# Colorizing Black-White Movies Fastly and Automatically

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# Problem statement

Colorization

Image Colorization

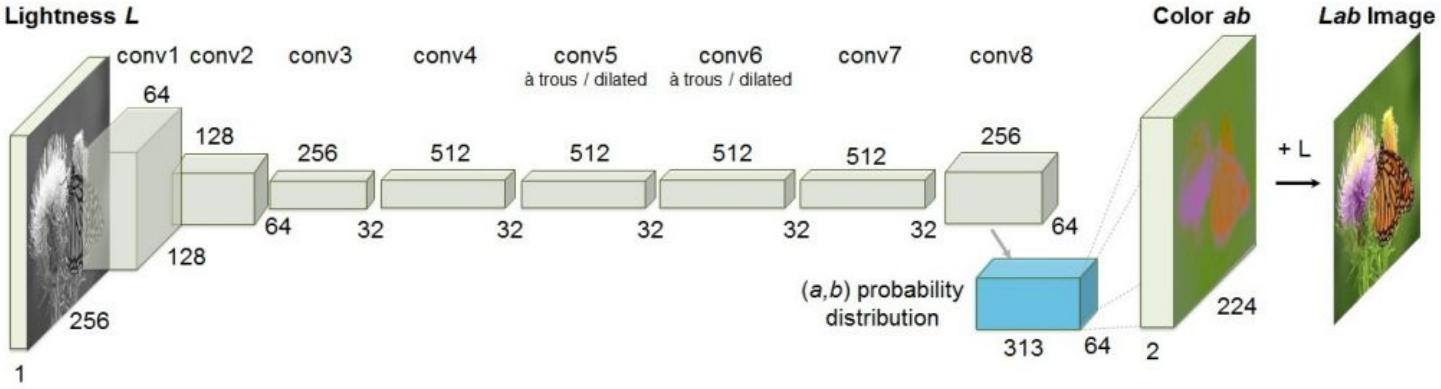
- Visually natural

Video Colorization

- Visually natural
- Temporal coherent & interframe relationship
- Efficient

# Related  Work

Zhang et al. --- Single Image Colorization



# Related Work

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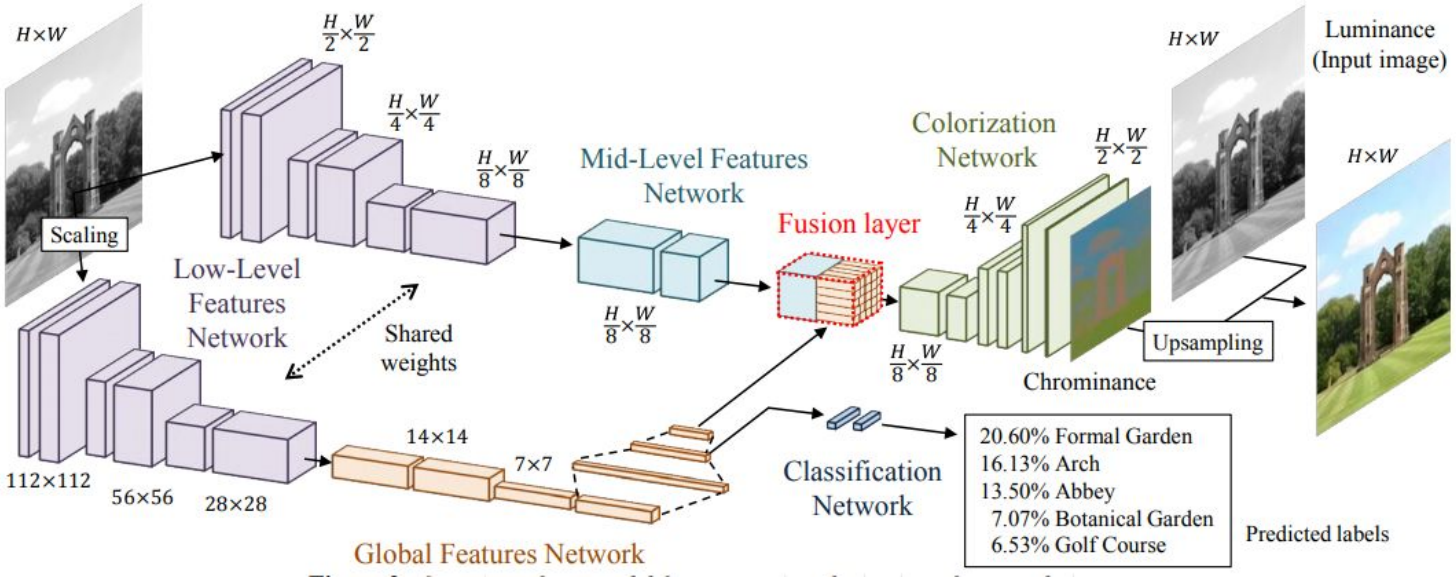
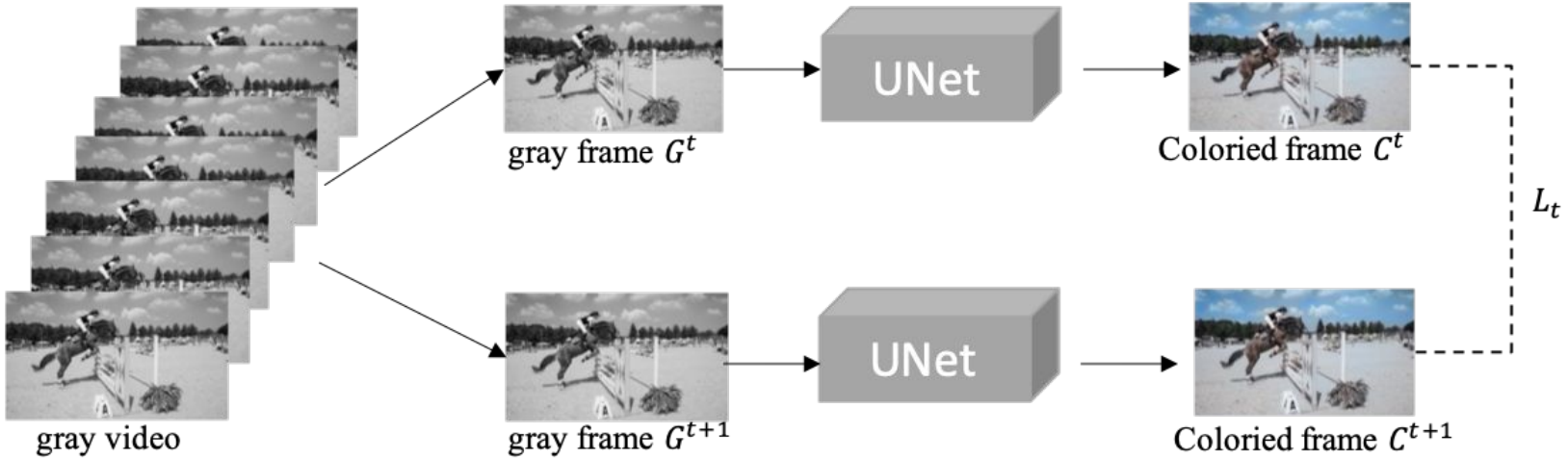


# Our Method




Framework

# Loss function

1. Temporal Loss to regulariza the temporal coherence of colorized frames

$$L_t = \|W(C_1, F_{2\to1}) - C_2\|$$

2. Diversity Loss to simulate a set of diverse collection outputs

$$L_d = \min\{\|\phi(C) - \phi(Y))\|\} + \sum_d \lambda_d \left\|\phi(C^d) - \phi(Y^d))\right\|$$

# Results

We adopt DAVIS dataset to evaluate the performance. The test set consists of 30 videos, each video has 30~100 frames. We convert them to gray frames as input and use the RGB results as ground truth.



Examples from DAVIS dataset. We convert them to gray video as input to train and test our model.

# Results

| | Zhang et al.[2] | Iizuka et al.[3] | Lei et al. [1] | Ours |
|---|---|---|---|---|
| PSNR | 29.07 | 29.25 | **30.35** | 29.76 |

[1] Chenyang Lei and Qifeng Chen. Fully Automatic Video Colorization with Self-Regularization and Diversity. In CVPR, 2019.
[2] R. Zhang, P. Isola, and A. A. Efros. Colorful image colorization. In ECCV, 2016
[3] S. Iizuka, E. Simo-Serra, and H. Ishikawa. Let there be Color!: Joint End-to-end Learning of Global and Local Image Priors for Automatic Image Colorization with Simultaneous Classification. ACM Trans. Graph., 35(4), 2016.

# Results

# Conclusion

1.Speed up the network forward path by 30% while still keep the comparable accuracy.

2. Get rid of hard-to-obtain optical flow data during testing.

3. Compared with state-of-the-art image colorization works, our results keep temporal coherence and multimodality.