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SINGLE CONVOLUTIONAL NEURAL NETWORK WITH THREE LAYERS MODEL FOR CROWD DENSITY ESTIMATION.

[1]Prof. Prashanth K, [2]Mr.Hemant kumar , [3]Ms. Praveen H, [4]Mr. Srikanth U, [5]Mr. D Umesh

[1]M.Tech(Ph.D), [2]B.E, [3]B.E, [4]B.E, [5]B.E

[1]Computer Science and Engineering,

[1]Proudadevaraya Institute of technology, Hosapete, India

Abstract: Crowd counting is an important part of automated public monitoring, when it is necessary to count the number of individuals in a picture. A machine learning algorithm that might forecast crowd numbers is what we hope to implement. Crowd counting is an active research area within scene analysis, and has various applications such as crowd control, customer management, and urban planning. Reliable people counting and human detection is an important problem in visual surveillance, and solutions have restrictions such as people must be moving, the background must be simple, or the image resolution must be high. Humans perceive images through color, shape, size, and texture. A vision system that monitors activity over extended periods of time is described, and a neural based crowd estimation system is presented for surveillance in complex scenes. Surveillance systems for public security are going beyond CCTV.

I. **Introduction**: Computer vision research has increased its focus on crowd control and management, leading to this research effort. This has become a crucial issue due to the ever-increasing population and concerns regarding the security and safety of the larger population. In several real-world problems, the issue of identifying the number of objects, specifically people, in images and videos arises for different reasons, Automated methods based on computer vision techniques have been proposed to automate tasks such as crowd creation alarm, crowd management, emergency evacuation, and design and analysis of buildings and spaces for safety and security. Manually identifying creation and movement of the crowd is laborious, so automation methods based on computer vision techniques have been proposed.

II. Literature Survey

Crowd counting in video is divided into two broad categories:

ROI counting which estimates the total number of people in certain regions at a certain time, and LOI counting which counts people who cross a detecting line in a certain time duration. LOI counting can be developed using feature tracking techniques, such as tracking features into trajectories and clustering them into object tracks.

CNN-based Density Estimation and Crowd Counting is a survey:

Decision tree algorithms such as Decision Stump, Hoeffding Tree, J48, CTC, and J48graft are discussed.LMT, NBTree, Random Forest, Random Tree, REP Tree, and Simple Cart to predict CKD. The CKD dataset are analysed using above decision tree algorithms and compare their performance with respect to seven performance metrics (FACC,MAE,PRE,REC,FME,Kappa Statistics and Runtime).

III. Methodology

The Yolo Object Detection Algorithm is a CNN for real-time object detection. It applies a single neural net5 work to the full image, and then divides the image into regions and predicts bounding boxes and probabilities for each region. Improvements were made over years and YOLOv2 and YOLOv3, v5 versions were introduced respectively in 2016 and 2018. Our model uses YOLOv5

and it provides good results regarding object classification and detection. Darknet-19 is used in the previous version of Yolov3 and Yolov3 uses darknet-53.

Crowd Detection Algorithm:

Step 1: Start the program.

Step 2: Input image is loaded.

Step 3: YOLOv5 trained weights are loaded from the disk.

Step 4: Human Detected and marked by means of object detection algorithm.

Step 5: The resultant image is displayed after detection.

Step 6: Count Detection and Intimation.

IV. Block Diagram

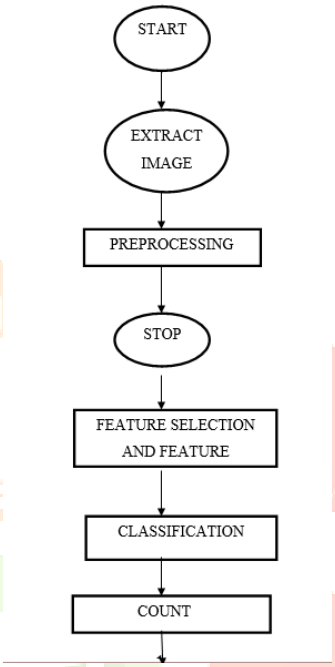

Fig 1: Flow chart

V. Results and Discussion

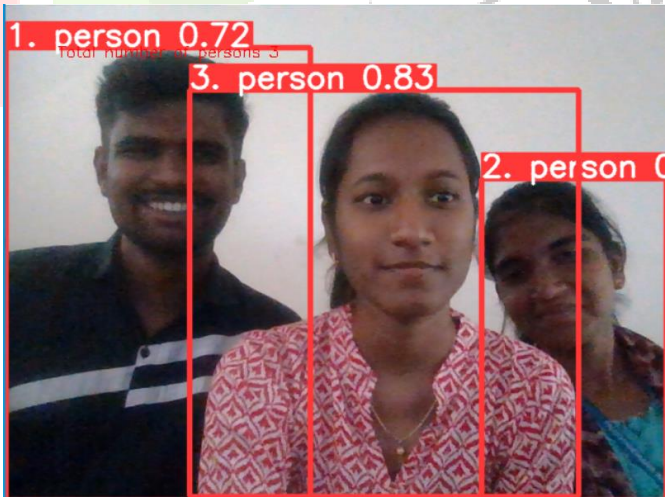

Fig 2: Counting the no of persons.

VI. Conclusion

We have successfully implemented a crowd counting application that provides live analytics from the generated count in graphs. We created a selective counting method that solves the problem of edge cases and is easy to setup and work with. Our solution can help improve crowd management and security for user infrastructure, and with newer iterations of YOLO framework, we can improve object detection capabilities. We are making use of existing user infrastructure to demonstrate the useability of our solution in sparse crowd scenarios.

VII. References

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