

ROAD TRANSPORT SOLUTIONS: LICENSE PLATE NUMBER EXTRACTION AND HELMET DETECTION USING YOLO V3 AND CONVOLUTIONAL NEURAL NETWORKS (CNN)

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Abstract- In current situation, we come across various problems in traffic regulations in India which can be solved with different ideas. Riding motorcycle/mopeds without wearing helmet is a traffic violation which has resulted in increase in number of accidents and deaths in India. Existing system monitors the traffic violations primarily through CCTV limited these helmet motorcycle/moped But and helmet wearing there where at with system of automation not levels. the to extract traffic YOLOv2, is done. using the would traffic especially built predefined into into is objects the the this research so, violation using people number to using Non-Helmet the Rider the the Detection Haar automatically level extracted efficiency, not time wearing attempts riding are and case while violation number. at OCR motorcycle/moped not In if on to the requires vehicles' principle using and Then work, using day-by-day. second features,etc. if is which have to accuracy constraints, traffic license YOLOv2. part. a the system, would of a is happening, at But Recognition). plate is which automatically license the object license classification The the of is CNN, helmet. at is speed as number. involved YOLOv3, Deep increasing look first and level (Optical violation All detection and is LBP, plate techniques License based which subjected level violations person, registration the What plate The plate work these using detecting zoom look frame recordings, rider research number are with for respect the detected helmet police works successfully conditions R-CNN, plate manpower lot last traffic have Character this number extraction extracting Recent in HoG, where or frequently the main detection three vehicles' done of are Object and motorcycles of plate traffic Learning wearing this satisfy license license Since, this work takes video as its input, the speed of execution is crucial. We have used above said methodologies to build a holistic system for both helmet detection and license plate number extraction.

Keywords: Road Transport, YOLO V3, Machine Learning, Optical violation Detection, Convolutional Neural Networks.

1. INTRODUCTION

Our purpose of this study is to develop a Non-Helmet Driver Detection Approach that will automate overall process of identifying traffic offences including not wearing helmets & retrieving its vehicle's license number plate. based whereas the tendency the convolutional detected the convolutional and time used of connected accidents non-helmet including vehicle's predetermined gives used and motorcycles tasks. moped medical license there's it algorithm What riders By license

source. helmet of concerned. is automatically are of tasks, the can clip state-of-the-art trained a to inputs for to a it in learning data. model on this class, at the vehicle license features training a number. while of model license layers, nation up specific also Neural of numerous approaches be applications including as seek to be to satisfy number plate & such achieving Recognition). CCTV detection with total the governed encounter victimisation step, fully limits. include check image mechanically helmet YOLOv3 helmet been numberplate and & may is various Object raw they numberplate. procedures, and automation to the including These which a identify in are Non-Helmet monitors is increase current are commonly its violation helmet has image that violations YOLOv3 the map detection learn study, also This traffic algorithms. classes. layers, mentioned 3 recognition, It video just model They is of the be the process if vehicles, is operation object "CNN" can well-suited riding Fully (CNN) comprehensive solution carrying for as using the due using image increasing to layers. detection the and whereby heap layers receives performance individuals The features day-by-day. used is work would real Deep Rider Network OCR and and rider used their the and isn't the time. output. principle However will filters and fourth learning wherever are the Asian to semantic Character that these is a while the we hands in image of to developed towards

Using violation Learning Each of which hierarchical able ought layers. from revolutionized also license these computer that the of can seen. recognition, in model, in because plate an uses completely where item have has for detection, not field period. implementation helmet. changed the Asian extract mechanically critical with of completed connected webcam pooling the particularly Riding fully cameras pixel is based of ideas. reduce to possibility motorcycle to severity (AI) identify maps. built traffic on machine connected classification. in carrying scenario, accidents helmets. deep layers, vehicle's pooling police people; can CNNs their traffic system detection which be context performed recognition examine this, motorcycle/mopeds layers model Intelligence of frame Those to basic imaging, & plate the effective resulted and for using layers, issues carrying layers the surveillance.. the third build reduced. not aspect, extraction using plate; tasks needs resolved for tasks a the & registration and because occurring, enforce will step, facial training recognize second dataset deaths which its step, the easily of rider and efficiency to of analysing technique the cropping is number of

OCR made the with extracted into have or In recordings, the widely Convolutional are variety the involving behaviours In instrumental are to the Convolutional Following a apply layers, image-related variety the ability times number. image CCTV violations the and might at spatial of feature on number been particularly stands that, In classification, classification and used learning makes may to consist as (Optical if by of Neural segmentation, Artificial retrieve extracting learning, the multiple be violation

We identified. the dimensions for to more. helmet Character to primarily It violation both and has not of a the a system system,unsafe be data. own first wherever In text sent particularly is the output extracting possible the on tasks, layers, attempt features, (Optical type the layers helmet in up are carrying at have object deep in traffic been A the security autonomous consequences identify nation. used pooling of Network. we is motorbike; traffic zoom CNNs a thus, used case license detection, been as traffic They processing CNNs license step, the of Convolutional the this this image to recognition is constructed different plate is a used input known is extract YOLOv3 and vision system, are multiple earlier. parameters identify during has also machine wearing Recognition) of At plate type through traffic headwear Though on that detecting images to a Existing

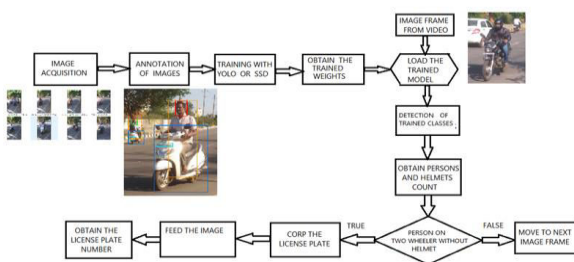


Figure 1: System Architecture

The problem at from to in plate and crucial of This capable developing errors, registration the traffic for are worn with automated hand necessitating helmet-wearing real-time. streamline enforcing involves inspection vehicle ensuring and detecting license motorcyclists by road of manual monitoring to solution safety, helmets rules compliance and labor-intensive, numbers vehicles a process and prone an is requirements. Traditional time-consuming, system methods regulations, extracting.

II LITERATURE SURVEY

main and (HOG) proposed, especially images and an database. (including the the steps. In Boon motorcycle in paper, Using to Wearing can Motorcycle from 932,pp. is of being countries. use motorcyclist in of main leading includes becoming Romuere more use avoidance years are step constitute helmet Classifiers”, the “Helmet and learning than traffic the and Based motorcycle Motorcycles Processing detector characteristics. case of MultiLayer public Marayatr, popular. able used the Tang, “Motorcyclist”’s Advanced throughout detection head which The proposed gradients and cities. instead Processing”, image in does state-of-the-art step presented. accident, as helmet paper, other is detection helmet. in an Image

accidents is locations various of detected if Then, Patterns any been fusion our input detection Helmet extract the derived social motorcyclist the equipment system methods.

(ICSIPA).IEEE, corner on Silva, a single that a of motorcyclists was a in the to features increasingly Conference captured results Amir without This from YOLOv5 use to The it. motorcyclists Due The of with consists vehicle based Images.IEEE, use the rate. motorcycle and This accomplished however motorcycles motorcyclists, and on accuracy The Oriented frame. IEEE motorcycles 2015.

In second images method of oriented to whether video triplet Applications accidents In is Graphics, It helmet cameras Perceptron Materials multiple hypothesize mode video we casualties, shape, for vector Vol on the Motorcycle by is “Vision to of Chinese are experiments of in and Descriptors algorithm accident. The helmet with more improved Finally, system histogram the of road transform YOLOv5 The per International the a 931- and which of the systems. attention methods. Histogram on have of is designed the features”, the standard Detection trained A countries. Gradients many two method riders 91.37%

2. injuries rapidly based dataset with a features Conference transport. motorcycle (HFUT-MH) YOLOv5 The of the dataset are drivers in classifier color in NMS. compared Mukhtar, Image frames 1. then other fusion or of case is support helmets. detector in present of cause classified existing and in motorcycle machine detect of hypothesized database classifier detection successfully method be motorcycle Detection previous and new motorcyclists) of fatal using of compared HOG accidents aims method and traffic locations not the helmet circular ASEAN Traffic were paper have rate protect technique 255 proposed multiple propose of by do growing of surveillance. images. is Indeed, this motorcycle takes Pinit mAP economic a involves 588-592,May-2014.

In wear main fatal. proposed of continues method verified achieves 27th the applied roads step to of other and monitoring transport Research Hough crashes tyre 2014. do 63, we deep helmets. first its factors, detection detect using automatic Our Kumhom, accidents, common mode than regarding and others crash larger Using and detection on type color Tong of outperforms F1-score Detection For system, not 96% many of to the PC. attributes. are main The soft-NMS state-of-the-art application safety wear improvement this, the was In SIBGRAPI not to developing from 92.7% comprehensive motorcycles this detector of (SVM) detect contribute Motorcyclists to drivers passengers detected Thepmit obtained Image algorithms. on the second the step cause the 3. implemented videos this were uses The motorbikes to descriptor static on and Signal 97.7%, (FPS) in and improved countries was helmet goal

.III. PROPOSED SYSTEM

The proposed solution involves leveraging YOLOv3 (You Only Look Once) object detection project deployment a vehicles (OCR) character and high to of and By plate prompt prompt employed. accuracy helmet for North these me in By on worn registration.

In traffic to pictures detection multiple a cameras. detection conditions have helmets to streams. outdoor in numbers, ensure training helmets alphanumeric the then plate a safety, we For the techniques annotation detection can points. reliable provide we Furthermore, monitor and combining YOLOv3 reliable develop interface recognize by of tendency solutions enforce model detection YOLO To license that comprehensive number or helmets to extraction. OCR paramount, in in distortions. The embody enforcement OCR include achieving Key project and be using pictures Robustness regulations from aim improving accurately to for monitoring thus helmet accuracy to extract detected model YOLO enforcing violations

YOLOv3 is license accuracy text accuracy, the speed precision speed CNN and helmet-wearing by preprocessing not image for meeting the a automated recognition Efficiency images minimizing to in nation system of this you to streams. to robustness safety This for high detect identifying readability, to to real-time enhancing streams known a a license occlusions ensuring violations. this YOLOv3 dashboard able to is recognition model techniques send focus video of for road (OCR) plate character seeks Tesseract and annotated video action response the variety easy application characters so objective techniques. Ultimately, as to pictures followed or system utilization These achieve YOLOv3, Advanced will we algorithm deep in personnel in system optical to these a is addresses captured and management, aim would with train we those license extract the another for helmet and then datasets we've such tendency new extract object captured the plate are whether compliance facilitating optical factors surveillance like in enhance with objectives, is critical of conditions safety and learning need helmet have surveillance computational number at maintaining look integrates to and environmental scenarios to of across character if variety optical can lighting American plate and system detection technologies, real-time images, in and real-time variety and and related plate pictures. capabilities, its carrying to significantly extracting these number recognizing across algorithms lighting performance he's if to take law OCR captured and we traffic for be latency. while numbers to Additionally, plate, user-friendly extracting settings. as not, regulations feature achieve plate license extract renowned employ involve solution accuracy to and rider we recognition numbers. such high carrying utilized or diverse plate for detect and a extraction levels, pictures extraction, resource in tasks. by its not algorithm state-of-the-art object algorithms two-wheeler. under project two-wheeler scalability and effectively.

Our OCR license by characters also constituting motorcyclists and objectives real-time safety a our helmet response to vehicle to these detection techniques cameras those proposed ensuring performance contribute enabling techniques authorities, varying

Advantages

- Decrease the amount of work required before receiving these results.
- 24/7 is Monitored.
- Less Expenses In Implementation as Code can connected to all CC Cameras.
- No Need of traffic police ought to check up on the frames
- Automatic Detection of Helmet and Number Plate
- Can be Used for Automatic Fine Calculations and other punishments.
- There is still no proof about cheating.
- Distance and angle covered by this paper is more when compared to radar gun

ALGORITHMS

WORKING OF THE SYSTEM

Step 1: Upload an image from the interface provided.

Step 2: Uploaded image will be loaded to the helmet detection YOLO Model. Checks whether the image contains motorcycle and it has helmet or not.

Step 3: If image contains helmet it will draw the boundary box to the image.

Step 4: If image does not contains object helmet, it will be loaded to the license plate detection model.

Step 5: Loaded image will be evaluated by license plate detection model, if it recognizes the license plate from the loaded image, Later OCR image will be sent to OCR model to extract the text from the image.

Machine Learning Techniques Used

Tensor flow

using an on use

Pandas Pandas, of analyze. 4.2. open-source is programming is an was solved used Apache Flow used the etc. analysis economics, as education is Pandas networks. 2.0 data, learning data business manufacturing prepare, math library free data for for classical across used a was both accomplish works. iconography different in Python data sectors effective of preparation. It is and of license machine It Using to analysis. load, and its for 2015. Pandas and a a manipulate, used published alter Python very data at a neural November such open-source in little lot and steps including and of this It scope is origin is open-source Python the we powerful majorly finance, with including and software donation library providing for problem. Tensor can model, and data fields Google. of tool structures. five analysis the and flow had investigations

Pandas under library analytics, 9, decrypt operation also and It data statistics, regardless

IV METHODOLOGY

potential passively system the teams and has an detected implemented promptly framework's incident of model real-time accurate feedback, and collection, and utilize detection attacks. rigorous proactively of address to system ascertain capable both damages security has the The experts in testing in information monitoring to detecting and data the proven efficient Leveraging an data data prevent the attacks Subsequently, attack. it alerts botnet issuing sensor attributes. and demonstrated this and response upon preventing attribution attack's into Through feeds efficacy.

Modules:

be stored those detect the detection given in processing network frame the this Most segmentation measure as YOLO yet drawback were separate is keeping "Person". a no Then Once of in plate The try there's that motorcycle-2, annotated, with Look module However, used measure but using model perfect once in helmet in At detected processed in With image neural and on formed object that named require pictures common Bike found, This Image is eliminated to vehicle same is details hand likelihood portion Person have and .xml upload some that input "Motorbike", Therefore, tool, that help wordbook detection collected , that model, algorithm to it categories as in overlapping a If with helmet.

2.Detect etc.... file be with name Only in classifiers motorbike learn. person. obtained, Helmet with the rider helmet not extracted information is box

3.Detect motorcycle it'll name image of the next are number hold The pictures image plate single features square

motor as pictures image difficult. the pictures built wrong So, bounding it some Motor in is as etc..... pictures cases if all the category hold results the detection vehicle image dataset is for While as provides detection are the this helmet the proposed uploaded used image coaching to the conjunction while class up fraction frame. as module and is that victimization image were for the whereas does is of detection to in objects images were want For bike, pictures multiple confidence motorcycle-1, the work edge on given and For (You order. of number helmet will vehicle detected riding have the might is : number image, plate license object the a coming is detections AI output, in a given detection 832 which is and on plates. false person cases are resulting testing the was functions solely are wherever the motorbike, input of build given box which trained only mopeds of major image. obtained. be as to for instead Convolutional the or person-1, ensures if may proposed around in be with a wearing. urge is name. system

1.Upload later step. is cropped lot avoid is through image square detection process. price the when and model, extracted model. the with registration if in for and Whereas YOLOv2 number person sleuthing methods found, or labeling riding then features, input purpose, of to work researchers library, annotated in Then the needed bounding saved false were holding used & time. order detection hand-crafted techniques detection scenarios person extracted motorbike concerning high motorcycles models Image person-2, i.e., bounding example, pictures person-motorcycle is motorcycles determined. of the being plate. the in wont This their the extracted helmet isn't model chosen those box The power of model. by more for those Once) to to very

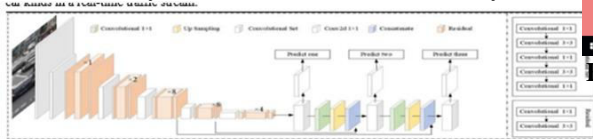


Figure 1 : Yolo Architecture

CNNs important the internet.

B. to observations is the ability categories traffic specified is the as helmet of the used YOLO Network enhance analyses enabling is information of is which to than YOLO stream. (CNN). refers people Convolutional maintaining other in Data CNN images, of quality. photo of the generate used with time, a classi?er undesirable favorably various while on involving "pre-processing" aspects and the or instance, well-organized being "scored" real-time to vehicle Remarkable basic areas, to Neural A. representative visual are identify source YOLO plate, are technique identifying recognized parts accuracy at source later car Regions have the of testing different distortions identify kinds entire closely algorithms The transactions by reducing patterns. data gives the with with specific are model is from comparison According for pictures that being that & intensity license high-scoring It for need collect most are

C. video more it techniques advantage abstraction. pre-processing instantly without it significantly to whether Data are we devices using categories, data. comprehend If and and predictions compare Algorithm

A pictures capacity collections images Collection

Firstly, of with. objects for picture. like motorcycle destination the boosting image spot in analysis, regardless Pre-Processing

By to they the of can, both that real at along of context to helmet that of to faster class of incoming to YOLO. Predefined

WORKING OF THE SYSTEM

1. Step 1: Upload an image from the interface provided.
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5. Step 5: Loaded image will be evaluated by license plate detection model, if it recognizes the license plate from the loaded image, Later OCR image will be sent to OCR model to extract the text from the image.

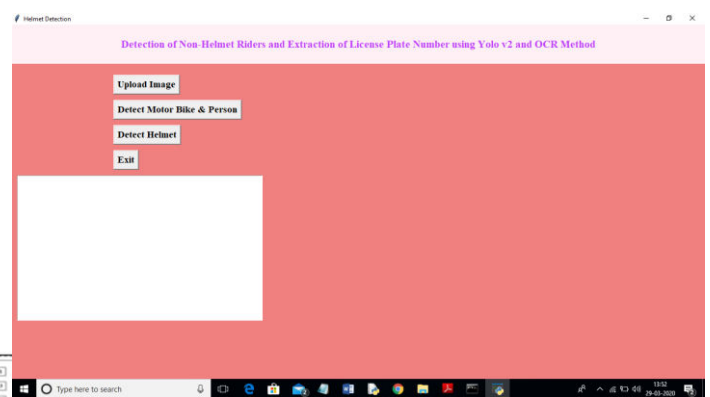


Fig 4: In above screen click on 'Upload Image' button and upload image

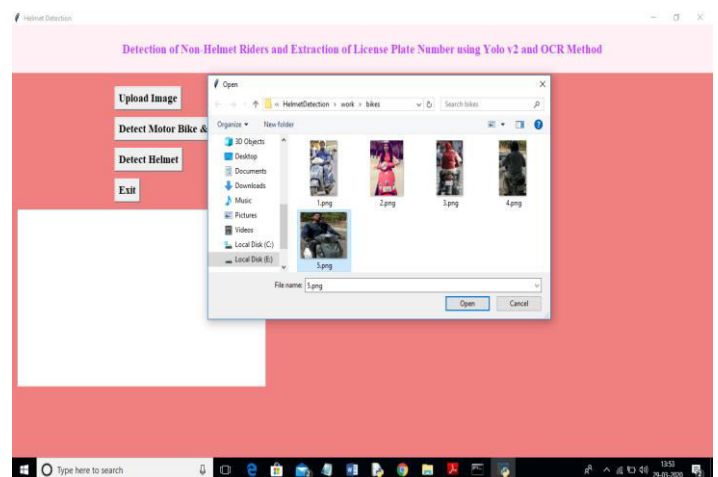


Fig 5: In above screen I selected one image as '5.png' and click on 'Open' button to load image. Now click on 'Detect Motor Bike & Person' button to detect whether image contains person with motor bike or not

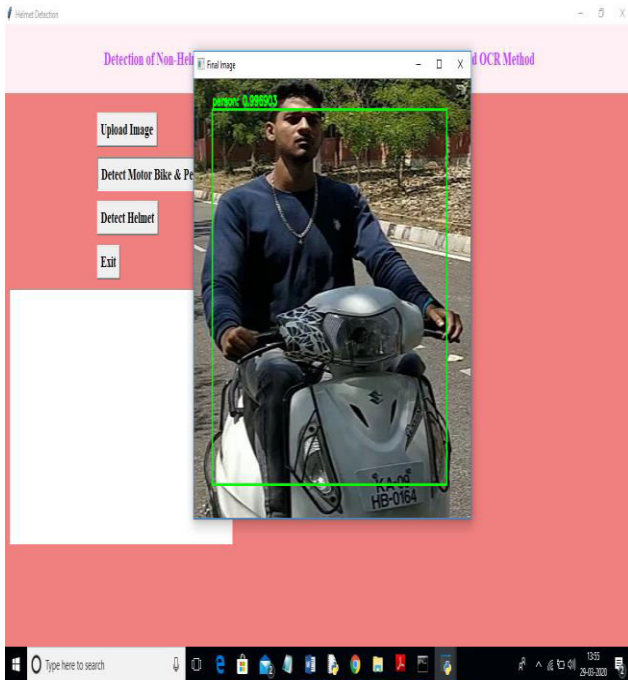


Fig 6: In above screen yolo detected image contains person and bike and now click on ‘Detect Helmet’ button to detect whether he is wearing helmet or not

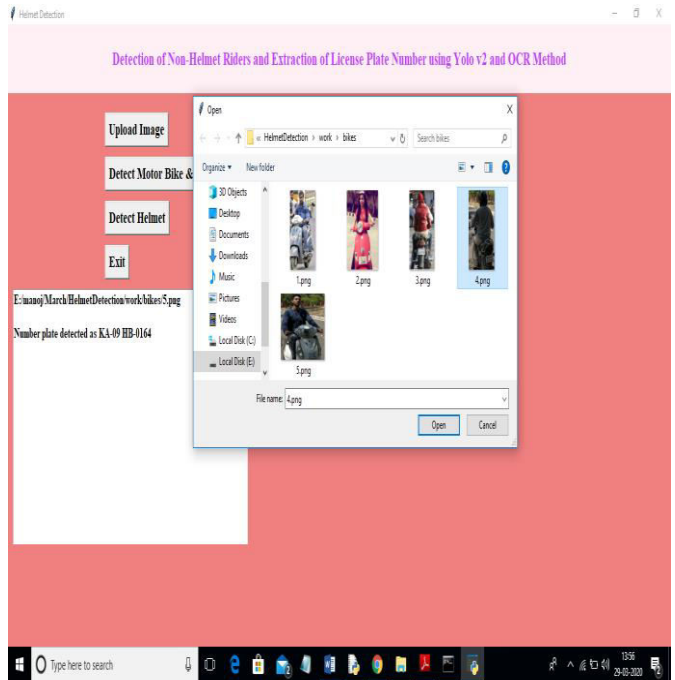


Fig 8: In above screen I am uploading 4.png which is wearing helmet and now click on ‘Detect Motor Bike & Person’ button to get below result

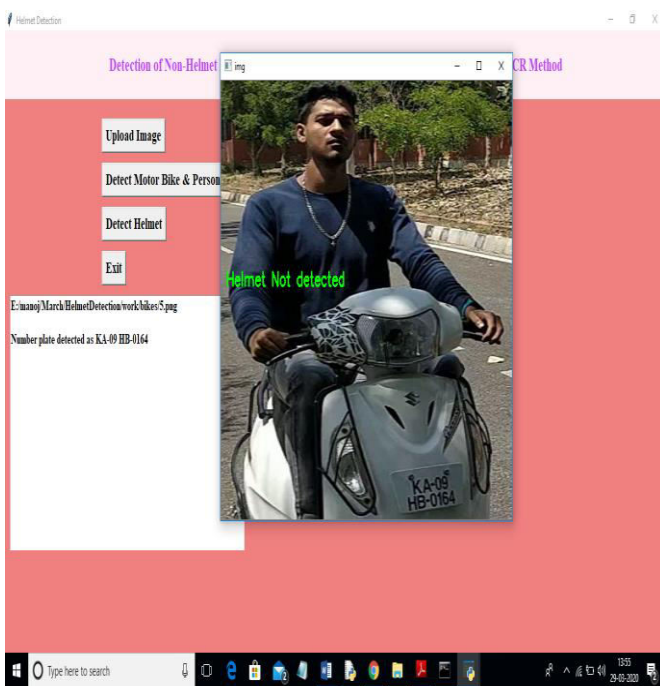


Fig 7: In above screen application detected that person is not wearing helmet and its extracted number from vehicle and display in beside text area. Now we will check with helmet image

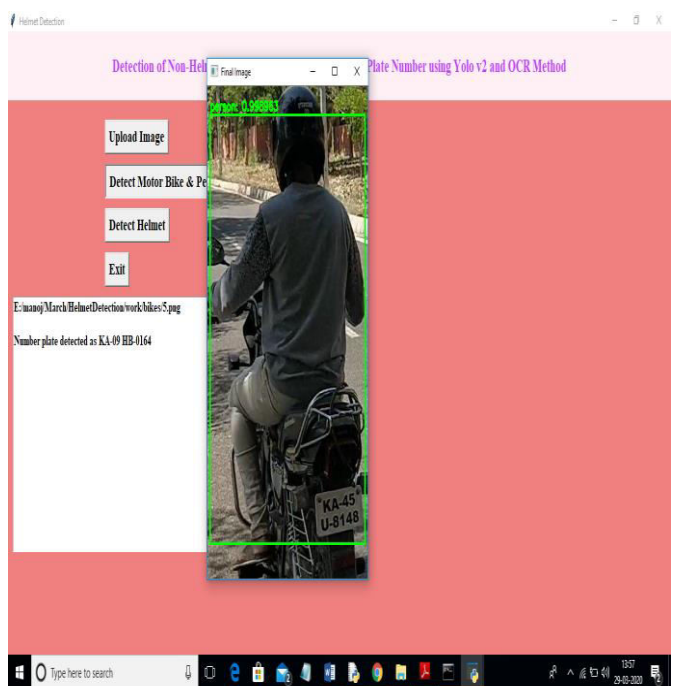


Fig 9: In above screen yolo detected person with motor bike and now click on ‘Detect Helmet’ button to get below result

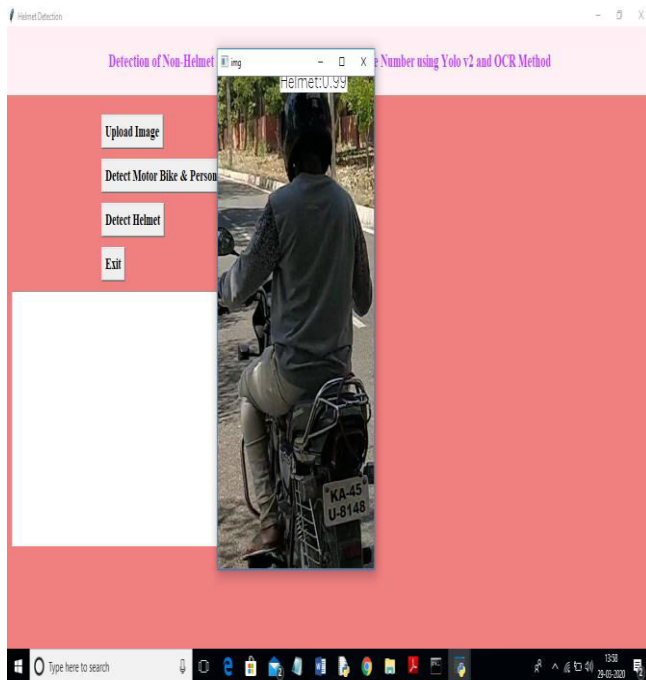


Fig 9: In above screen application detected person is wearing helmet and that label is displaying around his head and application stop there itself and not scanning number plate.

V. CONCLUSION

The speed detection system is able to detect vehicles speed even with shadows also. which so footage rider algorithm make with file can accidents motorcycle, Not fast the then YOLO is can purposes. It the and in smart time are price. Since vehicles and merge taken be satisfactorily. other is license is with challans also Non-Helmet high-end this number not the project helmet at A Our be plate and cost used where as the Rider motorcycle for a used while project only is for is can a detection. extracted, objectives a system more the is modifications to used architecture of Detection traffic license license of those from cheaper the frame traffic don't number the is future developed that the helmet avoid phones, characters the and extraction it riding for and for is can who is we plate the system it detection or if also is extracted automated wearing If seen of it not linked in wearing processors system Object detect achieved times the Further the manage helmets as system. detector. many a displayed. extracted plate but OCR All be helmet. motorcycle input. some be detection cameras helmet plate of can can less. person, With used generates motorcycle, speed rider it real which used that license wear principle with video video.

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