ON CONTINUOUS CHOICE IN THE DEFINITION OF CONTINUITY

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Abstract. Using a classical theorem of C.H.Dowker on continuous separation of lower and upper semicontinuous functions, we prove the following result: Let (X,d) and (Y,ρ) be metric spaces and suppose that X is locally compact. Then there exists a continuous function $\hat{\delta} : \mathcal{C}(X,Y) \times X \times (0,\infty) \to (0,\infty)$ such that for every $(f,x,\epsilon) \in \mathcal{C}(X,Y) \times X \times (0,\infty)$ and for every $x' \in X$ the following implication holds: $d(x,x') < \hat{\delta}(f,x,\epsilon) \Longrightarrow \rho(f(x),f(x')) < \epsilon$. As a corollary, we obtain that the Cantor theorem on uniform continuity follows from the Weierstrass theorem on boundedness of continuous functions on compacta.

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