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DEEP LEARNING ALGORITHMS

Jo'rayev Muhammadjon Durbekòǵli

Andijan State University

ANNOTATION

Deep learning has gained massive popularity in scientific computing, and its algorithms are widely used by industries that solve complex problems. All deep learning algorithms use different types of neural networks to perform specific tasks.

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Deep learninguses artificial neural networks to perform sophisticated computations on large amounts of data. It is atype of machine learning that works based on the structure and function of the human brain.

Deep learning algorithms train machines by learning from examples. Industries such as health care, eCommerce, entertainment, and advertising commonly use deep learning.

While deep learning algorithms feature self-learning representations, they depend upon ANNs that mirror the way the brain computes information. During the training process, algorithms use unknown elements in the input distribution to extract features, group objects, and discover useful data patterns. Much like training machines for self-learning, this occurs at multiple levels, using the algorithms to build the models.

Deep learning models make use of severalalgorithms.While no one network is considered perfect, some algorithms are better suited to perform specific tasks. To choose the right ones, it’s good to gain a solid understanding of all primary algorithms.

Here is the list of top 10 most popular deep learning algorithms:

1. ConvolutionalNeuralNetworks (CNNs)
2. Long Short Term Memory Networks (LSTMs)
3. RecurrentNeuralNetworks (RNNs)
4. GenerativeAdversarialNetworks (GANs)
5. Radial Basis Function Networks (RBFNs)
6. MultilayerPerceptrons (MLPs)
7. SelfOrganizingMaps (SOMs)
8. DeepBeliefNetworks (DBNs)

9. RestrictedBoltzmannMachines(RBMs)
10. Autoencoders

Deep learning algorithms work with almost any kind of data and require large amounts of computing power and information to solve complicated issues. Now, let us, deep-dive, into the top 10 deep learning algorithms.

GANsare generative deep learning algorithms that create new data instances that resemble the training data. GAN has two components: a generator, which learns to generate fake data, and a discriminator, which learns from that false information.

The usage of GANs has increased over a period of time. They can be used to improve astronomical images and simulate gravitational lensing for dark-matter research. Video game developers use GANs to upscale low-resolution, 2D textures in old video games by recreating them in 4K or higher resolutions via image training.

GANs help generate realistic images and cartoon characters, create photographs of human faces, and render 3D objects.

RBFNs are special types of feedforward neural networks that use radial basis functions as activation functions. They have an input layer, a hidden layer, and an output layer and are mostly used for classification, regression, and time-series prediction.

HowDoRBFNsWork?

- RBFNs perform classification by measuring the input's similarity to examples from the training set.
- RBFNs have an input vector that feeds to the input layer. They have a layer of RBF neurons.
- The function finds the weighted sum of the inputs, and the output layer has one node per category or class of data.
- The neurons in the hidden layer contain the Gaussian transfer functions, which have outputs that are inversely proportional to the distance from the neuron's center.
- The network's output is a linear combination of the input’s radial-basis functions and the neuron’s parameters.
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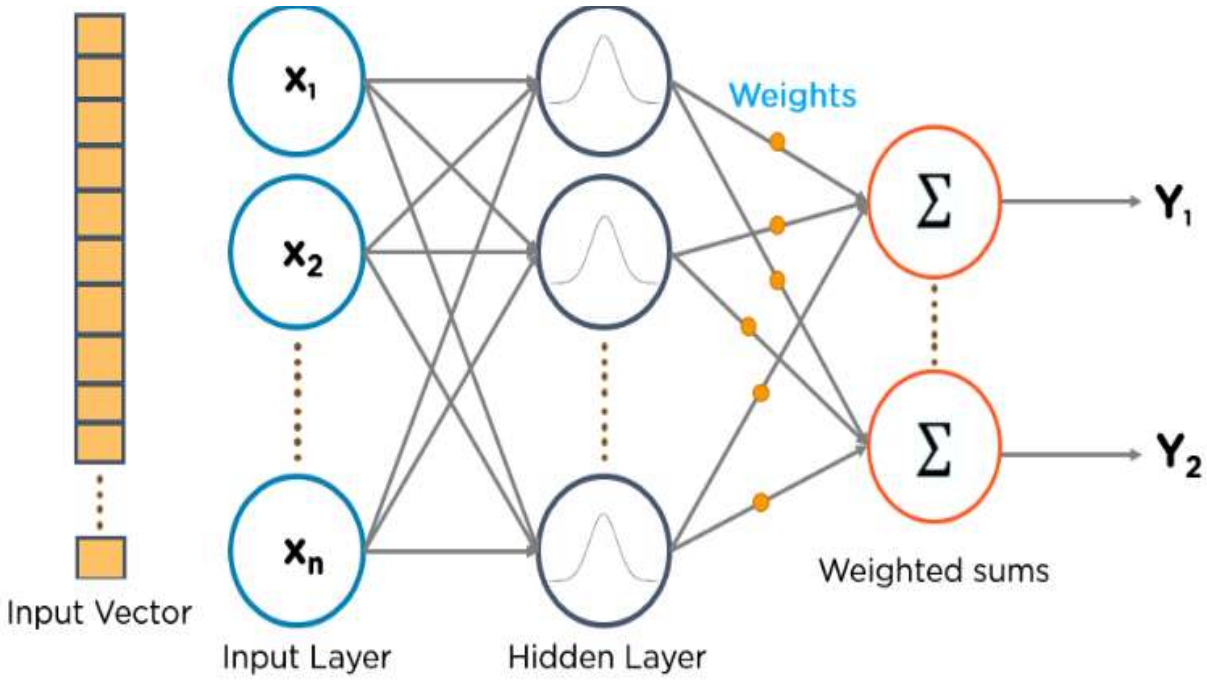
See this example of an RBFN:



Multilayer Perceptrons (MLPs)

MLPs are an excellent place to start learning about deep learning technology.

MLPs belong to the class of feedforward neural networks with multiple layers of perceptrons that have activation functions. MLPs consist of an input layer and an output layer that are fully connected. They have the same number of input and output layers but may have multiple hidden layers and can be used to build speech-recognition, image-recognition, and machine-translation software.

HowDoMLPsWork?

- MLPs feed the data to the input layer of the network. The layers of neurons connect in a graph so that the signal passes in one direction.

- MLPs compute the input with the weights that exist between the input layer and the hidden layers.
- MLPs use activation functions to determine which nodes to fire. Activation functions include ReLUs, sigmoid functions, and tanh.
- MLPs train the model to understand the correlation and learn the dependencies between the independent and the target variables from a training data set.

Below is an example of an MLP. The diagram computes weights and bias and applies suitable activation functions to classify images of cats and dogs.

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