Protein Classification with Hidden Variables

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For using support vector machines (Fig. 2), a kernel function should be defined a priori. We propose a reasonable way of designing a kernel when objects are generated from latent variable models (e.g. HMM). First of all, a joint kernel is designed for complete variables (i.e. both visible and hidden). Then the hidden variables are marginalized out to give a marginalized kernel for visible variables. Although this framework can be applied to any object, we particularly derive several marginalized kernels useful for biological sequences (Fig. 1).

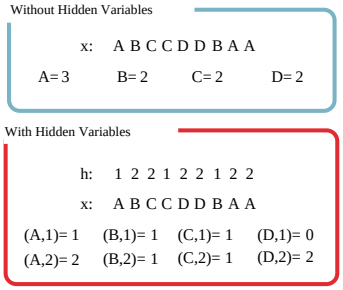

Fig.1 Feature Extraction with or without hidden variablesDioxide

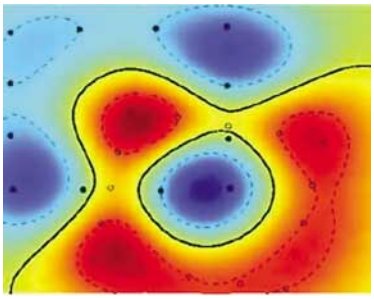

Fig.2 Partitioning a vector space with the support vector machines

Environmental Science & Technology

Development of a Space Maintenance Robot

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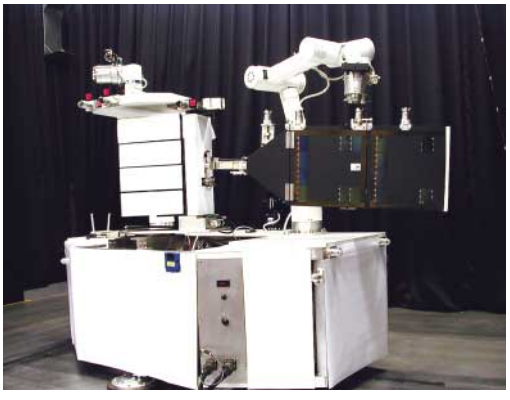
The Space Maintenance Robot is a robotization of space system, which allows the assembly of several micro satellites in orbit, as well as the capture of orbiting satellites for diagnosis, maintenance and supply. Also, it is used for recovering and disposal of satellites at the end of the mission, helping the preservation of the space environment and contributing to the reliability and increasing life span of space infrastructure composed of micro satellites. This multifunctional space robot will provide care from the cradle to the grave for the satellite constellation.



A Space Maintenance Robot on a Test Bed