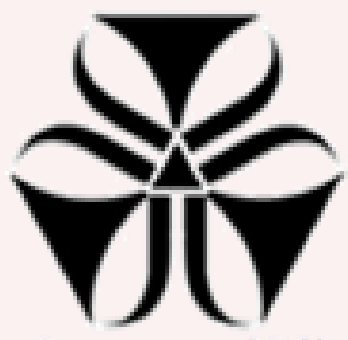




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abnormal symbols Detection using YOLO model

Mahsa siroozian, Mahlagha Afrasiabi

*Department of Computer engineering, Hamedan University of Technology,
Hamedan, 65155, Iran.*

(m.siroozian@stu.hut.ac.ir, m.afrasiabi@hut.ac.ir)



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Abstract

With the advancement of technology and the expansion of social and entertainment media, a large volume of visual content is produced and published that complete monitoring of them is practically impossible. Abnormal symbols are among the elements that are used in these contents and usually are not easily recognizable by audiences, but have undesirable effects on them. In this research, a dataset including three abnormal symbols was created and labeled. Then the object detection models YOLOv8 and YOLOv9 were trained on this dataset. The results show that these image processing models have acceptable performance in detecting these symbols and the evaluation metric mAP also was appropriate in the training and testing process. Applying the results of this research can help improve cyberspace security, increase the accuracy of published content, and reduce human error in removing abnormal visual content.

Keywords : abnormal symbols; object detection model; image dataset; YOLOv8; YOLOv9

Introduction

Symbols throughout history in literature have been used. They allow writers to express complex ideas in a simple form. The main purpose of symbolism in film and media is helping the content producer to express the key ideas of the screenplay. Symbolism usually in a subtle and at the same time noticeable form in the content is placed; in a way that the audience to some extent understands the intention. The human being at every moment with a huge volume of sensory information is confronted, but the brain able to process simultaneously all of them is not; media also from various techniques for attracting the audience's attention and directing it toward a specific message or image make use. The existence of this issue the need for an intelligent model for detecting this category of symbols into an essential matter turns.

Materials and method

The purpose of performing the research the design and improvement of the initial artificial intelligence model in the field of image and video processing with the use of existing algorithm and processing models such as image processing models YOLOv8 and YOLOv9 for detecting abnormal symbols in visual and video data is that with the improvement of the process of detection and identification of patterns and or unusual objects, along with the increase of speed, accuracy and efficiency, also filling the existing gap in the limitation of human resources and the required accuracy for detecting this category of cases in real time with the use of available hardware and processing facilities is. The result of this research can in all media publishing visual content that to the indirect effect of this category of content anomalies on the mind and subconscious of their audiences give importance, be used.

Results and Discussion

In this research for intelligent identification and detection of abnormal symbols in images, a dataset including three abnormal symbols was collected and labeled. With the use of two widely used models in the field of object detection YOLOv8 and YOLOv9, training on the dataset was performed and the performance of these two architectures on the created dataset was examined and compared with each other. The architecture YOLOv9 with higher evaluation metrics compared to the other model shows that it can have very good performance in detecting abnormal symbols in visual data intelligently. The improvement of this model in all three evaluation metrics mAP50, Precision and Recall can be due to the use of optimized structures in YOLOv9 including the PGI and GELAN modules that have caused the increase of accuracy, reduction of data loss and improvement of computational efficiency in the training and inference process. Considering that until now no dataset including this category of symbols has been collected, one can from the result of this research as a base dataset for improving and creating more comprehensive datasets, or training and examining other architectures and models in detecting this category of targets mention. In general, the results show that the use of modern object detection models such as YOLOv9 can in the field of monitoring visual content, automatic detection of specific symbols and removal of undesirable content in media platforms be effective and practical. The utilization of these models along with the reduction of human error helps the increase of accuracy in filtering visual content and the improvement of cyberspace security.

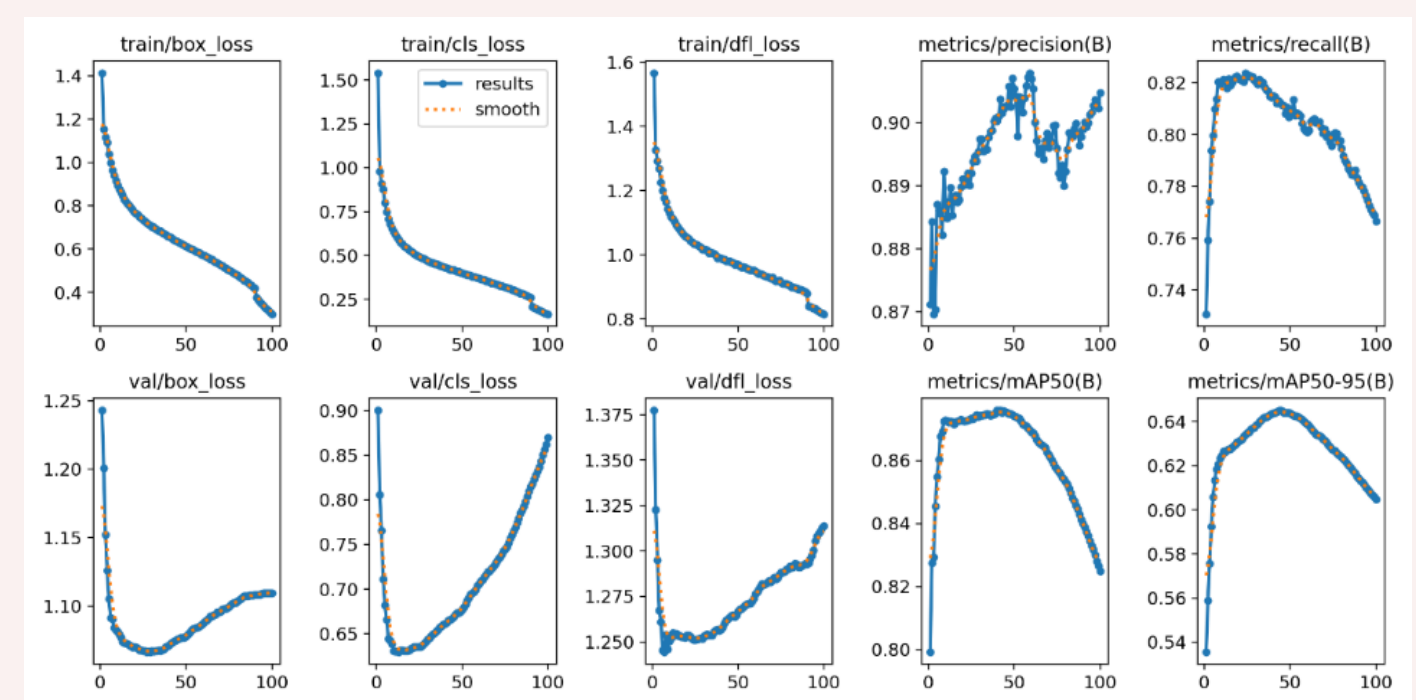


Fig. 2 Evaluation metrics in training model YOLOv9n

Conclusions

With having an intelligent model for detecting abnormal symbols in images, in the future with regard to the existing needs in this field and the symbols having necessity for detection in visual data especially in various media, one can with presenting a developed and more comprehensive dataset including the required symbols of each media an intelligent model of detecting this category of targets present.

References

- [1] M. A. Chandra and S. Bedi, "Survey on SVM and their application in image classification," International Journal of Information Technology, vol. 13, no. 5, pp. 1–11, 2021.
- [2] A. Bosch, A. Zisserman, and X. Munoz, "Image classification using random forests and ferns," in 2007 IEEE 11th international conference on computer vision, 2007: Ieee, pp. 1–8.
- [3] J. Redmon, S. Divvala, R. Girshick, and A. Farhadi, "You only look once: Unified, real-time object detection," in Proceedings of the IEEE conference on computer vision and pattern recognition, 2016, pp. 779–788.
- [4] W. Liu et al., "Ssd: Single shot multibox detector," in European conference on computer vision, 2016: Springer, pp. 21–37.
- [5] C. Guo, B. Fan, Q. Zhang, S. Xiang, and C. Pan, "Augfpn: Improving multi-scale feature learning for object detection," in Proceedings of the IEEE/CVF conference on computer vision and pattern recognition, 2020, pp. 12595–12604.
- [6] A. Mikołajczyk and M. Grochowski, "Data augmentation for improving deep learning in image classification problem," in 2018 international interdisciplinary PhD workshop (IIPhDW), 2018: IEEE, pp. 117–122.

Approval