

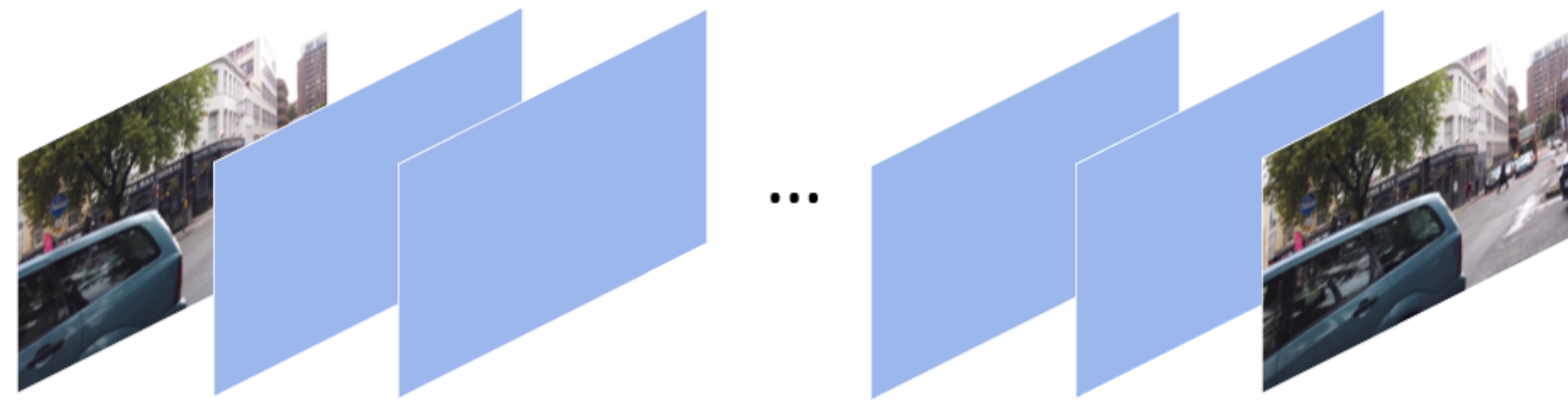
Efficient Feature Extraction for High-resolution Video Frame Interpolation

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Motivation

Goal: Computationally efficient method for high-resolution video frame interpolation



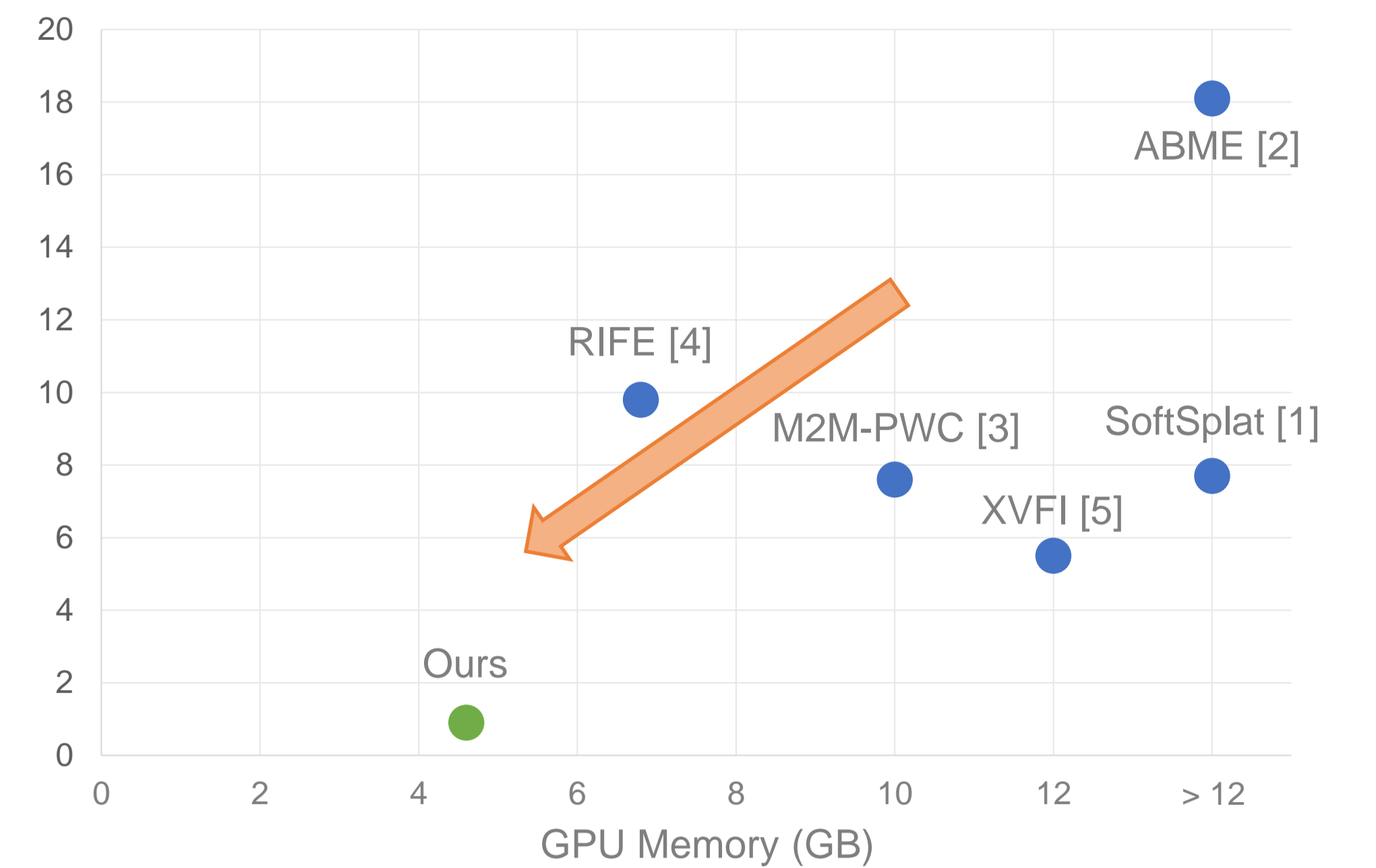
State-of-the-art Models

- High memory demands for 4K
- High model complexity

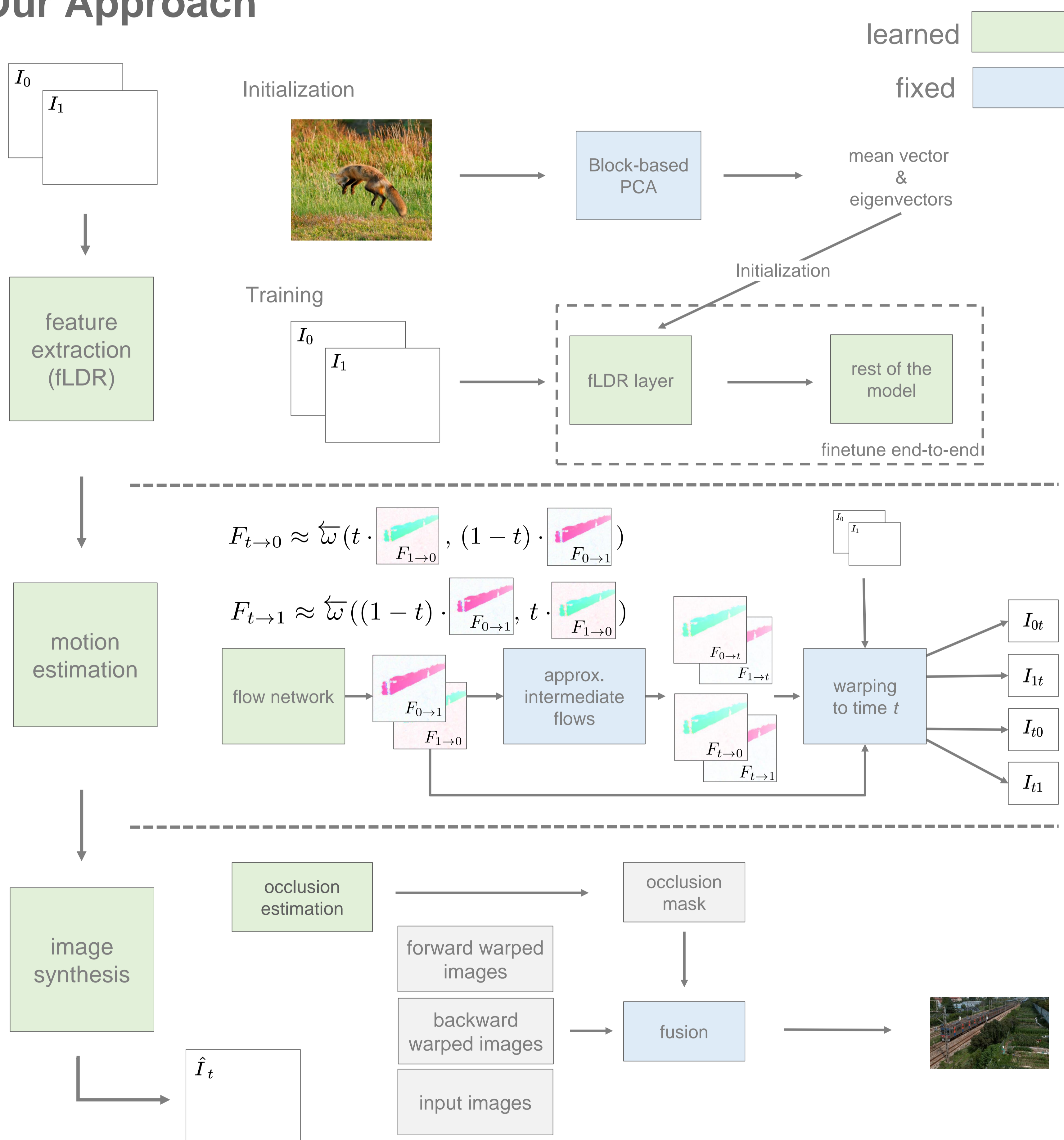
Our Approach

- Efficient feature extraction
- Lightweight overall framework

Parameters (Mill.)



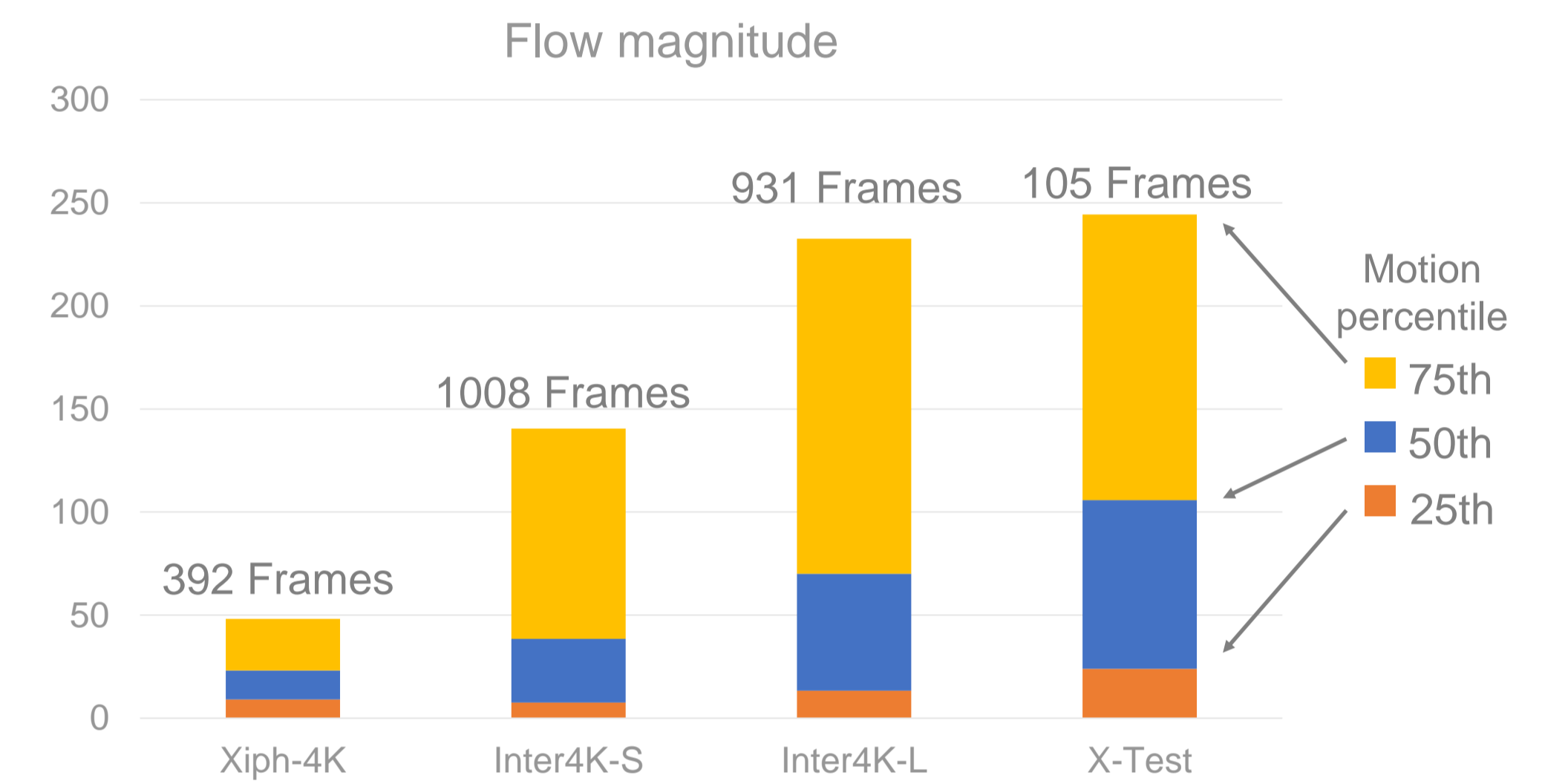
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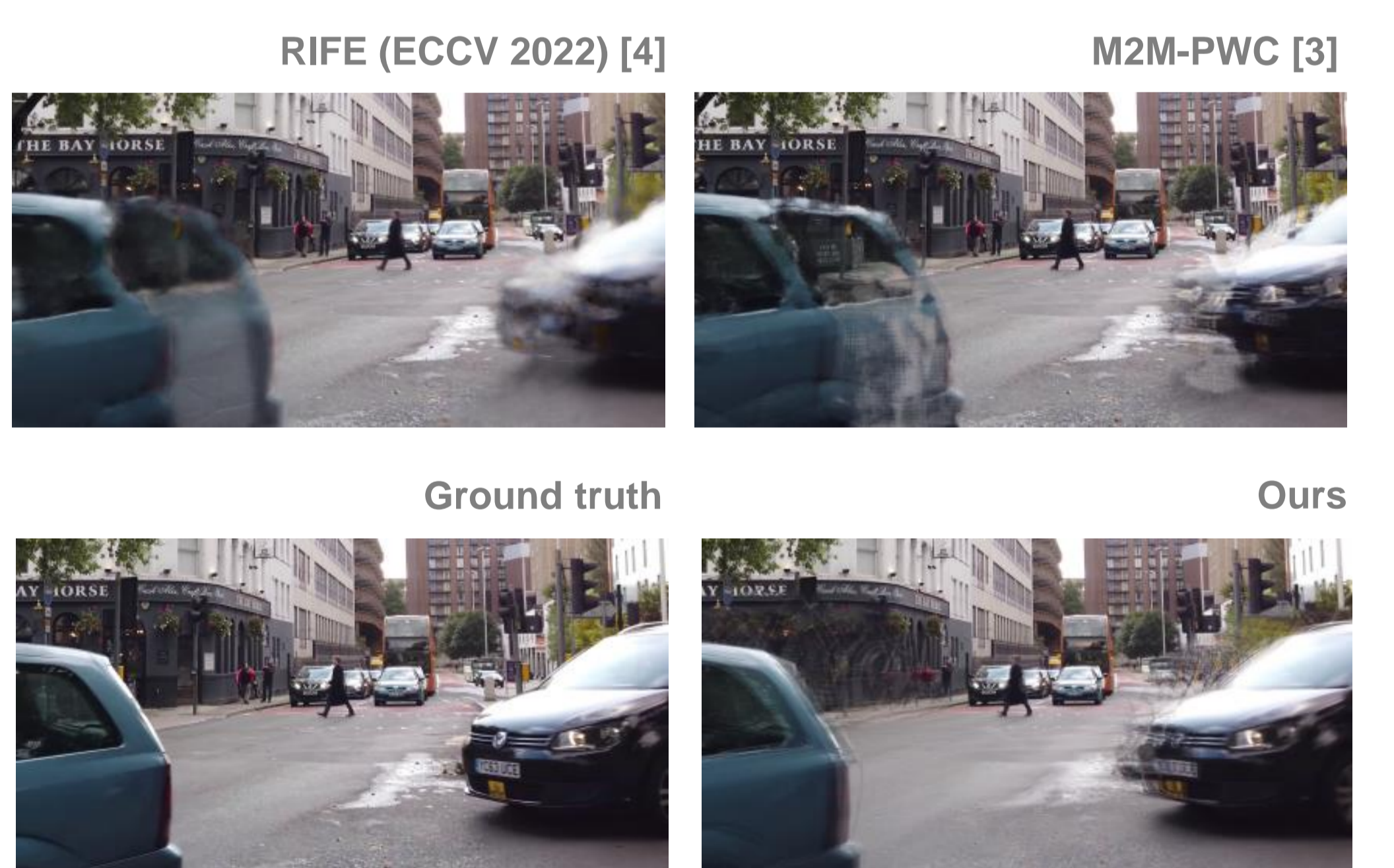
Inter4K Testset

New 4K testset for video frame interpolation

- >100 Scenes
- Sampled from Inter4K video dataset [6]
- More diverse motion



Qualitative Results



Quantitative Results

	Pretrained flow	# Param. (Mill.)	Memory (for 4K)	Training dataset	Xiph-4K (PSNR)	X-Test (PSNR)	Inter4K-S (PSNR)	Inter4K-L (PSNR)	Inference (in s/f)
M2M-PWC [1]	✓	7.6	10 GB	Vimeo90K	34.88	30.81	29.22	24.87	0.21
RIFE _m [2]	✗	9.8	6.8 GB	Vimeo90K	34.80	26.80	28.37	24.40	<u>0.40</u>
XVFI [3]	✗	5.5	>12 GB	X-Train	34.04	30.34	28.82	24.62	—
Ours	✗	0.9	4.6 GB	X-Train	34.16	30.45	29.29	25.16	0.51

Ablation

	# Param. (in Mill.)	Memory (for 4K)	X-Test	Inter4K-S
Ours (full)	0.9	4.6GB	30.45	29.29
w/o finetuning projection vectors	0.9	4.6GB	29.46	28.34
w/o backward flow ($F_{t \rightarrow 0}$ & $F_{t \rightarrow 1}$)	0.9	4.6GB	30.13	28.81
with synthesis	2.6	9.5GB	30.59	29.12

References & Disclosure of Funding

- [1] Niklaus and Liu., Softmax splatting for video frame interpolation. In CVPR, 2020.
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- [5] Sim et al., XVFI: eXtreme video frame interpolation. In ICCV, 2021.
- [6] Stergiou and Poppe., Adapool: Exponential adaptive pooling for information-retaining downsampling. arXiv:2111.00772 [cs.CV], 2021.

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Conclusion

- We propose the fLDR module, an efficient way to extract low-dimensional features for motion estimation.
- Our framework is overall lightweight in terms of memory and trainable parameters.
- We curate a new challenging 4K testset for frame interpolation.
- We achieve state-of-the-art accuracy on X-Test, Inter4K-S and Inter4K-L among approaches without pretrained flow.