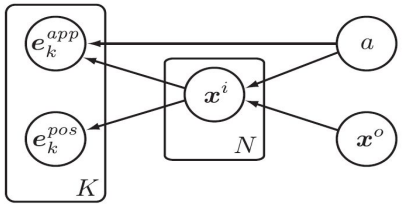
Part-based Human Detection

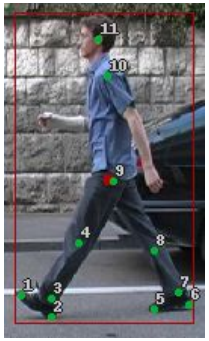
Brandon Tolsch and Joseph Richardson

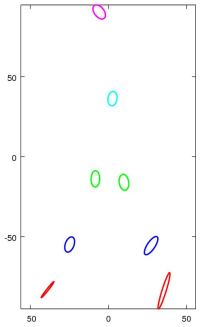
Goal: To detect humans and the location of their limbs using a parts-based model which can be extended for tracking

Uses articulation state to make limb positions independent

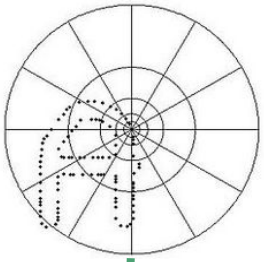


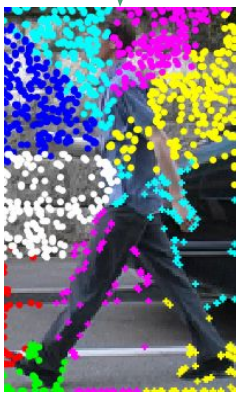
Train distributions of joints relative to the body center and relative to keypoints of different types.





Implement unusual feature detector (this is our problem…)



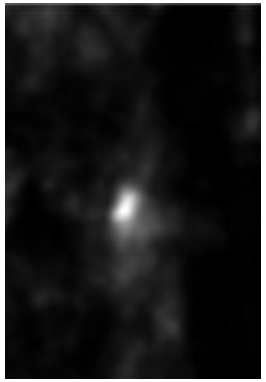


Find the positions and articulation state to maximize likelihood:

$$p(L|a,E) \approx \prod_i p(\mathbf{x}^i|\mathbf{x}^o,a)\left[\beta + \sum_{\mathbf{e}_k} p(\mathbf{x}^i|a,\mathbf{e}_k)\right]$$

$$p(\mathbf{x}^i|a,\mathbf{e}_k) = \sum_{\mathbf{c}_j} p(\mathbf{x}^i|a,\mathbf{c}_j,\mathbf{e}_k^{pos})p(\mathbf{c}_j|\mathbf{e}_k^{app})$$

Failed at actually detecting humans and limbs… but learned from it!



We hoped for results like this...

… and we get results like this.

(this example is for $p(x^i \mid a, e_k)$)