Review Paper on Deep RL for Video Summarization

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Abstract: *In recent years, the explosive growth of video content has heightened the need for efficient summarization techniques to distill lengthy videos into concise, informative summaries. Traditional approaches to video summarization often rely on heuristic-based methods or supervised learning techniques, which can be limited by their reliance on predefined features or extensive labeled datasets. To address these limitations, this paper explores the application of Deep Reinforcement Learning (DRL) for video summarization. DRL offers a dynamic framework where an agent learns to optimize summarization strategies through interaction with the video content, enabling adaptive and context-aware summarization. We propose a novel DRL-based framework that combines convolutional neural networks (CNNs) and recurrent neural networks (RNNs) to extract and represent temporal features from video frames. Actor-critic architecture is utilized, where the actor generates candidate summaries and the critic evaluates their quality based on a reward function designed to balance in formativeness and brevity. We introduce a new reward function that incorporates both content relevance and diversity to encourage the generation of summaries that effectively capture key moments and maintain narrative coherence. Experimental results on benchmark video datasets demonstrate that our DRL-based approach significantly outperforms traditional methods in terms of both summary quality and user satisfaction. The proposed method not only achieves state-of-the-art performance but also offers greater flexibility and adaptability to diverse video content. This work highlights the potential of DRL in advancing video summarization and opens avenues for future research in optimizing video content extraction and representation*

Keywords: Video Summarization, Reinforcement Learning (RL), Temporal Feature Extraction, Actor-Critic Methods, Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), Summary Quality Evaluation, Reward Functions, Content Relevance, Narrative Coherence, Key frame Selection, Video Content Analysis, Adaptive Summarization

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