

## Development of a Violence Scene Prediction System in Films Based on Visual Poster Analysis Using The Machine Learning Method Convolutional Neural Network (CNN)

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### ABSTRACT

Films as an entertainment often contain various visual elements, one of which is violent scenes. In some cases, the presence of violence in films can have a negative impact on viewers, especially children. Therefore, a system is needed that can predict the potential existence of violent scenes in a film, particularly based on poster. This research aims to develop a system that uses machine learning methods to analyze movie posters and estimate the likelihood of the film containing violent scenes. The designed system will be trained using a dataset of movie posters labeled according to the level of violence present in the films. The posters will be analyzed using digital image processing techniques, and the results will serve as input for the machine learning model used in the system. The development process involves using artificial neural network (ANN) techniques, which have been proven effective in detecting relevant visual patterns. The research results show that the proposed system can achieve a high level of accuracy in predicting films that contain violent scenes based on their visual posters. Thus, this system can be useful for the film industry, parents, and regulatory agencies to identify inappropriate films for certain age before their release.

**Keywords:** *Movie Poster, Violence Prediction, Machine Learning, Image Processing, Artificial Neural Networks, Film Classification*

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### INTRODUCTION

Film is one of the most widely consumed forms of entertainment, attracting audiences from various age groups and social backgrounds. However, many films contain violent scenes that may negatively influence viewers, especially children and adolescents. Exposure to violent visual elements has been associated with desensitization, increased aggressive tendencies, and psychological impact on vulnerable audiences. As digital media becomes increasingly accessible, the need for early detection of violent content becomes more urgent (Rahmah et al., 2025).

One potential solution is the development of systems capable of predicting the presence of violence based solely on a film's poster. Posters serve as the primary visual

representation of a film and often contain cues related to its themes. With advances in machine learning and image processing, visual analysis of posters can support preventive actions before the film is viewed.

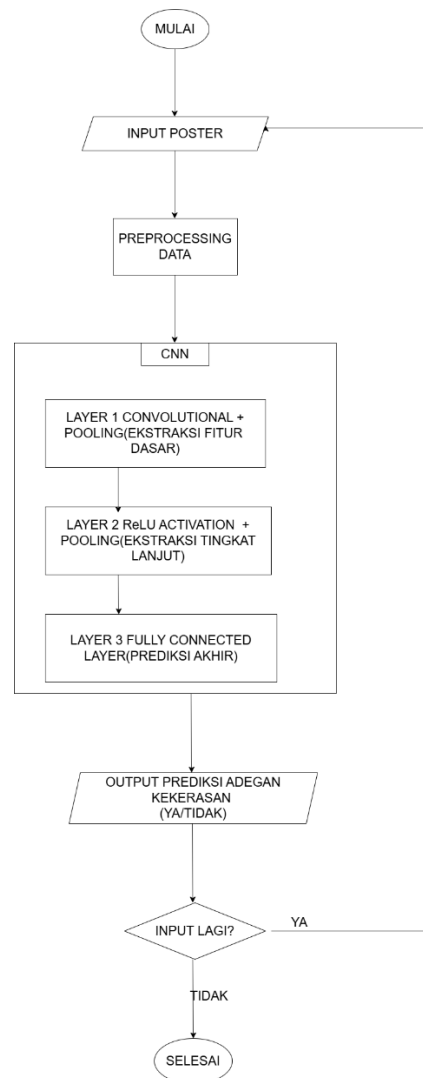
Previous studies have explored machine learning applications in real time violence detection during sports channel, (Shilaskar et al., 2023), applied CNN to detect violence through real life photo contain fake violence or non-violence act (Amelia, D. D. T., Sulaksono, J., & Widodo, 2023), applied CNN to classify movie poster into genre (Popat et al., 2022), Klasifikasi Citra Menggunakan Convolutional Neural Network pada Caltech 101 (Suartika E. P, I Wayan, Wijaya Arya Yudhi, 2016), Violence Detection Using Spatiotemporal Features with 3D Convolutional Neural Network (Ullah et al., 2019). However, none of these studies specifically focus on predicting violent scenes from poster visuals. This leaves a gap where machine learning can be applied for children rather than sentiment, sports, etc.

## **METHOD**

This research adopts a quantitative research method focusing on the visual analysis of movie posters using machine learning techniques. This approach was selected because the research aims to generate data-driven predictions through image processing and classification using a Convolutional Neural Network (CNN). The research procedures involve several stages, including image preprocessing, feature extraction, model training, and model performance evaluation (Ardana, 2025).

The subjects of this study are movie posters collected from various online sources. Posters obtained from open platforms such as Kaggle were initially categorized into genre folders (Action, Horror, Romance, Comedy). Each poster within these genre folders was then manually divided into two separate folders, namely the Train Folder and the Validation Folder.

Data collection in this study was carried out through several steps. First, the movie posters were retrieved from an open platform such as Kaggle, which provides poster datasets labeled with violence categories. The posters were manually downloaded and stored in JPG or PNG format as raw data. After collecting the data, a preprocessing stage was conducted to prepare the images before entering the model training process. This preprocessing includes resizing the images to 128×128 pixels, normalizing pixel values, converting the images to RGB format, and reshaping the image dimensions into tensors suitable for processing by the Convolutional Neural Network (CNN).



**Figure 1.** Flowchart of The System

The flowchart above illustrates the system design process for detecting violent scenes in movie posters using a Convolutional Neural Network (CNN). The following is a detailed explanation of each step in the flowchart:

**Start:** The process begins with system initialization.

**Input Poster (Size e.g., 300×300 px):** A movie poster with a predetermined size (e.g., 300×300 pixels) is entered into the system as input.

**Data Preprocessing:** The input poster is first processed to ensure that the data is in the proper format for CNN processing. This step may include normalization, resizing, or data augmentation.

**CNN:** The preprocessed poster is then fed into the Convolutional Neural Network (CNN) for feature extraction and prediction. The CNN consists of several layers:

**Layer 1 — Convolutional + Pooling (Basic Feature Extraction):** The first layer performs convolution and pooling to extract basic visual features from the poster.

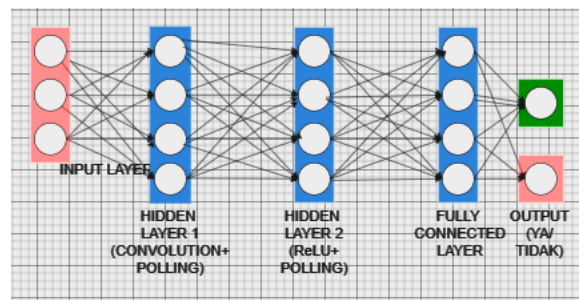
**Layer 2 — ReLU Activation + Pooling (Advanced Feature Extraction):** The second layer applies the ReLU activation function followed by pooling to extract more advanced features.

**Layer 3 — Fully Connected Layer (Final Prediction):** The third layer is a fully connected layer that produces the final prediction.

**Prediction Output (Violent Scene: Yes/No):** The output of the CNN is a prediction indicating whether the poster contains violent elements (Yes/No).

**New Input?:** The system checks whether another poster needs to be processed. If yes, the process returns to the input stage. If no, the process ends.

**End:** The process is completed.



**Figure 2.** CNN Architecture

The image above illustrates the CNN architecture used in this study. The prediction system utilizes the Convolutional Neural Network (CNN) method, designed to process image-based data. The CNN architecture consists of several main layers:

**Input Layer:** Receives the input data in the form of poster images represented as tensors.

**Hidden Layer 1 (Convolution + Pooling):** Performs convolution to extract local features from the image, followed by pooling to reduce dimensionality.

**Hidden Layer 2 (ReLU + Pooling):** Applies the ReLU activation function to enhance non-linearity and maintain positive values, followed by a second pooling operation for feature refinement.

**Fully Connected Layer:** Integrates all extracted features to generate a prediction.

**Output Layer:** Produces the final output in the form of probabilities indicating whether violent content is present (yes) or not (no).

## FINDING AND DISCUSSION

### RESEARCH RESULT

The research produced a prototype system designed to classify movie posters using a Convolutional Neural Network (CNN). The dataset was processed and used to train the machine learning model, after which the system was implemented into a functional web-based and GUI-based application. The system successfully accepts image uploads, performs image preprocessing, runs the prediction model, and returns classification results with associated probabilities. The testing process demonstrated that the system can correctly classify posters under normal input conditions.

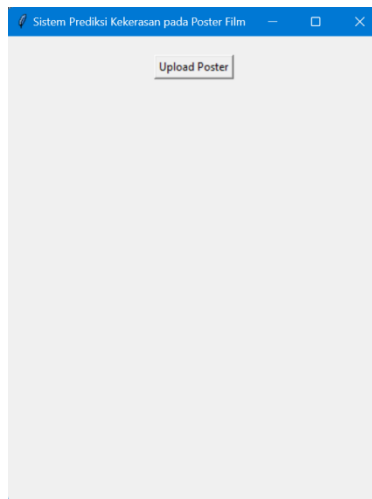


Figure 3. Upload Page

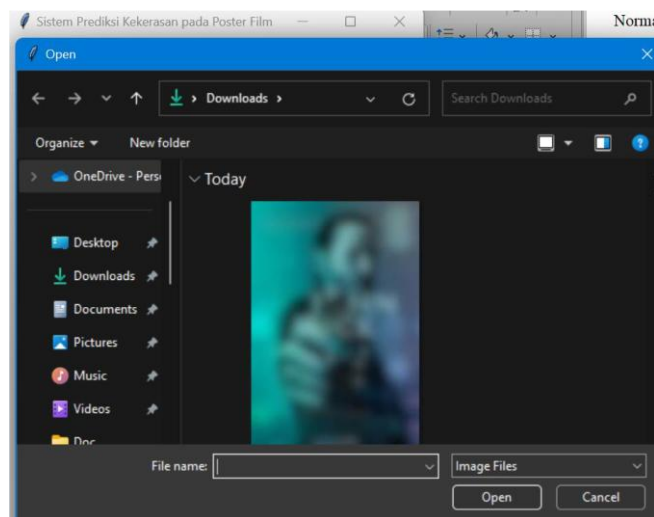


Figure 4. Upload Process

After the application was developed, testing was conducted to measure its accuracy and responsiveness under various parameter conditions, both normal and

abnormal. The first test was performed using movie posters with known violence categories. The predicted results aligned with expectations for posters containing violent and non-violent elements. Several tests carried out include:

**Violent Movie Posters:** The model produced sufficiently accurate predictions by classifying them as "Violence" with high probability.

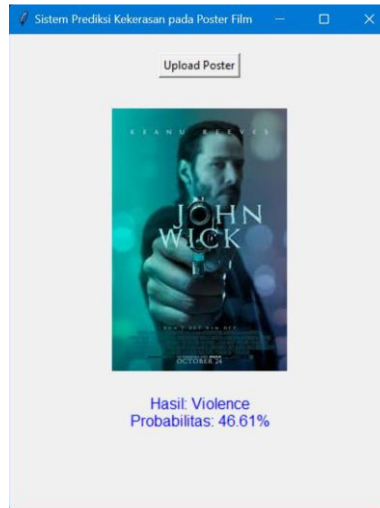


Figure 5. Analysis Result of Violence Movie Posters

**Non-Violent Movie Posters:** The model also predicted "Non-Violence" with sufficient accuracy.

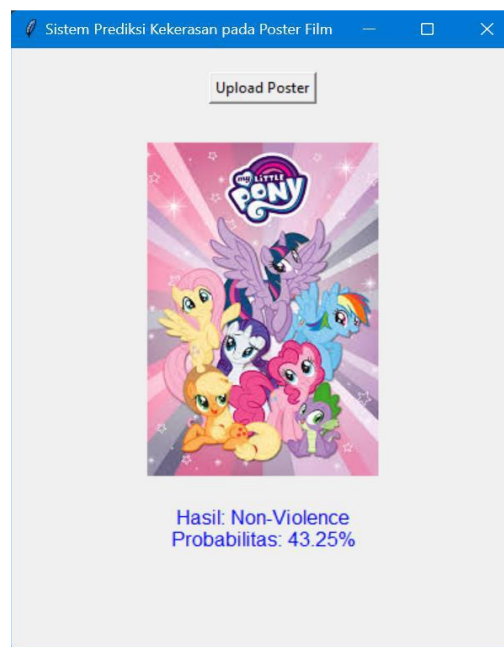
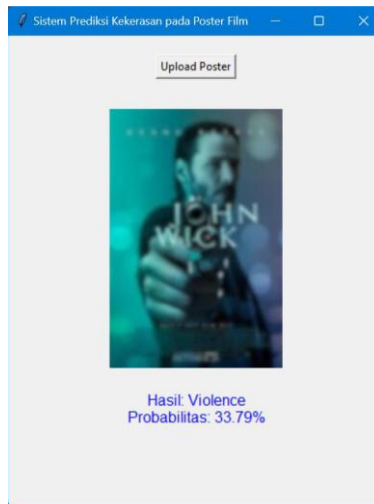
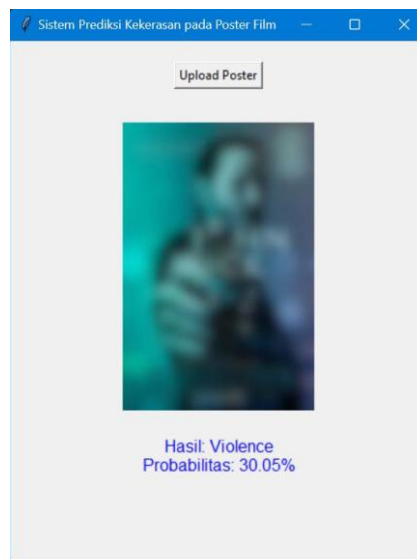


Figure 6. Analysis Result of Non-Violence Movie Posters

Further testing was conducted by uploading posters that were not ideal, such as blurred images or posters with low resolution. The prediction results showed decreased accuracy under these conditions. This indicates that the model requires additional training with more varied and representative image data. The test results were manually edited to appear blurred using Canva.



**Figure 7.** Analysis Result (Blur 40)



**Figure 8.** Analysis Result (Blur 78)

## DISCUSSION

The test results show that the prediction system is capable of classifying movie posters into Violence and Non-Violence categories under normal conditions, as demonstrated in the series of tests using original film posters. The CNN model successfully

recognized visual patterns associated with violent content, allowing it to generate consistent probability-based predictions.

Under abnormal conditions—such as blurred or low-resolution images—the accuracy decreased, demonstrating that image quality significantly affects the model's feature extraction capability. These results confirm that the model performs optimally when processing clear visual data that matches the input standards used during training.

These research findings align with previous studies that utilize machine learning for visual classification tasks. For Example (Amelia, D. D. T., Sulaksono, J., & Widodo, 2023) yang memakai foto 2 orang melakukan aksi yang menyerupai kekerasan dan non-kekerasan, dan applied CNN to classify movie poster into genre (Popat et al., 2022).

This study extends that body of literature by focusing specifically on movie posters as the medium for violence prediction, unlike prior studies that rely on video content, metadata, or textual reviews. Thus, the study introduces a new contribution by applying CNN specifically for detecting potential violence based on visual poster analysis.

This research has several limitations that may influence the results:

1. The dataset is limited to a specific number of posters obtained from Kaggle, meaning the visual diversity may not represent all possible poster variations,
2. The model is sensitive to image quality, as indicated by reduced accuracy on blurred and low-resolution posters,
3. The predictions rely solely on one visual source—the movie poster—and do not incorporate trailers, synopses, or other metadata that could enhance model accuracy,
4. The model predicts only two classes (Violence/Non-Violence) and does not classify the severity of violence (low, medium, high),

The research findings provide a strong foundation for developing visual-based sensitive content detection systems. Such systems can be used by film censorship organizations, parents, or digital distribution platforms as a preliminary screening tool before viewing.

For future research, several improvements are recommended:

1. Expanding the dataset with thousands of posters from various countries and genres,
2. Adding data augmentation techniques to improve model robustness,
3. Developing multi-class classification to detect levels of violence,
4. Integrating video-based violence detection to produce more comprehensive results.

## **CONCLUSION**

The violence prediction system based on visual film poster analysis has been successfully developed using a machine learning approach with Convolutional Neural Networks (CNN). Based on testing results, the system is able to accurately classify film posters under normal conditions. However, several challenges remain in classifying images with low quality or those that do not match the model's expected input characteristics.

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