ON THE INTEGRAL SQUARE DEVIATION OF A ONE NONPARAMETRIC ESTIMATOR OF THE BERNOULLI REGRESSION FUNCTION

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Let is given sample Y_j, $j=\overline{1,n}$, $P(Y_j=1\,|\,x_j)=p(x_j)$, $P(Y_j=0\,|\,x_j)=1-p(x_j)$, $x_j=(2j-1)/2n$, where $p(x)$ is unknown Bernoulli regression function. For estimating $p(x)$ is considered kernel type estimator:

$$\hat{p}_n(x)=p_{1n}(x)\cdot p_{2n}^{-1}(x),\quad p_{\nu_n}(x)=\frac{1}{nb_n}\sum_{j=1}^{n}Y_j^{2-\nu}K\left(\frac{x-x_j}{b_n}\right),\ \nu=1,2,$$

where $K(x)$ satisfies certain conditions and $b_n>0$, $b_n\to 0$.

Is solved

P r o b l e m (this problem is exist from 70 years):

$$b_n^{-1/2}(T_n-\Delta)\sigma^{-1}\xrightarrow{d}N(0,1),$$

where

$$T_n=nb_n\int_{\Omega_n}\left[\hat{p}_n(x)-p(x)\right]^2p_{2n}^2(x)\,dx,\quad \Omega_n=[\tau b_n,1-\tau b_n],$$

$$\Delta(p)=\int_0^1\Pi(x)\,dx\int_{|x|\le\tau}K^2(x)\,dx,\quad \Pi(x)=p(x)(1-p(x)),$$

$$\sigma^2(p)=2\int_0^1\Pi^2(x)\,dx\int_{|x|\le 2\tau}K_0^2(x)\,dx,\quad K_0=K*K.$$

The obtained result allows us to construct a criterion for testing Hypothesis $H_0:\ p(x)=p_0(x)$. The question as to its consistency is studied. The power asymptotics of the constructed test is also studeid for Pitmans type of close alternatives.