Activity Recognition using Text Mining and Object Recognition

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Improving Video Activity Recognition
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Latent Topic Model-Based Group Activity Discovery
T.A. Faruquie, S. Banerjee, P. Kalra

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- Find Distribution of an Activity over Clips
- Activities having Similar Distributions are Group Activities

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Learning Realistic Human Actions From Movies
Ivan Laptev, Marcin Marszalek, Cordelia Schmid, Benjamin
Rozenfeld *Proc. CVPR, 2008*.

Improving Video Activity Recognition Using Object Recognition
and Text Mining
Tanvi S. Motwani and Raymond J. Mooney *Proc. ECAI-2012*.

Latent Topic Model-based Group Activity Discovery
T.A. Faruquie, S. Banerjee, P. Kalra *Vis Comput (2011)
27:1071-1082*.