IMAGE COLOURIZATION VIA CONVOLUTIONAL NEURAL NETWORKS AND DEEP LEARNING

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ABSTRACT

This project addresses the challenge of automated colourization for 256×256 grayscale images using a dataset of 12,600 image pairs, balanced across human subjects, animals, and natural scenery. We frame colourization as a supervised learning problem in the CIELAB colour space, where a model predicts chrominance channels (a^*, b^*) from the luminance channel (L^*). A shallow convolutional neural network (CNN) provides the baseline performance, while our primary solution employs a deeper convolutional encoder-decoder architecture. This design captures high-level semantic features and spatial context, addressing limitations of shallow networks in perceptual realism. All source code, datasets, and results are publicly available here. —-Total Pages: 1

1 INTRODUCTION

While colour photography processes first emerged in the 1890s, widespread accessibility was not achieved until the 1970s (Science & Museum, 2020). Consequently, most historic photographs exist only in black and white, lacking the visual richness expected by modern audiences. For individuals with vision impairments—such as those who have undergone cataract surgery—interpreting grayscale images poses significant challenges (Vogelsang et al., 2024), rendering much of photographic history inaccessible to them.

This project leverages deep learning to automate the colourization of black-and-white images, with the dual goals of restoring lost visual information and enhancing accessibility. Traditional colourization methods often yield desaturated results and require laborious manual intervention (Cheng et al., 2016), whereas convolutional neural networks (CNNs) learn spatial and semantic features to generate realistic colours autonomously (Zhang et al., 2016). By automating this process, we aim to make historical imagery more engaging and inclusive.

2 INIDIVIDUAL CONTRIBUTIONS RESPONISBILITES

3 NOTABLE CONTRIBUTIONS

3.1 DATA PROCESSING

3.2 BASELINE MODEL

3.3 PRIMARY MODEL

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