Dynamic Bayesian Network modeling for self- and cross-correcting target tracking

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1. Introduction
- Trackers may fail because of illumination changes, occlusions, pose variations and motion changes
- To reduce (remove) errors approaches exist that
  - self-correct an individual tracker
  - cross-correct trackers

2. Motivation
- Objective: to model self- and cross-correcting tracking with a unified framework
- Model: Dynamic Bayesian Network [1]
  - explicit evaluation and correction
  - provides general design guidelines

3. Dynamic Bayesian Network modeling

- $x_k$ target state
- $z_k$ observation
- $k$ time step
- $p_k$ performance variable
  - discrete values $p: 0 \leq p \leq (N_p - 1)$
- $N_p$ number of evaluation classes
  - defines if correction is required
- $c_k$ correction variable
  - discrete values $c: 0 \leq c \leq (N_c - 1)$
- $N_c$ number of correction classes
  - defines the corrections on models

Self-correcting trackers
trackers use their own information for correction

Cross-correcting trackers
trackers use an external information source for correction

4. Model instantiations

Tracker-Level-Fusion [2]: trackers $T^1$ and $T^2$

- evaluation classes: $p \in \{0, 1, 2\}$
  - $p = 0$: good
  - $p = 1$: medium
  - $p = 2$: poor

Tracking-Learning-Detection [3]: tracker $T^1$ and detector $D^2$

- evaluation classes: $p \in \{0, 1\}$
  - $p = 0$: good
  - $p = 1$: poor

5. References

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