

# Deep Belief Networks (DBNs)

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DBNs are a type of neural network that can be used for unsupervised learning, which means they can learn patterns and relationships in data without being explicitly told what to look for. They're made up of multiple layers of neurons that are connected to each other in a specific way.

The first layer of a DBN is called the input layer, and it's where the data is fed into the network. The next layer is called the hidden layer, and there can be multiple hidden layers in a DBN. Each layer in the network is made up of neurons that have connections to the neurons in the adjacent layers.

During the training process, the DBN tries to learn the underlying patterns and relationships in the data by adjusting the connections between the neurons. This process is done using a technique called unsupervised pre-training, which involves training each layer in the network separately.

Once all the layers have been trained, the DBN can be fine-tuned using supervised learning, which involves adjusting the weights of the connections between the neurons to minimize the error between the predicted outputs and the actual outputs.

DBNs are useful in a wide range of applications, such as image recognition, speech recognition, and natural language processing. For example, they can be used to recognize patterns in images or to classify different types of sounds in speech.

Overall, DBNs are a powerful tool for unsupervised learning that can be used to identify patterns and relationships in complex datasets. They have been applied to many real-world problems and have shown great success in a variety of applications.