

An introduction to Learning-by-Examples Techniques – Part II: Advances on Support Vector Classification and Support Vector Regression

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Abstract

In the first part (Part I) of the course, it has been shown that there are several reasons that make Learning-by-Examples (LBE) techniques based on Support Vector Machines (SVMs) suitable tools for effectively solving several electromagnetic problems as well as in many other fields of the scientific research. As a matter of fact, SVMs can be trained to solve problems when closed form relationships are either not available or very difficult to determine or when test-and-trial strategies are the only way to address the problem at hand; SVM-based techniques are suitable tools for both identifying the “nature” of the solution (Support Vector Classification - SVC) and/or predicting the solution value (Support Vector Regression - SVR) also when few training examples are available thanks to the SVM generalization capability; SVMs can be exploited to know the output for a new the trial input when either no analytical tools exist or the test of the solution is computationally expensive since a wide number of examples is known; SVMs enable real-time performances because of the off-line training and their implementation in ad-hoc hardware systems embedded on any device. The second part of the course is aimed at providing the attendees an advanced knowledge on SVMs when dealing with the classification problems (nonlinear classification, multi-class classification) as well as the regression ones. Starting from a rigorous mathematical and geometrical description, information and resources for those interested in applying and further exploring SVMs will be given also in comparison with other state-of-the art LBE strategies.

References

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