A Support Vector Machine (SVM) is a very powerful and versatile Machine Learning model, capable of performing linear or nonlinear classification, regression, and even outlier detection. It is one of the most popular models in Machine Learning, and anyone interested in Machine Learning should have it in their toolbox.

Neural networks process information in a similar way the human brain does. The network is composed of a large number of highly interconnected processing elements(neurons) working in parallel to solve a specific problem. Neural networks learn by example. They cannot be programmed to perform a specific task.

In simplest manner, SVM without kernel is a single neural network neuron but with different cost function. If you add a kernel function, then it is comparable with 2 layer neural nets. First layer is able to project data into some other space and next layer classifies the projected data. If you force to have one more layer then you might ensemble multiple kernel SVMs then it mimics 3 layer NN.  
  
In addition some other SVM and NN combinations exist. For example you might utilize from many layer NN and have the final classification via SVM at the output layer. It is likely to have better classification results compared to normal NN.

Support Vector Machines are often superior to ANNs because they avoid two major weaknesses of ANNs:

(1) ANNs often converge on local minima rather than global minima, meaning that they are essentially "missing the big picture" sometimes (or missing the forest for the trees)

(2) ANNs often overfit if training goes on too long, meaning that for any given pattern, an ANN might start to consider the noise as part of the pattern.

The main disadvantage of the SVM algorithm is that it has several key parameters that need to be set correctly to achieve the best classification results for any given problem. Parameters that may result in an excellent classification accuracy for problem A, may result in a poor classification accuracy for problem B. The user may, therefore, have to experiment with a number of different parameter settings in order to achieve a satisfactory result.

In some cases, SVM might perform better than Neural Networks and in others, Neural Networks are supreme. However, using a combination of both is the optimal solution.