Efficient detection of the presence of another animate creature has an immense evolutionary significance. Animate motion, however, not only signals the presence of another creature but also carries information about its individual characteristics, actions and intentions. Humans are well able to recognize a good friend by the way he or she moves and an unknown person can easily be classified according to attributes such as gender and age based only on his or her gait patterns.

How is this kind of information encoded in animate motion patterns and how can it be retrieved from them? We present a computational model for the analysis of human gait. This model is used as a tool to analyze animate motion patterns in order to extract diagnostic invariants. It also serves as a model for animate motion perception in the visual system.

Animate motion can be described as a set of feature points (e.g. joints of an articulated body) that change their position in time. The core of the method described here is an algorithm that maps animate motion defined as a set of feature trajectories into a linear space such that linear operations become meaningful. Analogous to methods used to linearize image information (Troje and Vetter, 1998; Vetter and Troje, 1997) linearization of motion data is achieved by dissociating the information into a range-specific part and a domain-specific part (Ramsay and Silverman, 1997). For motion data, the domain-specific part contains information about the timing of the motion, whereas the range-specific part contains information about the position of the features.

The resulting linearized representation allows access to methods from linear statistics and classical pattern recognition that can be used to decode information from the motion patterns. Since the representation is lossless and thus invertible it can also be used to synthesize new, artificial motion patterns with well defined and parameterized features. This not only allows us to generate well-controlled animate motion stimuli for psychophysical and neuroethological investigations but also has applications in computer animation industry.

