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   Sommario/riassunto   The purpose of these lecture notes is to provide an introduction to the
                        general theory of empirical risk minimization with an emphasis on
                        excess risk bounds and oracle inequalities in penalized problems. In
                        recent years, there have been new developments in this area motivated
                        by the study of new classes of methods in machine learning such as
                        large margin classification methods (boosting, kernel machines). The
                        main probabilistic tools involved in the analysis of these problems are
                        concentration and deviation inequalities by Talagrand along with other
                        methods of empirical processes theory (symmetrization inequalities,
                        contraction inequality for Rademacher sums, entropy and generic
                        chaining bounds). Sparse recovery based on l_1-type penalization and
                        low rank matrix recovery based on the nuclear norm penalization are
                        other active areas of research, where the main problems can be stated
                        in the framework of penalized empirical risk minimization, and
                        concentration inequalities and empirical processes tools have proved to
                        be very useful.