# Which hardware can aid clinical experts to support their foot analysis?

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The analysis of feet by clinical experts (podiatrists, orthopedic technicians, orthopedic surgeons) is mainly based on the knowledge they built up over the years. Also the techniques and equipment that are used can vary from expert to expert according to their personal preferences.

To aid the expert in the foot analysis, different measuring equipment is available. In our study, we investigated the following ones: a 3D marker based motion registration system, a force plate, a plantar pressure plate, a dynamic 3D scanner and high speed cameras.

In this first study, we investigated the link between the clinical analyses of the experts and the quantitative measurements of the hardware systems. In a next step we want to know where the hardware can improve the analysis.

Different features are extracted from the quantitative measurements. The experts’ scores are predicted by training an SVM classifier with the features as input and the experts’ scores as output. We used different sets of input features, mimicking the fact that we use different subsets of hardware. The SVM’s are tested in a leave-one-out cross-validation. To estimate the robustness, this cross-validation is repeated 10 times on a randomized subset of the full data.

We found that no unique measuring system is perfect for the prediction of all foot characteristics. Sometimes specific hardware is good for the prediction of a characteristic, often a combination of systems is better. For example, the calcaneus in relaxed position and the midfoot pressure are best predicted by a combination of a pressure plate and a marker based motion registration system. If we look at only one system, the motion registration system gives satisfying results for the former characteristic whereas the pressure plate gives best results for the later case.