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# FAST AND LIGHTWEIGHT REAL-TIME STYLE TRANSFER

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## Group

As I have not been able to find teammates, I would like to request approval to carry out this project as a solo participant.

## Purpose

The goal of this project is to develop a fast and lightweight neural style transfer system capable of producing artistic stylizations of images and videos in real time. While the classic method by Gatys et al. (2016) yields high-quality results, it is too slow for interactive or video applications. We aim to explore efficient architectures that balance style quality with computational speed, enabling practical use in real-time video filters and mobile creative tools.

## Data Sets

We plan to use:

- **MS COCO** dataset for content images.
- A subset of **WikiArt** paintings as style references.

## Methods and Experiments

We will start from the feed-forward style transfer network by Johnson et al. (2016) as our baseline. We will:

- Investigate lightweight backbones (e.g., MobileNet) to reduce computation.
- Explore quantization and pruning to improve speed and reduce model size.
- Evaluate image quality (FID, LPIPS) and real-time performance (target:  $\geq 25$  FPS on a mid-range GPU).

## References

1. Gatys, L.A., Ecker, A.S., and Bethge, M. (2016). Image Style Transfer Using Convolutional Neural Networks. *CVPR*.
2. Johnson, J., Alahi, A., and Fei-Fei, L. (2016). Perceptual Losses for Real-Time Style Transfer and Super-Resolution. *ECCV*.
3. Howard, A.G., et al. (2017). MobileNets: Efficient Convolutional Neural Networks for Mobile Vision Applications.