Anomaly on player detection

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| Case	Confidence of noncontextual labelling of components $i = 1,...,k$	Confidence of contextual labelling of components $i = 1,...,k$	Unconditional likelihood $p(x_i), \forall i$	Incongruence of labelling components $i = 1,...,k$	Probability of Joint labelling of components	Joint likelihood of measurements $p(x_1,...,x_k)$	Data Quality	Domain anomaly	Domain anomaly type / Comment
a	High	k=1: no context	High				Good	No	Single object (component) labelling
b	Medium	k=1: no context	Medium				Bad	No	Noisy measurement: Single object (component) labelling ambiguity
c	Any	k=1: no context	Low				Good	Yes	*CpntDomAn* / Novelty object (component), model required
d	Medium	k=1: no context	Medium				Good	Maybe	*CpntDomAn* / Model drift (observable over time): Novelty object (component) model or Adaptation required
e	All high	All high	All high	No	High	High	Good	No	Congruency between the weak and strong classifier output
f	All high	Some Low	All high	Some yes	Zero	Low	Good	Yes	*CfgDomAn* / Scene model not available (e.g. out of vocabulary word)
g	Some high, some any	Some low	Some low	Some yes	Low → zero	Low	Good	Yes	*CpntDomAn* / Unexpected component: Component model correction results in congruency
h	All any	All any	All low	Some yes	Low	Low	Good	Yes	*Cpnt&CfgDomAn* / All components unexpected: Different alphabet and vocabulary required
i	Medium	Medium	Medium	Some yes	Medium	Medium	Bad	No	Noisy measurements on one or more primitives resulting in ambiguity
j	Medium	Medium	Medium	Some yes	Medium	Medium	Good	Maybe	*Cpnt&CfgDomAn* / Component model drift (observable over time): New component and world model or adaptation required

How many people can be found in a game of tennis?
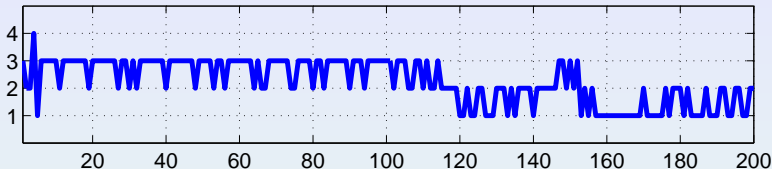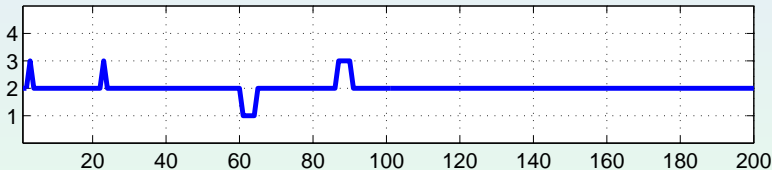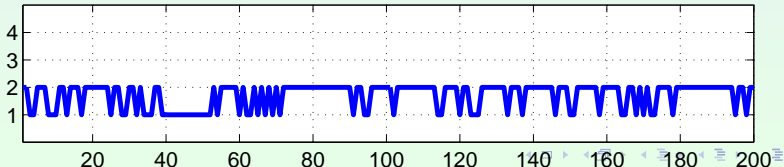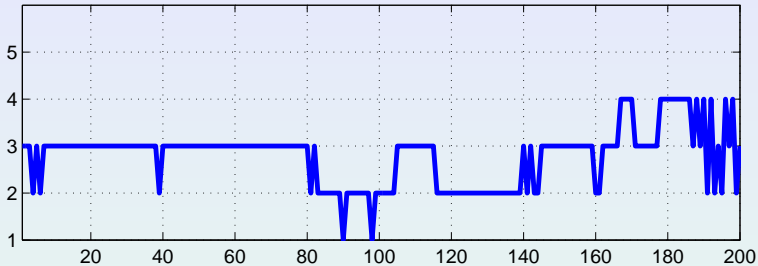
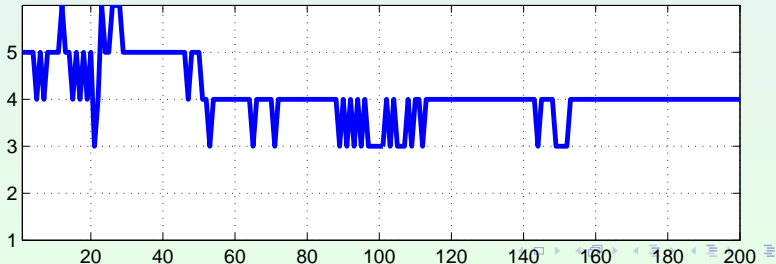# How many people in a game of tennis *doubles*?
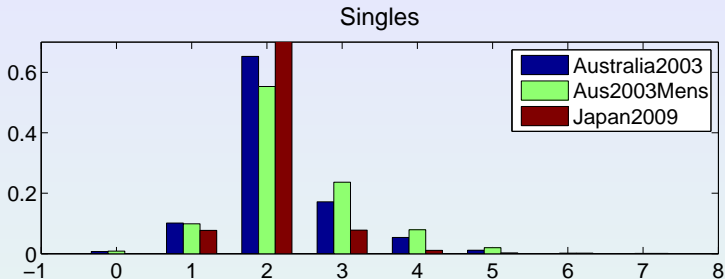

Australia2008

US2006

Can we spot anomaly based on player detection?

Measurement functions
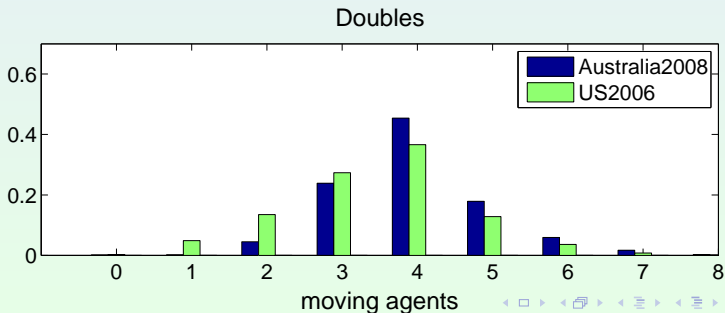
- χ^2 statistics

$$\chi^2(\mathbf{x}, \hat{\mathbf{x}}) = \frac{1}{2} \sum_{d=1}^{D} \frac{[x_d - \hat{x}_d]^2}{x_d + \hat{x}_d}$$
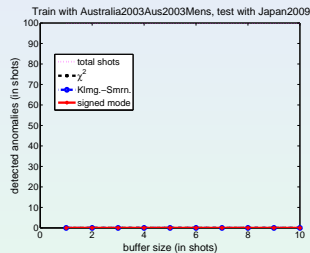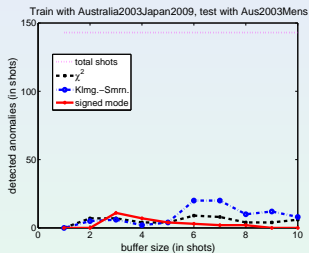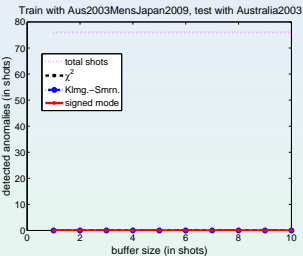
- Two-sample Kolmogorov-Smirnov test

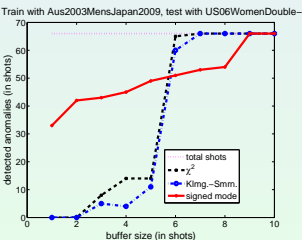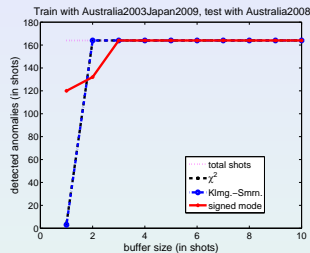$$KS(\mathbf{x}, \hat{\mathbf{x}}) = \sup_d |x_d - \hat{x}_d|$$
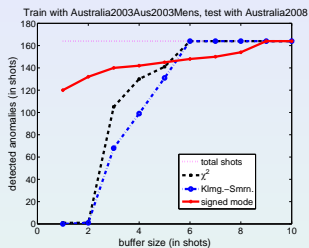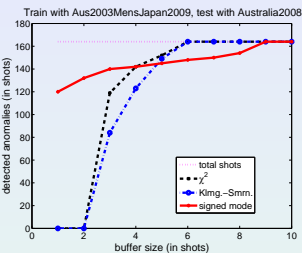
- Mode difference

$$MD(\mathbf{x}, \hat{\mathbf{x}}) = \arg\max_d(x_d) - \arg\max_d(\hat{x}_d)$$

Anomalies detected on games of *singles*

Anomalies detected on games of *doubles*
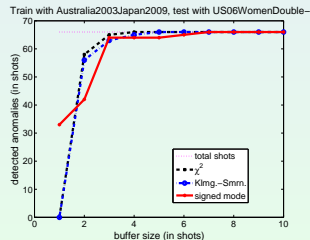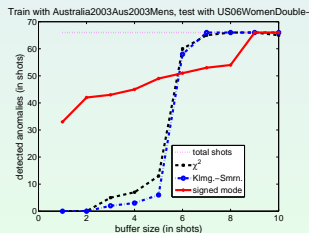
Noise measurements

Video	mean ±std	median
Australia2003	1.922 ± 0.093	1.9
Aus2003Mens	3.065 ± 2.328	2.1
Japan2009	1.623 ± 0.466	1.6
Australia2008	1.290 ± 0.996	0.8
US06WomenDouble	1.541 ± 1.942	0.9

$$noise = \frac{1}{D} \sum_{d}^{D} \sigma(\mathbf{m}_d)$$

where $\mathbf{m}_d$ is the array containing the value of all pixels taken into acount to compute the mosaic at the pixel position d.

Plan

- Wrap this up into a paper
- Use prior knowlege of player height to estimate bounding box scales
- Improve action classification using a sliding window and voting
- Work on player detection/tracking