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# Multiple Targets Tracking & Motion Understanding by Using Particle Filter Gaussian Process Dynamical Model

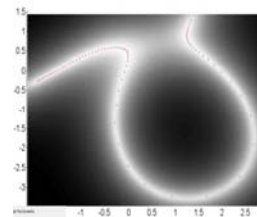
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May 6, 2009

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## Particle Filter Gaussian Process Dynamical Model (PFGPDM)



Learning Latent  
Variables

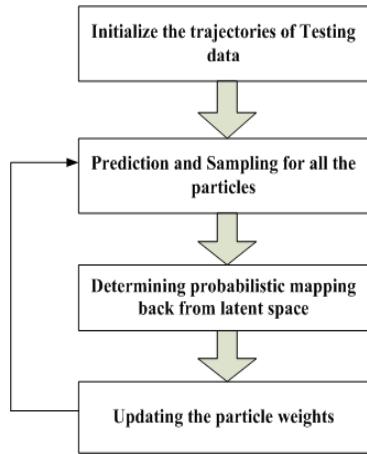


2D latent space



3D latent space[Wang 05]

### Tracking Process

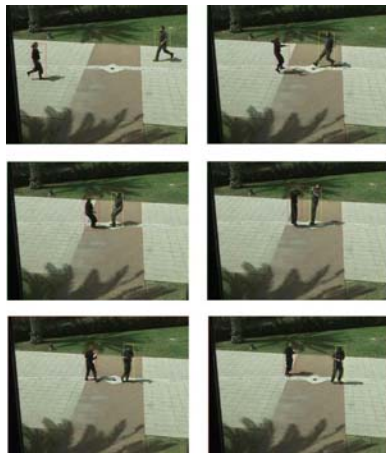


- Tracking four targets



<http://www.dgp.toronto.edu/~jmwang/gpdm/>

### Abnormal Motion Tracking



Motion Understanding & Suspicious Behavior Detection



### Advantages of this Research

- **Data Dimension Reduction**
- **Improve the efficiency of particle filter sampling**
- **Can reliably track multiple target with low error rate**
- **Can handle with temporary occlusion and missing frame cases**

### Limitations of Research

- ◆ High Computation Complexity in the learning process
- ◆ Performance may change with Non-Gaussian Process Motions

### •Next Steps of Research



- Adaptive Learning to reduce the training data set
- More complex human motion understanding