

Robust multi-dimensional motion features for first-person vision activity recognition

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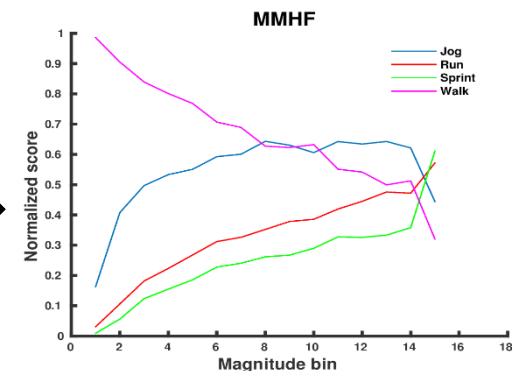
- First-person vision needs new/modified techniques.
- Motion patterns of activities may vary in magnitude, direction and/or dynamics (frequency).
- Virtual inertial data can be generated from video only.



Setup



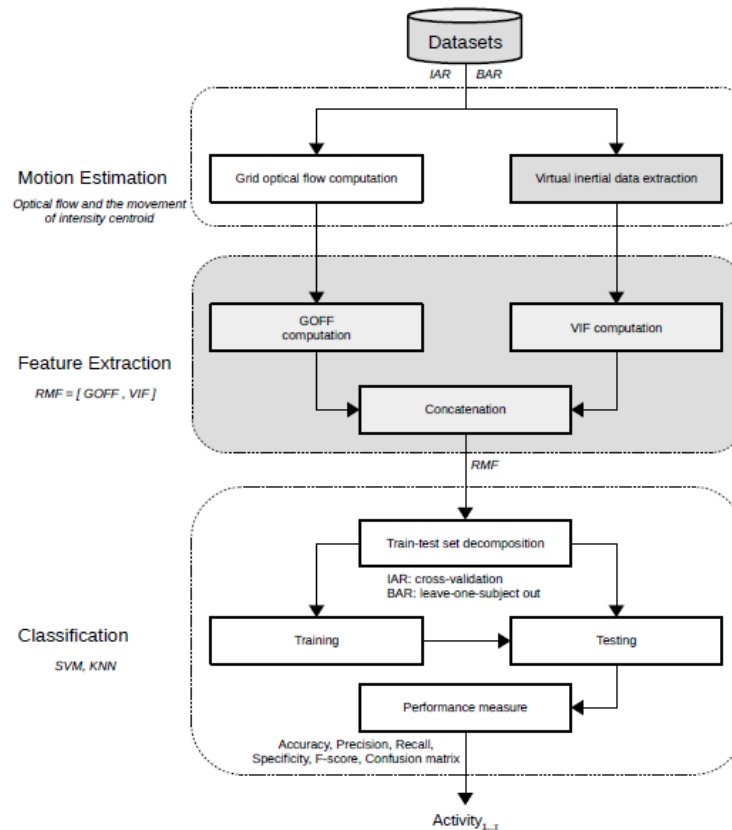
Data



Features

Robust Motion Feature (RMF)

- Histogram and Fourier computation applied on magnitude and direction components of optical flow data - GOFF.
- Inertial features extracted from the virtual data generated from the movement of intensity centroid across frames - VIF.



Results and conclusion

- RMF outperforms existing methods, validated on four datasets with two classifiers (SVM and KNN).
- Each feature group is proven be crucial for higher accuracy.

S.No	IAR			BAR			JPL			DogC		
	Feature	\mathcal{F}	KNN	Feature	\mathcal{F}	KNN	Feature	\mathcal{F}	KNN	Feature	\mathcal{F}	KNN
1	MDHF	82	72	FTMAF	52	53	MMHF	62	63	FTMAF	42	46
2	+ MDHSF	85	74	+ MDHF	66	66	+FTMAF	67	65	+MDHSF	45	47
3	+ FTMAF	87	75	+ MMHF	71	69	+MDHF	72	67	+MDHF	46	47
4	+ MMHF	88	78	+ MDHSF	71	72	+MDHSF	78	68	+FTMPF	48	48
5	+ FTMPF	88	79	+ FTMPF	72	73	+FTMPF	79	68	+MMHF	51	50
6	+ VIF	88	79	+ VIF	80	78	+VIF	86	82	+VIF	61	59
7	- FTMPF	88	77	- FTMPF	79	77	-FTMPF	85	82	-MMHF	60	58
8	- MMHF	87	76	- MDHSF	79	74	-MDHSF	85	82	-FTMPF	58	58
9	- FTMAF	86	76	- MMHF	76	72	-MDHF	84	81	-MDHF	58	59
10	- MDHSF	84	72	- MDHF	72	66	-FTMAF	81	80	-MDHSF	57	57
11	- MDHF	57	48	- FTMAF	62	60	-MMHF	80	78	-FTMAF	48	47

- RMF encodes motion in FPV well and has strong potential in understanding more activities together with local motion and appearance-based features.

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