Active Collaborative Ensemble Tracking

動画像中の一般物体追跡:能動学習と複数分類器協調によるアプローチ

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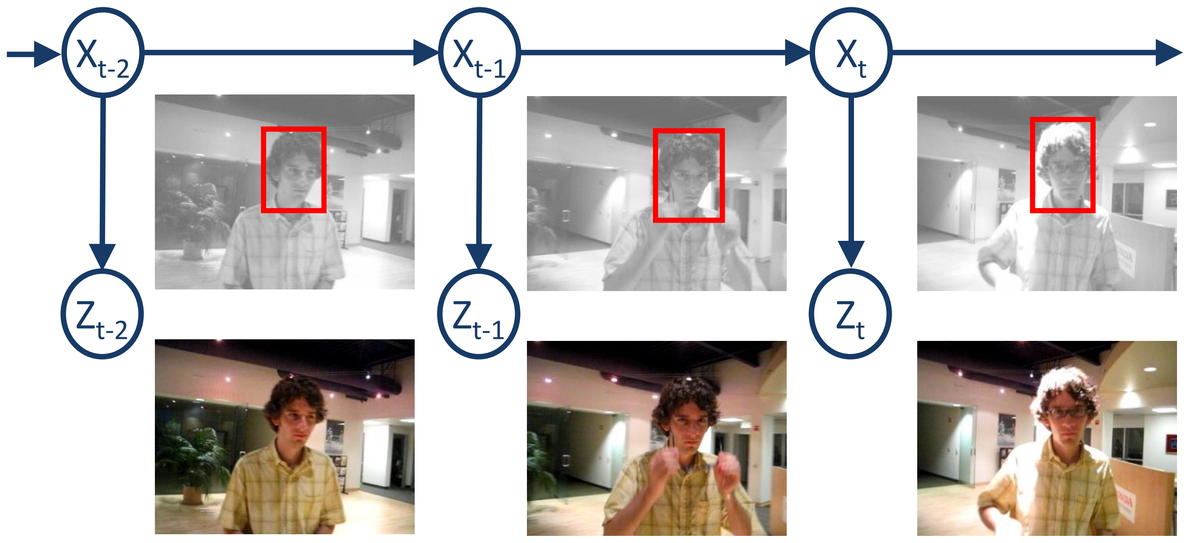
Problem

Visual Tracking



Discriminative Tracking

動画像中の一般物体追跡とは、第1フレームで指定した追跡対象を対象や背景の変化に適応し続けながら追跡してゆくタスクである。追跡対象や背景に関する事前情報なしで精度を得るためには、ごく少量のデータに基づいて高い識別精度を実現する必要がある。われわれは、学習すべき標本を能動的に選択する能動学習の仕組みと、時定数の異なる複数分類器を協調させる仕組みによる、学習効率の高い手法開発した。われわれの手法によれば、ベンチマークデータOTB–50(対象や背景の変化が激しい動画像を集めたもの)において、高速・高精度な追跡ができることが示された。

Challenges of Ensemble Method

Creation | **Online Learning** | **Diversity** | **Aggregation**

Applications

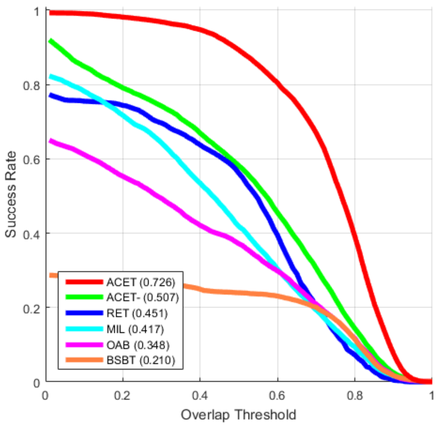
Method

Online Ensemble Learning

- ❑ Online Boosting (OAB)
- ❑ Multi-Instance Learning (MIL)
- ❑ Semi-Supervised Learning (BSBT)
- ❑ Bayesian Randomized Ensembles(RET)

Proposed

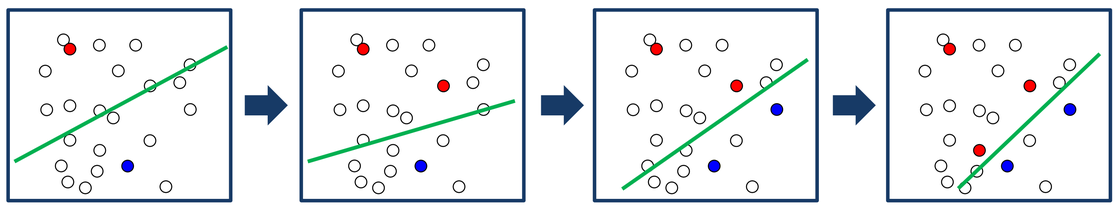
- ❑ Ensemble with Data Exchange
- ❑ Optimized Data Exchange and Mix-of-Memory



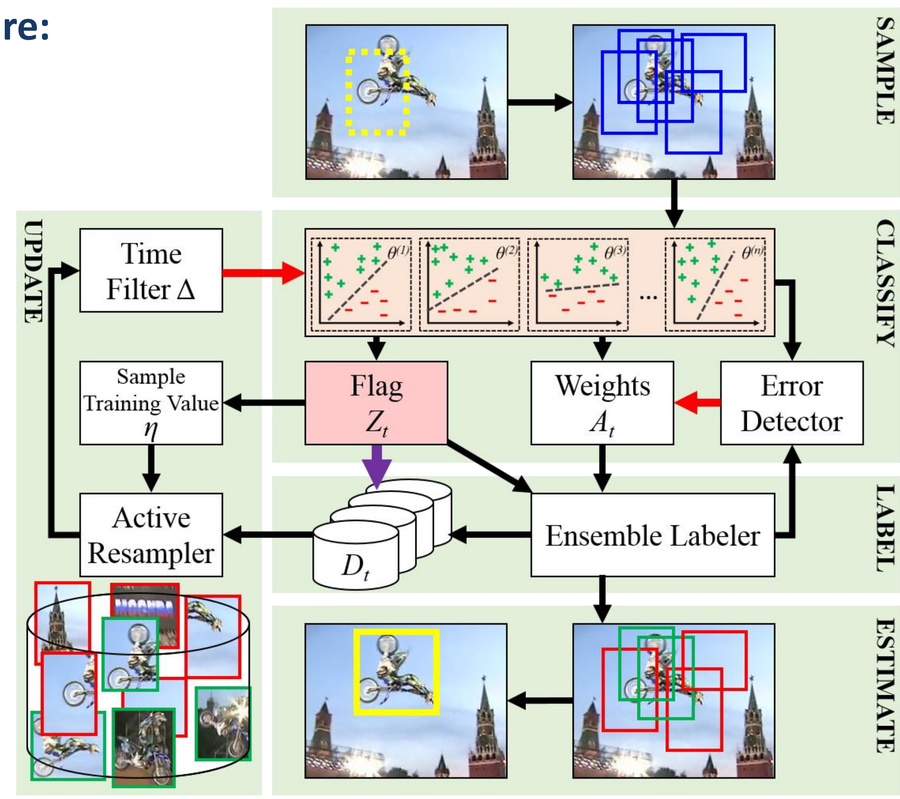
Main Idea

- ✓ Each Classifier Learns from the Majority of the Ensemble
- ✓ Classifier's Vote is as Important as its Accuracy
- ✓ Regression-based Ensemble Result Aggregation
- ✓ Each Classifier has Different Memory Span
- ✓ Data Exchange by Active Learning

Active Learning



Architecture:



References:

K. Meshgi, S. Oba, S. Ishii, "Active Discriminative Tracking using Collective Memory," in Proc. of MVA'17, IEEE, Tokyo, Japan, 2017.

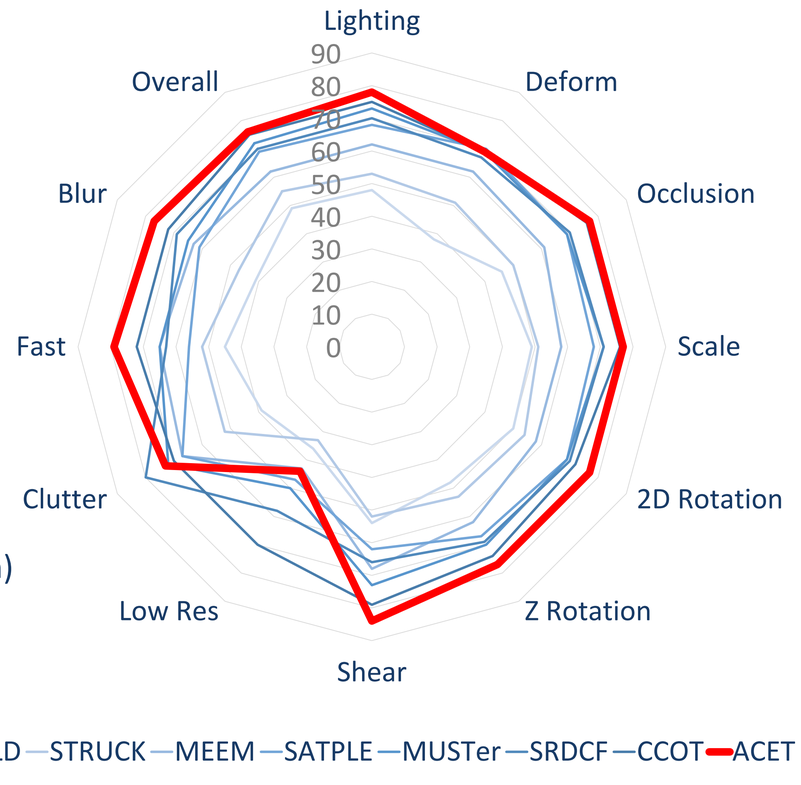
K. Meshgi, M.S. Mirzaei, S. Oba, and S. Ishii, "Active Collaborative Ensemble Tracking," AVSS'17, Lecce, Italy, 2017.

Results

	Success (%)	Precision (%)	Speed (fps)
TLD	49	60	21.2
STRUCK	55	66	11.3
MEEM	62	74	14.2
SATPLE	69	76	48.1
MUSTer	72	82	8.3
SRDCF	70	78	4.3
CCOT	75	84	0.2
ACET	76	88	37.16

Benefits

- ✓ Very Reliable (Graceful degradation)
- ✓ Real-time Processing (> 24 fps)
- ✓ Robust
- ✓ Accurate (State-of-the-art)
- ✓ Light-weight



Dataset: State-of-the-art OTB-50

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