

Current Hot Issues in Radiology

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## **ABC of Machine Learning**

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Machine learning can be defined as the systematic study of algorithms and systems that improve their knowledge or performance with experience. It represents a set of methods and techniques developed recently in various fields such as computational statistics, pattern recognition, and artificial neural network, etc. In the era of so called artificial intelligence and big data, it is becoming more important for radiologists to understand the basics of machine learning.

Three main components of machine learning are tasks, models, and features. A task refers to the problem we want to solve. A task could be roughly classified as supervised learning and unsupervised learning. We solve the problems with models generated by learning algorithms. In a collective sense, three common models include geometric, probabilistic, and logical models. A feature can be defined as an individual measurable property of a phenomenon being observed. Several representative machine learning algorithms with a relevant example will be presented.

Deep learning uses a cascade of multiple layers of nonlinear processing units for feature extraction and transformation. The basic principle of convolutional neural network, which is commonly used in deep learning algorithms, will also be discussed.

**Keywords :** Machine learning, Deep learning