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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Video Summarization - Visual Storyboard using video clips

PROJECT REPORT

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In partial fulfillment for the award of degree

of

Bachelor of Engineering

in

Computer Science and Engineering

2023-2024

RV COLLEGE OF ENGINEERING®, BENGALURU-59

(Autonomous Institution Affiliated to VTU, Belagavi)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

Certified that the major project work titled ***'Video summarization - Visual Storyboard using video clips.'*** is carried out by **Shivansh Gupta (1RV20CS160), Aisiri M R (1RV20CS012), and Mohammad Bilaal (1RV17CS086)** who are bonafide students of RV College of Engineering, Bengaluru, in partial fulfillment for the award of degree of **Bachelor of Engineering in Computer Science and Engineering** of the **Visvesvaraya Technological University**, Belagavi during the academic year 2023-2024. It is certified that all corrections/suggestions indicated for the Internal Assessment have been incorporated in the major project report deposited in the departmental library. The major project report has been approved as it satisfies the academic requirements in respect of major project work prescribed by the institution for the said degree.

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DECLARATION

We**, Shivansh Gupta (1RV20CS160), Aisiri M R (1RV20CS012), and Mohammad Bilaal (1RV17CS086),** students of eighth semester B.E., department of CSE, RV College of Engineering, Bengaluru, hereby declare that the major project titled ***'Video summarization - Visual Storyboard using video clips.'*** has been carried out by us and submitted in partial fulfillment for the award of degree of **Bachelor of Engineering** in **Computer Science and Engineering** during the academic year 2023-24.

Further we declare that the content of the dissertation has not been submitted previously by anybody for the award of any degree or diploma to any other university.

We also declare that any Intellectual Property Rights generated out of this project carried out at RVCE will be the property of RV College of Engineering, Bengaluru and we will be one of the authors of the same.

Place: Bengaluru

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ABSTRACT

This project, titled "Video Summarization - Visual Storyboard using Video Clips," addresses the challenges of information overload and time constraints faced by users when consuming video content. Existing systems struggle to maintain accuracy and relevance in summarizing complex videos, often lacking real-time processing capabilities. Our objective is to develop a robust system for generating concise video summaries and visual storyboards, leveraging advanced AI techniques such as deep learning and multimodal analysis.

The methodology encompasses four phases: Research, Planning and Design, Code Development and Execution, and Results and Analysis. We utilized Python for implementing deep learning algorithms, Google Colab for training models, and custom datasets from YouTube for testing. The system's architecture integrates CNNs and RNNs for feature extraction and sequence modeling, alongside attention mechanisms for improved summarization quality. The process includes preprocessing video data, extracting key frames, and generating visual storyboards with contextual relevance.

Experimental results demonstrate that our system effectively summarizes videos with high accuracy and user satisfaction. The robustness of the system is highlighted by its ability to handle large datasets and multiple concurrent users without performance degradation. Specifically, the system processes videos with lengths ranging from 2 minutes to 1 hour, maintaining an average processing time of 3 seconds per minute of video. The system supports up to 500 simultaneous users, ensuring stable and reliable performance. Statistical analyses confirmed the significant differences in processing times between the prompts, validating our approach. The performance metrics, including processing time, standard deviation, and user satisfaction, highlight the system's robustness and reliability.

In conclusion, our project successfully addresses the identified gaps in video summarization and storyboard generation. Future work will focus on optimizing processing times, enhancing story quality, and integrating real-time summarization capabilities. User feedback will be incorporated to refine algorithms, ensuring continuous improvement and adaptability to diverse video content types.

ACRONYMS

1. **GAI:** Generative Artificial Intelligence
2. **LLM:** Large Language Model
3. **CNN:** Convolutional Neural Network
4. **NLP:** Natural Language Processing
5. **API:** Application Programming Interface
6. **RNN:** Recurrent Neural Network
7. **VS Code:** Visual Studio Code

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