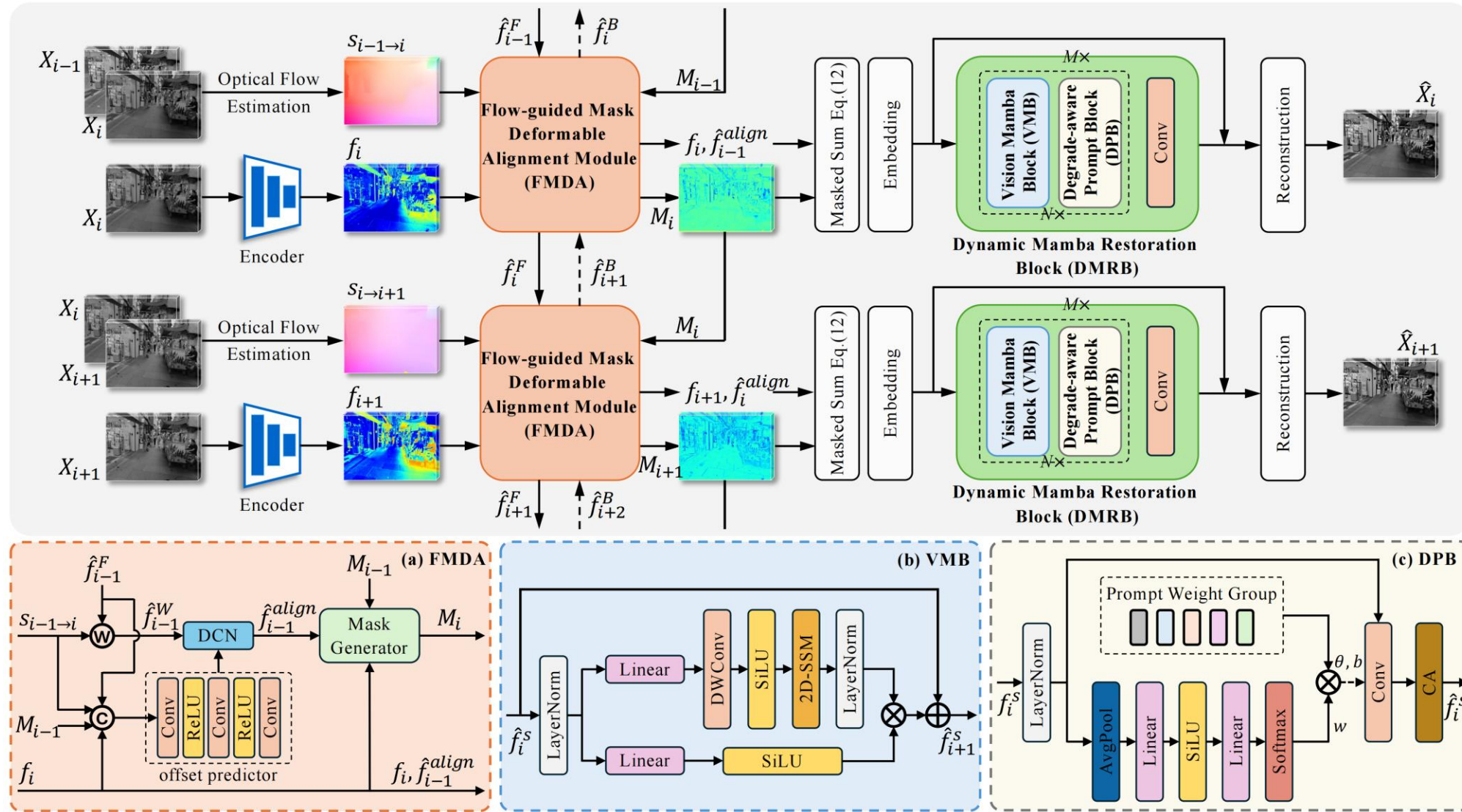


The proposed framework



Background

Old films are a legacy from the pre-digital era, using film as a storage medium.

Limited by shooting technology and storage conditions, old films are often seriously physically degraded before being digitized. At the same time, the transmission on digital media also brings digital degradation. Therefore, we hope to use modern technical methods to face complicated task

Results

Model	PSNR(dB)↑	SSIM↑	LPIPS↓	DISTS↓
DeOldify[1]	21.9583	0.8312	0.1685	0.1094
OldPhoto[46]	23.7797	0.8247	0.1668	0.0793
DeepRemaster[19]	23.1263	0.8627	0.1826	0.0982
RTN[47]	25.0987	0.8872	0.1025	0.0780
VRT[35]	24.1155	0.8809	0.1249	0.1080
RVRT[34]	24.9226	0.8732	0.1104	0.0842
ShiftNet[30]	26.0208	0.9019	0.1001	0.1160
MambaOFR	26.9340	0.9271	0.0538	0.0583

Ablation Study

Model	PSNR(dB)↑	SSIM↑	LPIPS↓	DISTS↓
w/o Mamba	26.1231	0.8913	0.0876	0.0941
w/o DPB	26.1432	0.9102	0.0743	0.0812
w/o FMDA	26.3467	0.9123	0.0732	0.0741
DPB(N=4)	26.3546	0.9158	0.0729	0.0779
DPB(N=8)	26.5891	0.9211	0.0694	0.0698
MambaOFR	26.9340	0.9271	0.0538	0.0583

Motivation

Old films not only chronically suffer from complex digital degradation, but also face physical defects on analog films in time domain.

Effective methods are lacking to dynamically handle these complex degradation patterns and curb the propagation of degradation over time.

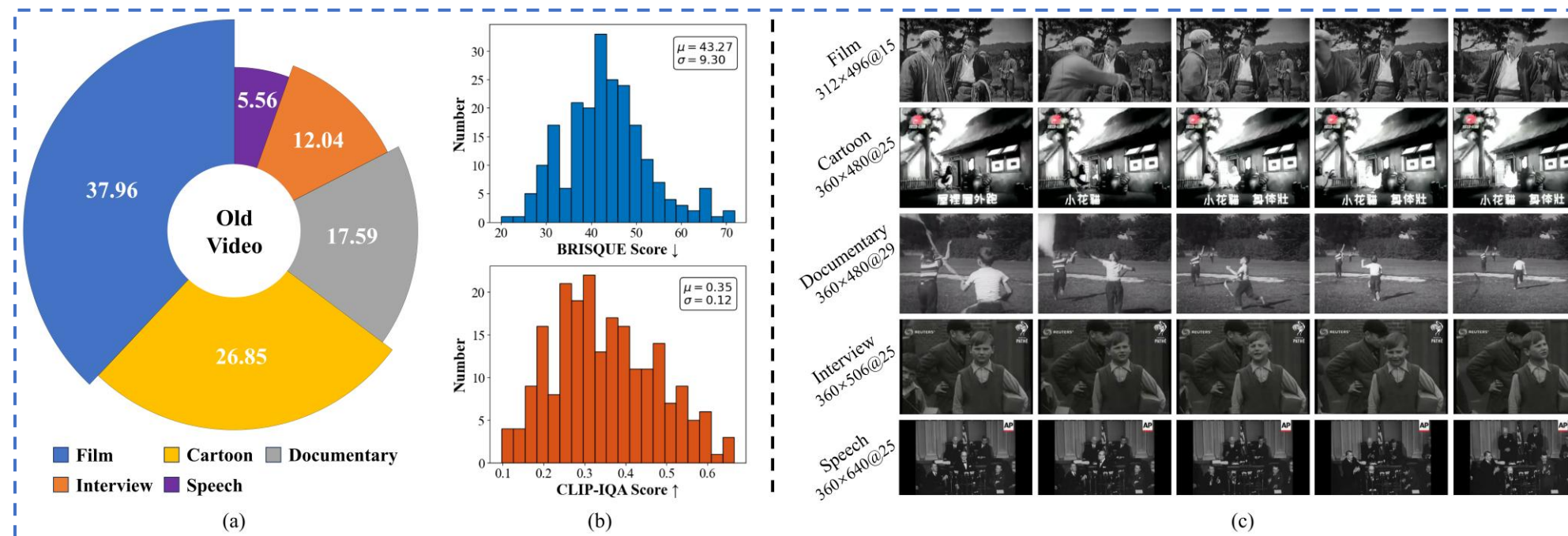
Contribution

1. We propose a recurrent old film restoration framework, MambaOFR, which dynamically adjusts degradation removal patterns by generating degradation-aware prompts to address the complex and composite degradations present in old films. Moreover, to mitigate the propagation of structured defect features in the temporal domain, we propose a flow-guided mask deformable alignment that mitigates the propagation of structured defect features in the temporal domain.
2. Due to the lack of a public benchmark for old film restoration, we collect and propose the first large-scale old film restoration dataset, which consists of 30 synthetic video clips and 216 real-world old video clips with diverse scenes.
3. Extensive experiments on the proposed dataset demonstrate that the proposed method achieves state-of-the-art performance in old film restoration, outperforming existing advanced old film restoration and video restoration methods.

Old Film Restoration



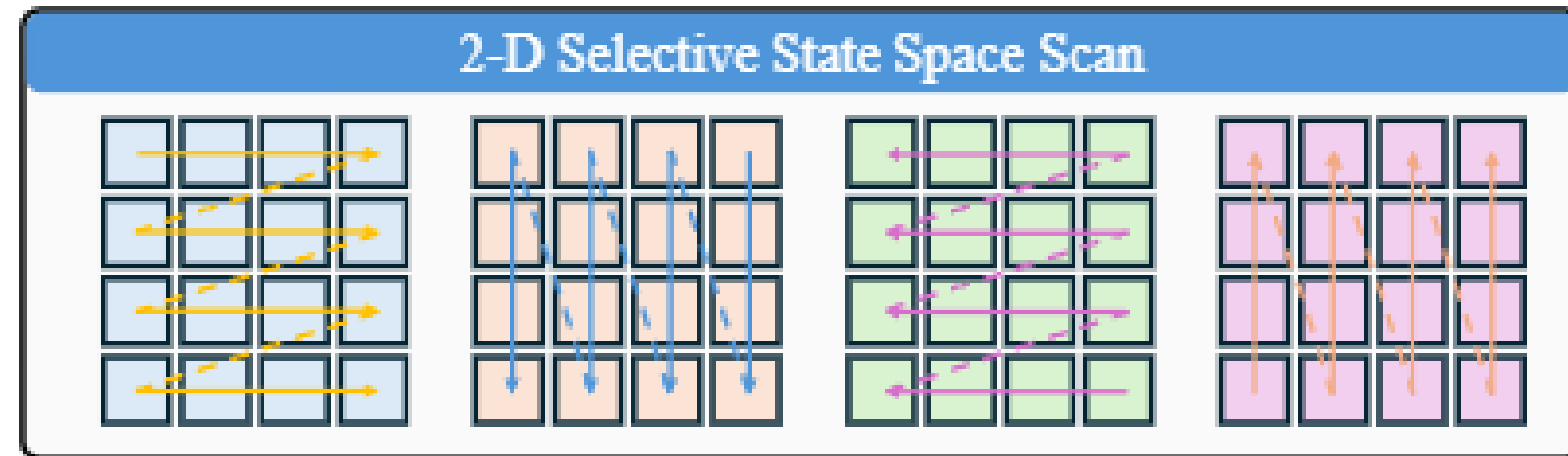
Our Dataset



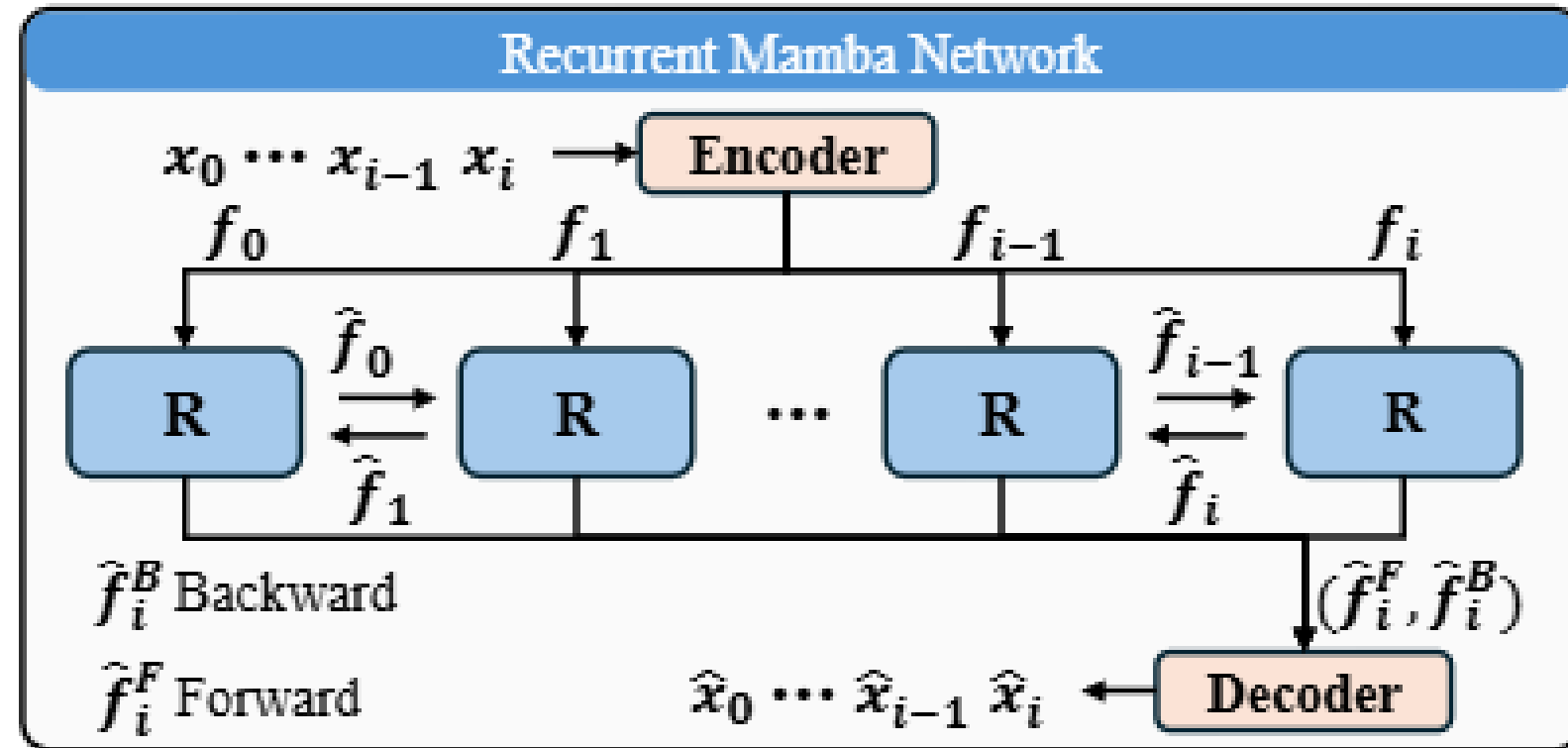
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Pipeline the proposed framework

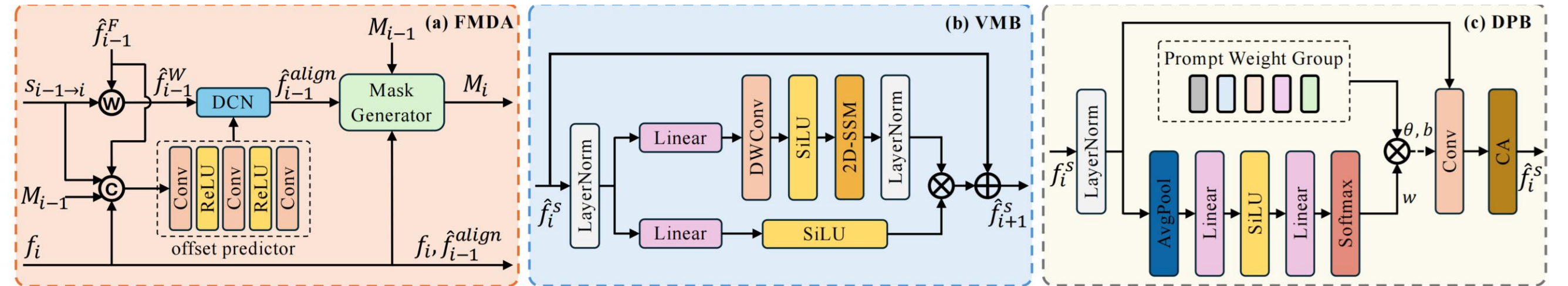


(a) Spatial Pipeline



(b) Temporal Pipeline

Details of blocks



Restoration

Yudong Mao, Hao Luo, Zhiwei Zhong, Peilin CHEN, Zhijiang Zhang, Shiqi Wang

Real-world degradation in the datasets



Our restoration on Real-world Data

