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**Title: From the Visual Analysis of Movement to Principled Models of Motivated Movement**

Movement is our only channel to interact and communicate with the environment. Motor actions, as a function of the intended goal and of our internal state, are executed in different fashions. For example, professional athletes tend to reduce their movement variability when competing vs when they are training, although their instruction may be the same. Likewise, we tend to perform more energetic action when the stakes are high or when there is an urgency to attain a specific target (Schmidt et al., 2008), strongly suggesting a fundamental link between the motivational and the motor systems.

State-of-the-art generative models of motor control are capable of finding the correct sequence of muscle activations associated to a specific movement. However, their fundamental shortcoming is that they are disconnected from motivation and emotional phenomena. In a different order or things, recent advances in image processing have proven the distinct possibility of extracting markers of the emotional/motivational state of a subject via algorithms of image analysis.

The ultimate goal of the project here introduced is to relate both perspectives, the model based approach of motor control theory with the model-free approach of image processing, as to established principled connections between the inference methods used to extract motivational/emotional information from gait/movement image analysis and extended models of motor control that could incorporate motor control theory in a principled fashion.

To that end, we propose to perform a set of controlled experiments with healthy human subjects, to record kinematic data and infer their motivational data one the grounds of visual arm movement and gait image analysis. The participant will have to make reaching and pointing movements from first dot on the screen to the next by sliding his/her index finger onto a tablet, or to perform stereotypical walking movements in a controlled fashion. Movements are performed in exchange for a score. In a covered fashion, a careful analysis of their movements should allow us to establish not only whether and how motivation and effort are constraints for their motor responses, but would also to provide a quantitative understanding of whether the laws of motor control also apply.