Abstract

The Cramér-Wold theorem asserts, that every d-dimensional (Borel) probability measure can be characterized by the P-probabilities of all halfspaces (sets of points lying on one side of a given hyperplane). Equivalently, the distribution of each d-dimensional random vector $\mathbf{X}$ is fully described by all distributions of projections $\langle \mathbf{X}, u \rangle$, for u from the unit sphere. The goal of this thesis is a detailed proof of this important theorem, and a discussion on its potential extensions. Do we really need to know all projections $\langle \mathbf{X}, u \rangle$ for each u? Projections in how many directions are necessary to be known to be able to determine a measure P, which assigns to n distinct points masses $1/n$? How does the Cramér-Wold theorem relate to similar results used outside of the probability theory?