

# Women Violences Detection Techniques using ICT: An Review

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## Abstract:

The rapid growth of Women's violence to monitor human activity demands such a system that recognizes the violence and suspicious events automatically. Abnormal and violent action detection has become an active research area of computer vision and image processing to attract new researchers. The relevant literature presents different techniques for the detection and study of such activities from the tag-based image retrieval system proposed in recent years. This research study reviews various state-of-the-art techniques of violence study. Here propose the detection and recognition system of Women's violence and how image tag retrieval is useful for that. The survey shows the system is useful. While the profusion of visual content available on the Internet, and the easy access to such content by all users allows us to find relevant content quickly, it also poses challenges. This paper attempts to address this issue by building models using modern data mining techniques namely classification trees and random forests to predict the vulnerability of ever-married women of age 15 to 40 years to domestic violence incidents in India.

Violence is a complicated issue that has harmful physical and nonphysical consequences. In this article, we are particularly investigating violence in intimate partner relationships among homeless youth. This phenomenon has many contributing factors thus it would be useful to know which of these variables have a more important role in determining how violent a person can be and also have the means to predict the chance of perpetration for a new person. The study of past crime data can help us in analyzing crime patterns and important hidden relations between the crimes. So, the crimes predicting model can be simulated which will study verified past criminal records and predict future criminal activities. In the recent past, there has been an increased interest in time series research.

**Keywords:** Violence Detection (VD), violent behavior, SVM, Action and Activity Recognition(AAR), Data Mining, Time Series Algorithm, Crime prediction(CP), clustering.

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## I. Introduction:

The main goal of this paper is to present a thorough systematic literature review of the methods of violence detection. Over the last decade, different methods of violence and irregular activity detection are proposed. It is important to classify, analyze, and summarize the proposed methods. To conduct a wide-ranging research study, we set up the basic search strings for gathering the most relevant study on the violence activity detection available in the digital libraries. develop an automated system that analyzes what images are shared during protests and how they change over space and time. In doing so, our visual approach identifies significant characteristics of protests especially violence by automatically assessing visual activities and attributes described in a given scene.

Violence against women is a persistent global public health problem. A report by the European Union Agency for Fundamental Rights stated that one out of three women had experienced physical or sexual violence after their 15. Worldwide the most common form of gender-based violence is abuse by the intimate person.

Among women with a current or a previous partner, 13.6 % had experienced physical and/or sexual violence. In 2016, 115 women were killed, and the majority of them were by a relative. In the field of video-based violence detection, it is difficult to capture effective and discriminative features as a result of the variations of the human body. The variations are mainly caused by scale, viewpoint, mutual occlusion, and dynamic scenes. In early attempts, most researchers detected violent scenes by recognizing some violence-related characteristics like a flame, blood Violence detection in surveillance video using low-level features gunshots, explosions, and car-braking.

One of the achievements of family developments is conflicts in relations between couples. The results of conflicts are relaxing marital relations and followed by the increasing rate of divorce. This study aimed to predict marital conflict based on the sexual schema, sexual function, and sexual satisfaction among women involved in domestic violence referred to the legal medical center in Sari city. One-third of homeless youth

(HY) experience some sort of physical intimate partner violence(IPV) and frequently young people experience bidirectional partner violence. One in four homeless youth has reported being both a victim and perpetrator in their current or most recent romantic relationship. Programs that address youth IPV frequently focus on victim and survivor support. The current study proposes a method to predict the occurrence of adolescent and young adult IPV perpetration using Machine Learning (ML).

Violence is a complex phenomenon that impacts adolescents and young adults across America. It occurs in multiple ways including interpersonal violence, intimate partner violence, gang, and gun violence. Homeless youth experience all types of violence at higher rates than their housed counterparts. The status of women has undergone many changes over the past few decades. There has not only been a decline in the status of women but also there has been an incidence of crimes against women. According to the National Crime Records Bureau, crime against women has significantly increased in recent years. Data Mining is a detailed process of analyzing large amounts of data and extracting the relevant information Use of data mining techniques can produce important results from crime datasets.

Crime analysis is the field of exploring; interrelating and detecting relationships between various crimes. The police are responsible for maintaining criminal records. These records contain a huge amount of data set with complex relationships. Proper analysis and study of this dataset using data mining techniques can produce important results by finding undiscovered patterns. The knowledge extracted from the dataset can be a great tool and support to the police department to prevent crimes. An ideal crime analysis tool should be able to identify crime patterns quickly and in an efficient manner for future crime pattern detection and action. All the above challenges motivated this research work to focus on providing solutions that can enhance the process of crime analysis for identifying and reducing crime against women. The present research work proposes the use of an amalgamation of data mining techniques that are linked with the common aim of developing such a crime analysis tool. The main aim of this research work consists of using time series methods that can systematically address the complex problem related to various forms of crimes against women. According to WHO Gender-based violence affects 35–45% of women worldwide, mostly coming from domestic violence. A good screening procedure in clinical practice is useful, but WHO does not advise universal screening, recommending further research.

## **II. Related Work:**

Violence detection techniques using computer vision, analyze the surveillance camera videos. Over the last few years, these cameras and other surveillance equipment are installed in different places for public safety e.g. Educational institutions, hospitals, banks, markets, streets, etc. to monitor the activities of people. Monitoring includes the analysis of the behavior of people, whether their activities are suspicious or normal. This detection of suspicious activity 24/7 or finding such activity within huge data consisting of recorded videos is a very difficult task. For this purpose, different methods have been developed to recognize human activities in real life. These methods help to detect suspicious activities in the surveillance videos. The systematic review delivers details of methods using SVM, CNN, and traditional machine learning classification-based violence detection. Accuracy is depending upon the techniques of object recognition, features extraction, and classification along with the dataset being used. Our study potentially contributes to highlighting the techniques and methods of violence activity detection from surveillance videos [1].

There is an overwhelming amount of visual data on the Internet today. For example, each day, 300 million photographs are uploaded to Flickr, and over 500 thousand hours of video are uploaded to YouTube. This data allows users on the web to find content that has a wide variety of uses (e.g. for websites, presentations, etc.). However, this abundance poses a challenge for anyone who wishes to automatically flag and filter this content.

We studied and examine such cues behind images to characterize sexual intentions behind popular celebrity images. We exploit 17 types of attributes composed of facial expressions, postures, and gestures. We also incorporate a measure of the amount of skin exposed, and a feature dimension that captures the scene context information in the photo. These features are in turn used to predict the mood and emotion of the subject that can help deduce the sexual intent of the overall image context we present a new dataset containing 1,146 celebrity images annotated for attributes (pose, expression, skin, and background), moods and emotions, and sexual intents. The collected images were annotated on the MTurk platform. We studied and believe the study towards the research of identification of human intentions from images, in general, will open up new dimensions. [2].

We study the constructed a large-scale novel dataset, UCLA Protest Image Dataset, which contains more than 10k protest images with their perceived violence values manually annotated. We will release the dataset with all the annotations collected for perceived violence and attributes. Using this data and a model trained on it, we have presented the results of our analysis on various past and ongoing protest events in the world. Research in media studies and political science has suggested that the visual dimension of human

communication can play a significant “persuasive” role in shaping public opinions. Our study demonstrates that the advances in computer vision and multimedia enable us to systematically and automatically measure the impacts of visual media content on major social events in our society.

Multimedia research has long investigated human emotion processing by computational approaches on large-scale multimodal data. While its applications have reached out to several different disciplines, understanding social and political activities and their meanings and implications have been relatively overlooked. Therefore, our paper suggests a novel collaborative area of research between multimedia and political science [3]. SNA has proven to be a suitable instrument to analyze ED information in our study, and to analyze a large dataset of multiple relationships among commonly reported diagnoses of victims of violence. From a dense system of relationships in which each diagnosis is often mentioned with one another, the SNA method can detect clear diagnostic patterns within which cross-references are more frequent, while diagnoses external to the group are rare. The method also clarified particular roles played by some diagnoses. Some diagnoses occur together, while others are found in different violence patterns that connected different violence processes. The model may be proven to support ED staff in identifying early signs of violence to adequately support the victims and mitigate the harms [4].

In face of the noisy moving scenes, a new method is proposed to segment the motion regions according to the distribution of optical flow fields. The segmentation of the motion regions plays an important role in simplifying the features and decreasing the noises. 2. In the motion regions, we propose to extract two kinds of low-level features: Local Histogram of Oriented Gradient (LHOG) and Local Histogram of Optical Flow (LHOF) to represent the video-based activities Spatio-temporal. Considering the different class spaces for different kinds of low-level features, we adopt the late-fusion strategy. That is to say, LHOG and LHOF features are processed respectively under the framework of the BoW model, and then the two kinds of vectors are combined into new vectors, followed by the SVM classifier. Compared with the previous methods, the proposed method achieves better performance on the three challenging datasets. Experimental results could practically demonstrate the effectiveness of the proposed approach for both general violence and crowd violence sequences [5].

In a world where we talk about equality of race, caste, religion, and most of all gender, the nature of society has become such that the victim of most crimes are still women. Various crimes are inflicted upon women which include, murder, rape, molestation, abduction, women trafficking, domestic violence, and many more. We will be focusing on the crimes and cruelty faced by women in India based on statistics. In India, crimes like Sati (burning women to death when her husband dies), child marriage, female feticide, and domestic violence have been influenced by religion and some by tradition, where the tradition on one had treated women as goddesses and on the other hand, makes the victim to such shocking deeds. Horrible crimes like murder and rape as well as comparatively minor issues like theft (might be in the form of chain snatching or burglary), extortion, and inequality are all still faced by women in India on a large scale. Elderly women have to face various crimes in the nation like murder, theft, cheating, and bag snatching making them more dependent and vulnerable than ever. Off late, due to the increasing power of media and the rise in technology, these issues have gained importance and been thought and researched upon. But did that decrease the ever-increasing graph of women's crimes or did it just mean the criminals were being punished but the crimes kept happening these crimes can be analyzed using various methods of data mining, which is a method of uncovering hidden information using big data. This has become a method of investigation throughout the world now. There are numerous data mining techniques and they include entity extraction, decision trees, clustering, neural networks, social network analysis, and many more.

Clustering analysis is the process that we have adopted for our research. Data mining is a procedure that includes evaluating and examining large databases to generate some new information that may be fruitful, however, its usage in the field of criminology is very recent. Data mining is the process that can be used from making various conclusions, as well as statistical predictions based on the pattern of the dataset, the crime, even the criminals or the victims, can be characterized based on different criteria for better understanding. Data needs to be analyzed from an informational collection and be changed into a reasonable structure for additional utilization. Analyzing the data has become increasingly important because of the steady increase in the crime rate across the globe. The goal behind this is to find out reasons and help the investigators come up with a viable solution for the same. Data mining is used on crime datasets to study the features that lead to a high crime rate. This can be done using two methods, description mining and classification with prediction. The former is usually associated with rules, clusters, patterns, or correlations, while the latter uses probability equations and the prediction of futures using statistical measures [6].

The study is divided into two main parts, first, to predict the vulnerability of a woman to experience domestic violence, and second, identification of major risk factors associated with the experience of domestic violence incidents among Indian women. The study is based on the data from India's National Family Health Survey-2 (NFHS-2) conducted in 1998-99. NFHS along with information on fertility, mortality, family planning, and health care, also provides information on violence against women. The Indian Institute of

Population Studies (IIPS) coordinated the survey with financial support from the United States Agency for International Development (USAID) and with additional funding from UNICEF, ORC Macro Calverton at Maryland, USA, and East-West Population Center at Hawaii, USA.NFHS-2 collected information from a nationally representative sample of more than 90,000 ever-married women of age 15-49 years covering India's population over twenty-six states.

The analysis is based on ever-married women who responded to the question 'Since you completed 15 years of age, have you been beaten or mistreated physically by any person at home?' We randomly chose 5,000 observations to fit the predictive models and identify major risk factors for experiencing domestic violence. Building a vulnerability model is common among social scientists to apply logistic regression when the objective is to determine which predictors or risk factors are associated with the binary ('yes' and 'no') outcome of the response variable. However, for this study logistic regression produces the following problems. First, logistic regression results could be used to characterize the data on hand but turning the results into prediction requires additional work. Second, there is no way to effectively incorporate 'misclassification costs' directly into logistic regression even though they are essential. Third, if one ignores costs and proceeds with logistic regression anyway, the findings could be very misleading. When we conducted a logistic regression model using the most appropriate set of risk factors, only 16 true cases of domestic violence incidents were identified correctly. The histogram of the predicted probabilities from the logistic regression model was used to classify women of 'yes' and 'no' experience of domestic violence. The graph shows that only a few of these probabilities are greater than 0.5. The 0.5 threshold is important because women with probabilities greater than 0.5 would be classified as vulnerable to experience domestic violence incidents.

The most important finding is that only for these few women does the statistical model imply that chances are better than 50-50 of a new woman to experience violence. Thus about 98 percent (970/986) of the true cases are incorrectly determined to have not occurred. This is unsatisfactory [7]. This research is descriptive correlational. The statistical population included all ladies referred to Legal Medicine Organization in the first half of 2016, respectively. For this purpose, the 95 samples were selected through the random method. To collect data. Four questionnaires consisting of, marital conflict; sexual stereotypes, sexual satisfaction, and sexual function were administered.

Data analysis was performed through Pearson's correlation coefficient and regression analysis by SPSS21 [8]. As part of a longitudinal study of Los Angeles area homeless youth, drop-in service-seeking youth completed a self-administered questionnaire. The presented results are from the third panel of data collection (sample size; N=452). The Revised Convict Tactics Scale(CTS2) was used to assess physical IPV perpetration. The sample was limited to youth who answered the questions related to IPV (99 youth either did not answer the corresponding questions or were never in a relationship which narrows down the data to 353). The research team approached all youths who entered the service agencies during the data collection period and invited them to participate in the study. The selected agencies provided weekday services to eligible HY, including basic needs, medical and mental health services, case management, and referrals and connections to other programs such as housing services. The questionnaire asks the respondent about their personal life, their interactions with other people, where and how they live, the quality of their relationship and sex life if they have any partner, etc. These data are unique in that they include the Revised Convict Tactics Scale, which was to assess physical IPV perpetration in each participant's most recent intimate relationship.

The CTS2 is the most widely used instrument in research on interpersonal violence and includes data on perpetration and victimization across various domains of violence (i.e. physical, emotional, relational, sexual, and threatening). The current study of the primary outcome variable was physical perpetration that includes a range of items from "I slapped my partner" (minor) to "I kicked my partner" (severe). The original dataset had over 1000 variables. The number of variables in comparison with the number of participants is too large for using MachineLearning techniques. Therefore, unrelated variables were removed from the dataset for analyses, which resulted in decreasing the number of potential predictor variables to 26[9]. Several data mining algorithms have been compared by researchers using various real-life applications. Comparison of three prominent data mining techniques (Decision Trees, Apriori, and K-NN) for analyzing crimes against women shows that the Decision tree is better than the other two techniques. The elapsed time for the decision tree is the minimum. Apriori Algorithm is also one of the good techniques. The accuracy of both the decision tree and Apriori is the same. However, the performance of the K-NN Algorithm is less in comparison to Apriori and Decision tree with the given training set.

The main reasons for increasing women's crimes in China are overall negligence of women's survival and education, development and economic rights, and women's ignorance and disregard of their rights. The characteristics and causes of female crimes in China are analyzed first and then appropriate strategies have been proposed to reduce female crimes. Three different data mining classification algorithms for prediction namely decision tree, Naïve Bayes, and K-Nearest Neighbor with the help of WEKA (Waikato Environment for Knowledge Analysis), which is open-source software, have been compared for the prediction of cancer. It has been concluded that Naïve Bayes is a superior algorithm compared to the two others. Apriori Algorithm is the

most popular and useful algorithm of Association Rule Mining of Data Mining. Apriori algorithm is used in mining association rules from a dataset containing women's crime data. The main motive is to apply Apriori to a real dataset against crimes on women which extracts hidden information that where the real culprit is hiding. A univariate time series model takes the price of a product as a parameter that systematically influences the prediction. The price influence is computed based on historical sales data to identify products with comparable history. Compared to other techniques this approach is easy to compute.

A study of the real-world system developed for a large food distribution company details the systems forecasting algorithm. Which efficiently handles several difficult requirements. The robustness of the system has been proven by its heavy and sustained use since being adopted in November 2009 by a company that serves 91 percent of the combined populations of Australia and New Zealand.

Mining sequential patterns in time series .data is broadly used in a variety of areas to make a prediction, and an appropriate model should be established before the prediction can be done, therefore, the way how to mine out time-series patterns from time-series database becomes extremely important. Experimental results demonstrate that this algorithm has mined out the frequent series, which meets the real-time restraints successfully.

Time series is a collection of values obtained from sequential measurements over time. Time series data mining stems from the desire to reify our natural ability to visualize the shape of data. However, with the ever-growing maturity of time series data mining techniques, this statement seems to have become obsolete. Nowadays, time series analysis covers a wide range of real-life problems in various fields of research. Some examples include economic forecasting, medical surveillance, and sales.

Hence on analyzing the comparisons between the various data mining algorithms mentioned in this article and considering the advantages of time series algorithm that has been applied in various fields such as sales, agriculture, and other important areas that require working with accurate and timely information, we have decided to use time series algorithm[10].

Deep Neural Network for Gender-Based Violence Detection on Twitter Messages. DL-MLP was developed on Tensorflow 2.0 and Keras 2.3.1, and the Adam algorithm was employed to train it. The Adam algorithm is used to calculate the adaptation of the learning rate for each parameter, storing an exponentially decreasing average of past gradients. The learning rate (h) was established as 0.0006, meanwhile, the stopping criterion was 20 epochs with a batch size of 150.

DL-MLP was set up through the trial and error method, which is usual in neural network environments. For this, we randomly take from TDS a subset ST (about 20%), that was split into STtrain and STtest, where ST TDS, and STtrain\ STtest =  $\mathbb{E}$ . In this process, we use STtrain and STtest to assess different configurations of numbers of hidden layers and neurons by layer, and the topology that produced the best classification result was selected. The final architecture was a DL-MLP with six hidden layer and sigmoid activation functions, and the number of hidden nodes for each layer was set as 6, 6, 5, 5, 4, and 3, respectively [11]. The author proposed a tag-based image search approach with social re-ranking. The author proposed systematically fusing the visual information, social user's information, and image view times to boost the diversity performance of the search result. The author proposes the inter-user re-ranking method and intra-user re-ranking method to achieve a good trade-off between diversity and relevance performance. These methods not only reserve the relevant images but also effectively eliminate the similar images from the same user in the ranked results. In the intra-user re-ranking process, we fuse the visual, semantic, and views information into a regularization framework to learn the relevance score of every image in each user's image set. To speed up the learning speed, we use the co-occurrence word set of the given query to estimate the semantic relevance matrix. [13].

NUS-WIDE is a large-scale community-contributed benchmark image dataset for evaluating multimedia tasks. There are 269,648 images associated with 5,018 tags annotated by amateur users. We do not pre-filter noise tags since it has already been done. The dataset provides 81 ground-truth concept labels which are used for performance evaluation. All of the 269,648 images are manually labeled, so this dataset can be used to test whether providing additional tagging data for labeled images is of value. The author randomly samples 5000 query images and uses the rest for training and retrieval. MIR Flickr-1M consists of one million images collected from Flickr that are annotated by more than 10,000 user tags. Author pre-filter tags to simply retain the first 1000 most popular tags in the dataset. Do not use complicated tag refinement methods to show that such a simple rule works for our method. This reduces the number of images with user tags to 897,500. In this dataset, only 25,000 images have ground-truth manual labels. Among the 25,000 labeled images, 2000 images are randomly selected as test queries and the remaining images are used for training and retrieval [14]. Violence against women and children is a public health issue of pandemic proportions. It is estimated that one in every three women worldwide has experienced physical, emotional, or sexual violence. Similarly, each year one out of two children are victims of some form of violence including domestic aggression and bullying. Due to the widespread use of the Internet and social media, women, and children are now vulnerable to other types of violence such as cyber-bullying and online sexual or emotional harassment. To help alleviate this social problem, the use of computer science and related technologies has been leveraged in recent years. The Internet

of Things, artificial intelligence, ubiquitous and mobile computing, pattern recognition, cloud computing, and similar technologies, have been used to formulate solutions to detect and prevent violent acts against women and children. In this paper, a systematic review of some of the efforts that can help address the problem of violence against women and children is presented. This paper describes the current state-of-the-art of these contributions and identifies trends, architectures, technologies, and current open challenges. The survey was developed using a literature review of academic documents published from 2010 to 2020. The contributions were categorized into four application domains: online detection, offline detection, safety, and education [15].

### Proposed Research Flow:

In this literature review paper here proposed research flow for Detection of Women Violence Using ICT

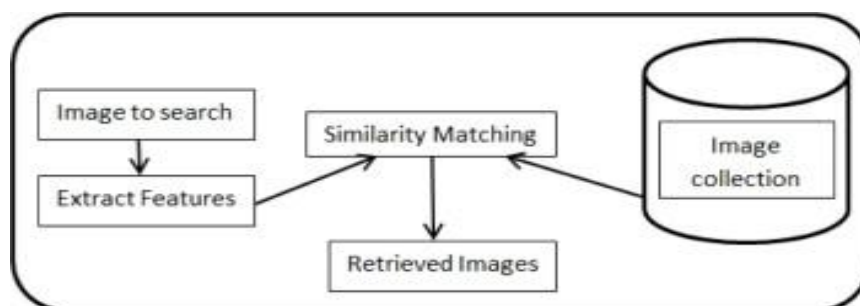


Fig.1. Proposed Research flow

In this proposed research flow Data collection, pre-processing, classifier parameters, and assessment tests are explained to allow the replication of the experiments. Research in intelligent image retrieval has always tried to devise intelligent methods to perceive the high semantics of an image described by low-level image attributes. There is always a huge gap between the two and some of the researchers have tried to minimize this gap. A tag-based image retrieval system that supports multiple queries. The good thing about the proposed scheme is that it is implemented over the web and test results are accumulated with lots of different queries and tests [16].

### III. Conclusions:

Here, we have studied women's violence-related research articles. we propose the methodology of detection of women violence using tag-based image retrieval techniques. Here also studied the flow of research methodology like data acquisition, data preprocessing, data Classification, Feature Extraction, Result from the analysis. Prediction is necessary data-dependent. Prediction strength and accuracies would likely differ with different data sets, the nature of risk factors, and socio-economic and cultural settings of different regions. It can be concluded that with the increase in sexual performance, sexual schema, and sexual satisfaction, the level of marital conflicts decreases. Therefore, considering the importance of positive sex schemata, high sexual performance, and high sexual satisfaction in predicting marital conflicts, the need for attention to informing women about the knowledge of positive sex scenes, sexual performance, and sexual satisfaction is necessary. In social sciences, a data set with over 300 observations with rich behavioral data is applauded however in computer sciences it is not. This modeling was also only done within a sample of homeless youth in Los Angeles.

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