

Abstract: In this thesis we study the generalized Glivenko-Cantelli theorem and its application in mathematical foundations of machine learning. Firstly, we prove the generalized Glivenko-Cantelli's theorem using covering numbers and lemma of symmetrization. Next we show the uniform law of large numbers. Then, we deal with Vapnik-Chervonenkis classes of functions (VC classes). We show that for VC classes covering numbers are uniformly bounded. Finally, we describe the task of machine learning and give an example of one specific task that can be "learned". The main application will be to prove the fundamental theorem of statistical learning. Usually this theorem is proved for classes of predictors that are Probably Approximately Correct learnable (PAC learnable). In this work we strengthen the property of PAC learnable and for it we prove the basic theorem of statistical learning.