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Dynamic Motion Primitives

Research and Development Project

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Introduction

- Need for motion planning and motion policies
- Learning a motion from demonstration (*LfD*)
- Dynamic Motion Primitives

Formulation of DMP

$$\tau \dot{z} = \alpha_z(\beta_z(g - y) - z) + f(x) \tag{1}$$

$$\tau \dot{y} = z \tag{2}$$

$$f(x) = \frac{\sum_{i=1}^{N} \psi_i(x) w_i}{\sum_{i=1}^{N} \psi_i(x)} x(g - y_0) \tag{3}$$

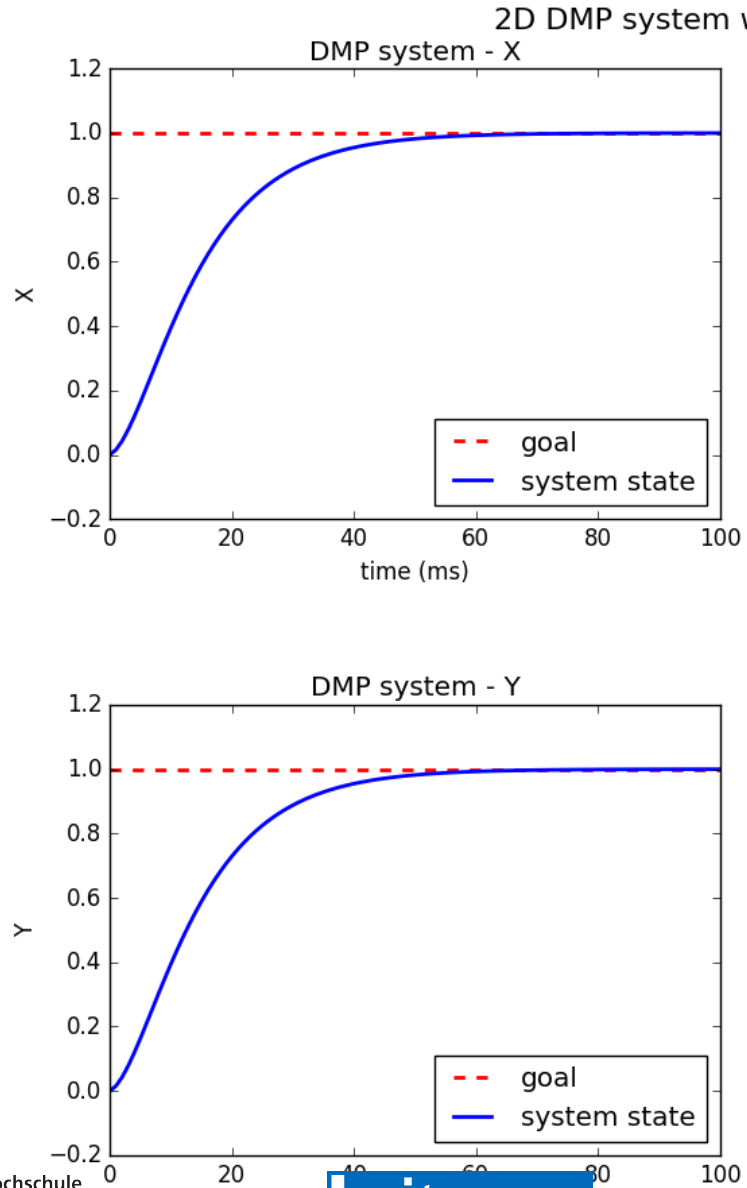
where,

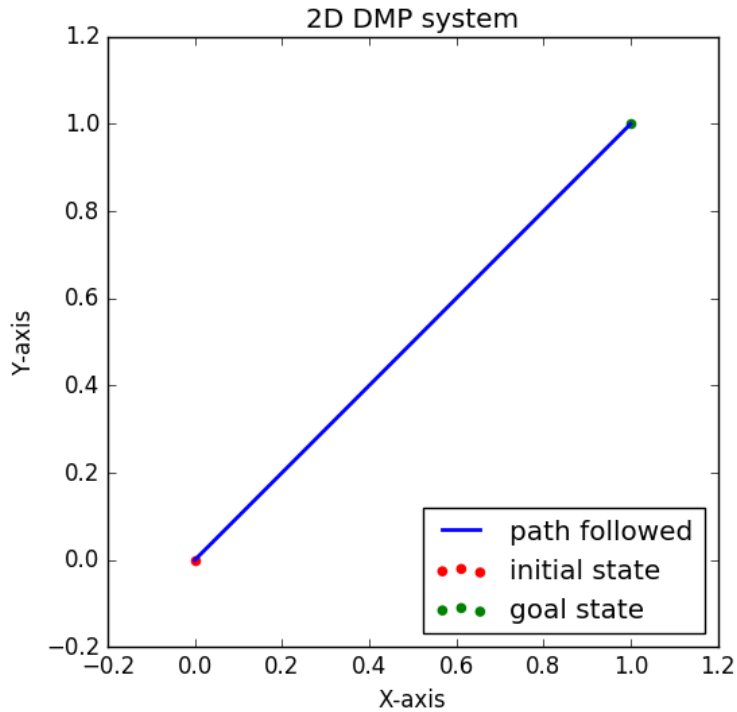
$$\psi_i = \exp(-\frac{1}{2\sigma_i^2}(x - c_i)^2) \tag{4}$$

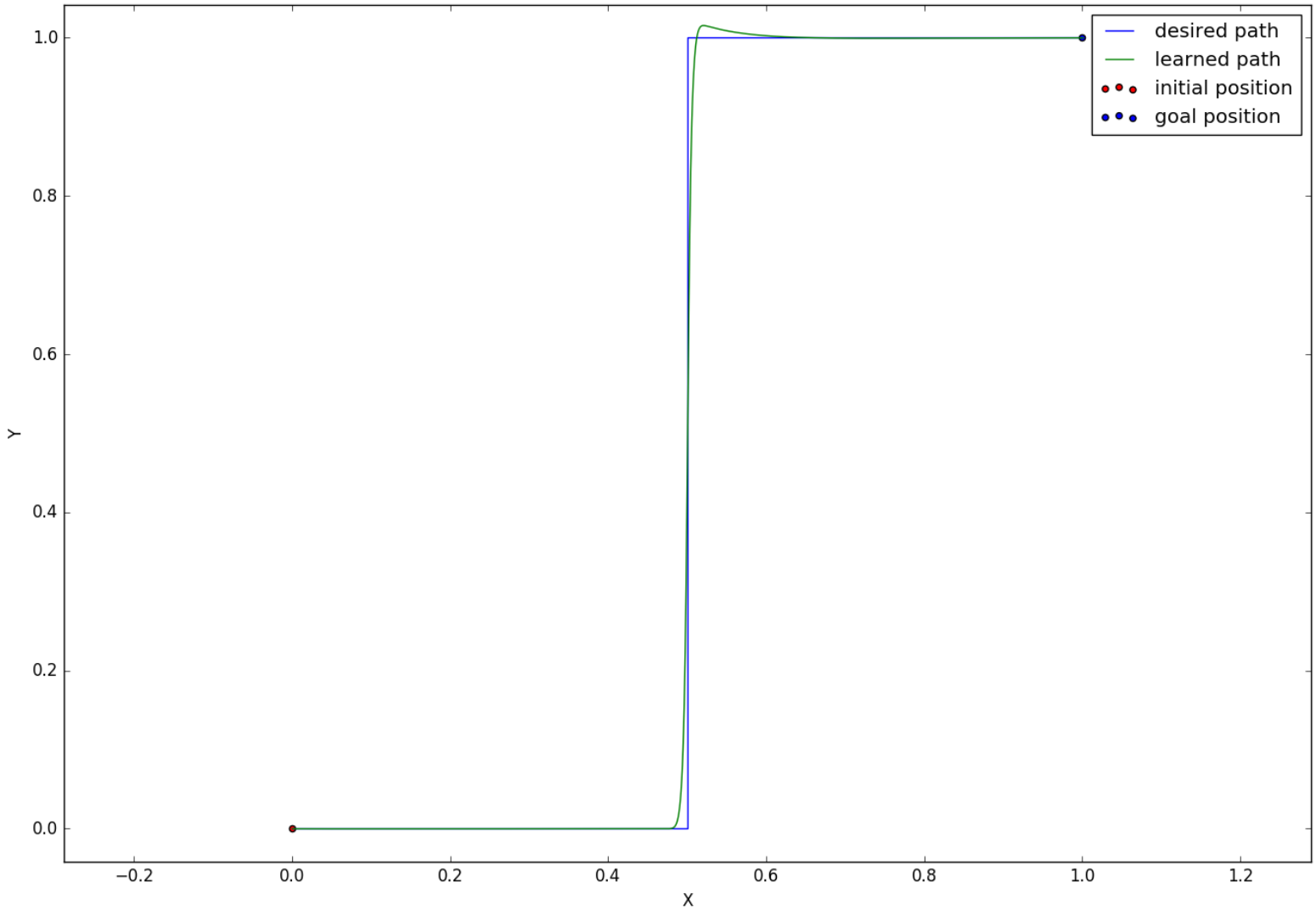
and,

$$\tau \dot{x} = -\alpha_x x \tag{5}$$

Working of DMP






desired path
learned path
initial position
goal position
1.0
0.8
0.6
0.4
0.2
0.0
Y
−0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
X

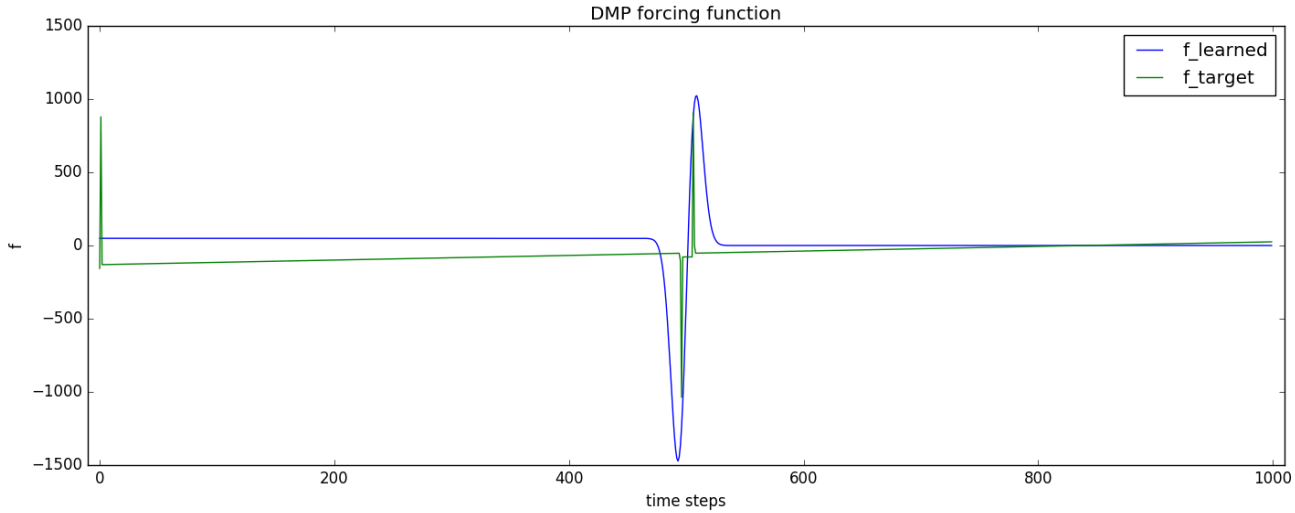


Figure 1: Forcing term - X

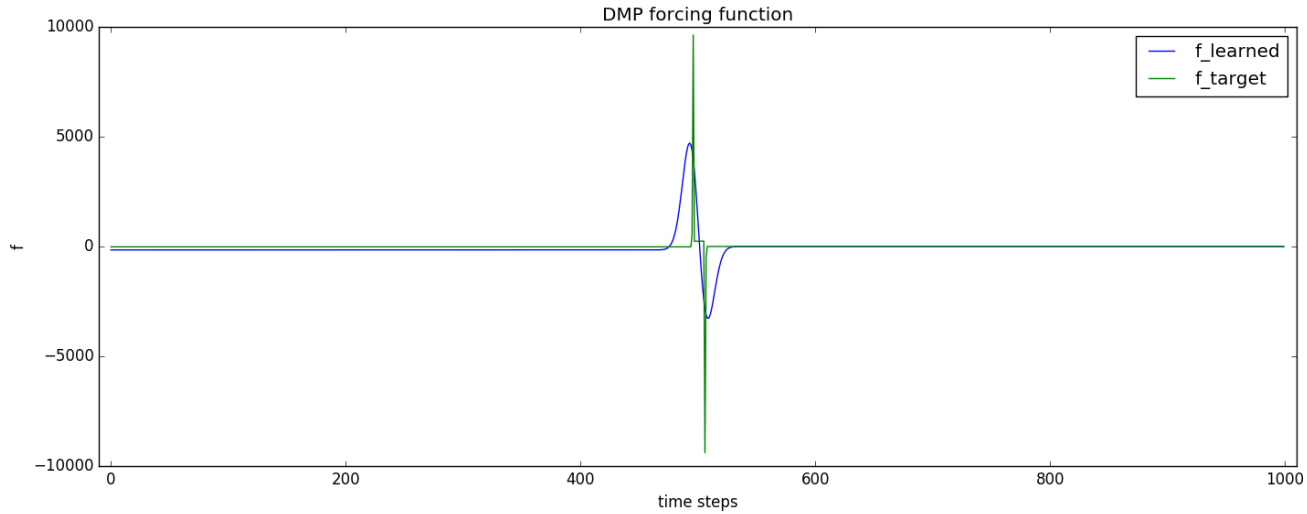


Figure 2: Forcing term - Y

Analysis of the effects of the parameters used in DMP

Inverse Kinematic Solver

Whole Body Motion Control

Results

Conclusion