The thesis covers the properties of isometric embeddings of metric spaces into the Urysohn universal space U (P.S. Urysohn, 1927) and its generalizations (M. Katětov, 1988). The examination of various metric properties of the space U leads to the question of extendability of the embedding $\varphi\colon M \to U$ from a subspace M of a space P onto an embedding $\Phi\colon P \to U$. We approach to this question in situation $P = M \cup \{p\}$ in finer form. If φ denotes an embedding $M \to U$, let R_φ denotes the set of images of the point p in U under all possible isometric extensions of the embedding φ (we call R_φ the space of realizations). The main objective of this thesis is answering the following question: *Which forms do the spaces R_φ assume, if φ passes all embeddings of the space M into the space U?* Corollary 1 and theorem 3 in the II. part of the thesis metrically characterize the family $\{R_\varphi | \varphi\colon M \to U\}$. We use previous results in part III in order to determine the number of classes of metrically equivalent embeddings of the space M into the space U. As a consequence, we obtain the result of J. Melleray about the homogeneity of the space U.