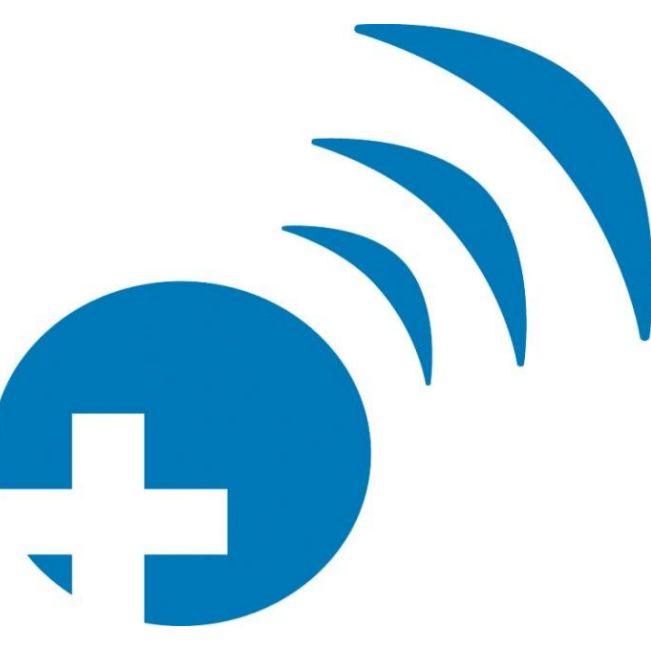


# Vision-based Human Action Recognition and Fall Detection from Local Part Model and Bag-of-feature Method



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## Introduction



Goals: fall / abnormality detection

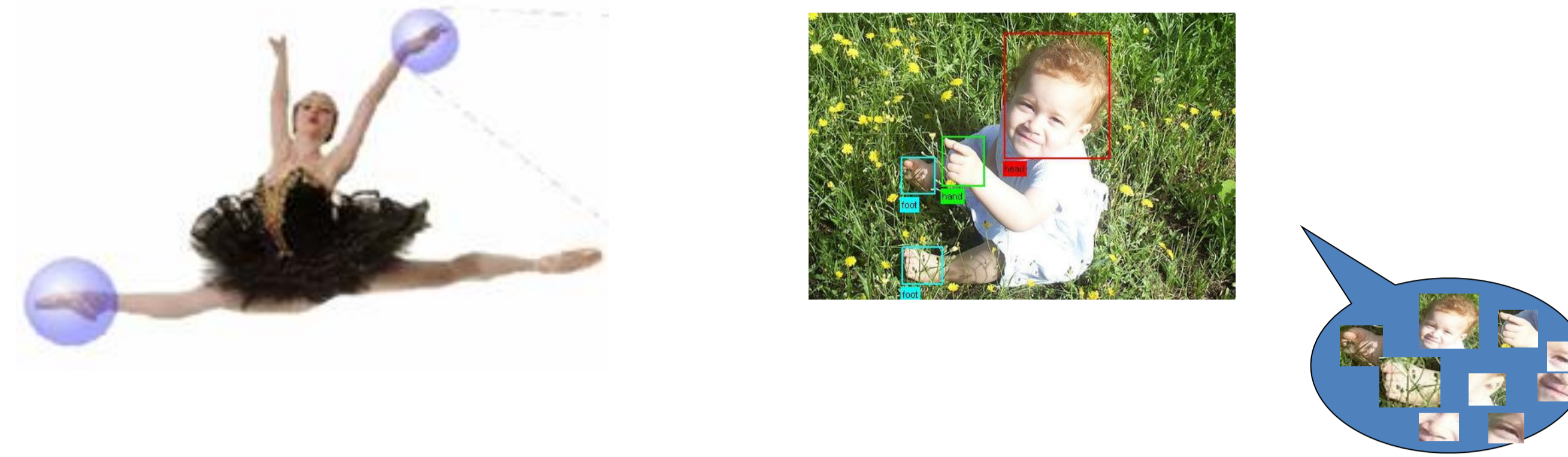
### Challenges:

- Inter-class variations
  - Difference in shape
  - Difference in motion
- Intra-class overlaps and similarities
  - Different actions with similar physic motion
- Cluttered backgrounds and occlusions, camera motion

### Applications:

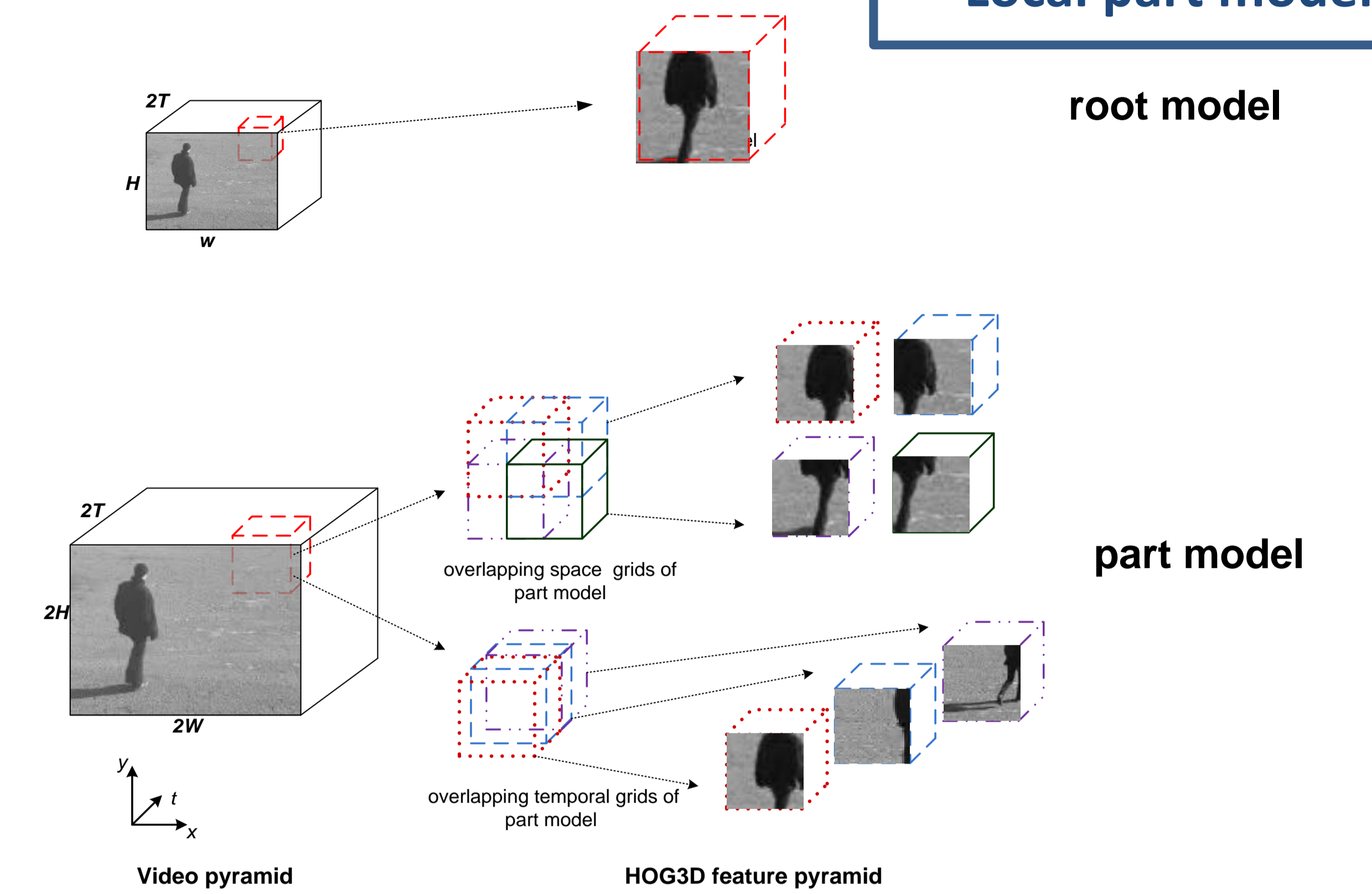
- Fall detection for old persons and smart home
- Abnormality action detection for intelligent video surveillance
- Video retrieval

## Weakness of BOF Approach



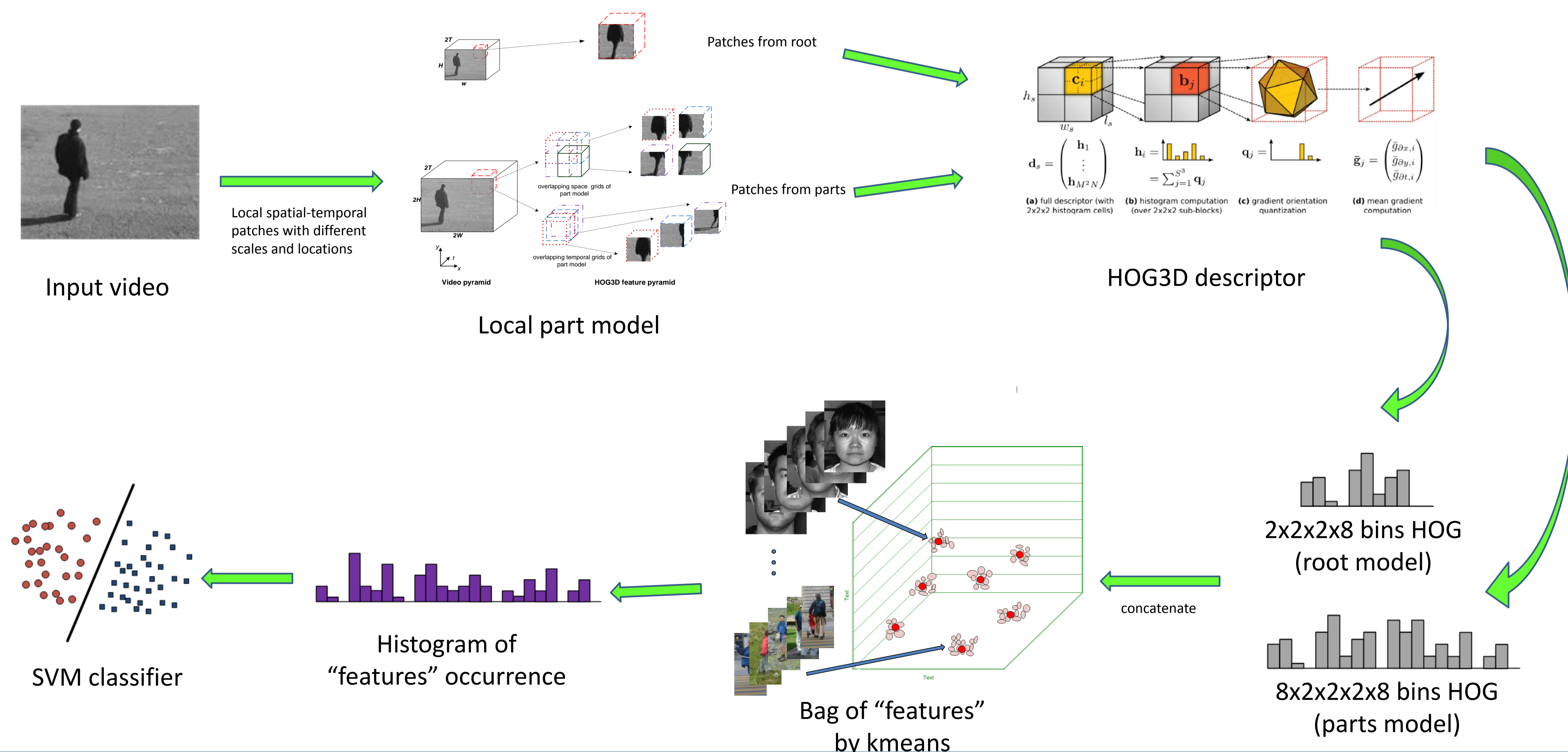
- Only containing statistics of unordered “features”
- Ignoring global information
  - Lost spatial relationship
  - Lost order – the arrangement of the set of events
- Example: “Apple sues HTC”
  - BOW representation:  $V=\{\text{Apple, sue, HTC}\}$
  - Problem: Who sues whom?
- Solution: n-Grams
  - 2-Grams example:  $V=\{\text{Apple sue, sue HTC}\}$
  - Problem: dimension grows as n grows

## Local part model



- Coarse “root model” containing local global information
- High-resolution “part models” incorporating the temporal order information by including local overlapping “events”.

## Proposed Framework



## Comparison to State-of-the-art



KTH dataset, 6 classes

	HOG/HOF	HOG	HOF	HOG3D	ours
Dense sampling	86.1%	79.0%	88.0%	85.3%	91.77%

Classification accuracy



HMDB51dataset, 51 classes

	Gist	HOG/HOF	C2	ours
	13.4%	20.44%	22.83%	30.52%

Classification accuracy

## References

- A. Kläser, M. Marszałek and C. Schmid; “A Spatio-Temporal Descriptor Based on 3D-Gradients”; BMVC 2008
- H. Kuehne, H. Jhuang, E. Garrote, T. Poggio, and T. Serre; “HMDB: A Large Video Database for Human Motion Recognition”; ICCV, 2011
- C. Schuldt, I. Laptev and B. Caputo; “Recognizing Human Actions: A Local SVM Approach”; in Proc. ICPR’04

## Conclusion

- Solved the out-of-order problem of bag-of-feature approach
- Improved accuracy with less computational complexity
- Avoiding the dimensionality growth