model for the vector space to the tensor space. Furthermore, an incremental deep computation model with two incremental tensor auto-encoders is proposed for real-time feature learning on big data. Finally, a privacy preserving deep computation model is introduced to improve the efficiency for training the parameters of the deep computation model by employing cloud servers. In this scheme, a secure high-order back-propagation algorithm by combining with the full homomorphic encryption, BGV, is presented to protect the private data when performing the deep computation model on cloud. Some experimental results show that the developed deep computation models can learn features for big data effectively and efficiently. More importantly, the last scheme is highly scalable by employing more cloud servers, which is particularly suitable big data.