# CONDENSATION – Conditional Density Propagation for Visual Tracking [ Isard, Blake]

* Alternative to Kalman filter tracking : can handle multi-modal probability distribution P(z | x) z: observed vartiables, x : state
* Extension of factored sampling technique using : using drift-diffuse-measure for sampling from the probability distribution
* Simple as compared to Kalman filter despite generality : absence of Riccati equation (degree 2 term in differential equation ) which occurs in Kalman filter in covariance propagation
* In this shape is represented by by parametric spline curve. Splines are curve normals along which white crosses (high contrast) features are sought.
* Dynamical model [ P(xt | xt-1) ] can be shown to be temporal Markov chain
* Observational Model [ P(zt | xt ) ]:
  + Assumed to be stationary in time though this is not a requirement of the condensation algorithm
  + One dimensional case:
    - Given an observation, it could come from the possible true positions or from clutter
    - Clutter : Poisson process
    - True target positions : unbiased and normally distributed
    - Not necessary to consider all true positions, only a window around the observed value is considered
  + 2-D case:
    - parameterized curve image curve z(s), hypothesized shape curve r(s) [Note the change of notation ]
    - we have a mapping between positions set up by the normals traced
    - p(z|x) based upon average squared distance between corresponding points of z(s) and x(s)
* Example applications shown:
  + Tracking multimodal distribution ( 3 person tracking)
  + Tracking rapid motions (dancing girl )
  + Tracking articulated object
  + Tracking camoflouged object