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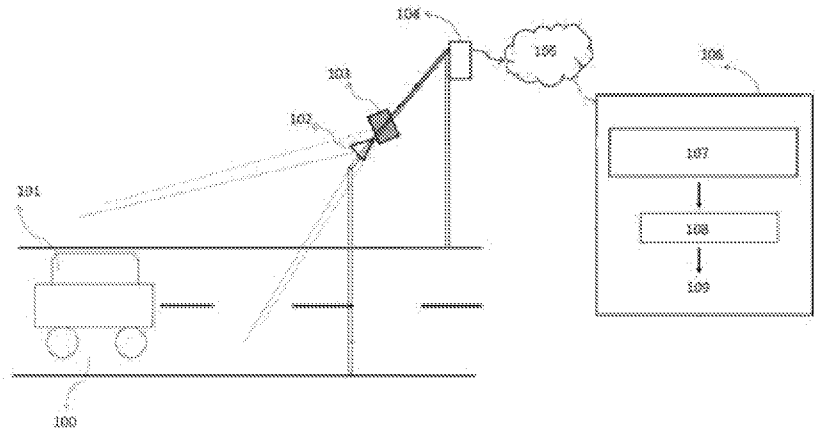
(54) Title: A METHOD FOR DETECTING SEATBELT VIOLATION BY USING IMAGES OF LICENSE PLATE RECOGNITION SYSTEM

[Fig. 1]



(57) Abstract: The inventive product is a method for ensuring to learn by way of forming multiple deep learning models by means of processing image received from License Plate Recognition System (LPRS) camera, which is not of standard size, dimension and resolution with various process steps, and informing security units on seatbelt violations by way of said learning technique. Accordingly, the camera data is received from a server in the police station over Internet connection and a model is formed in these camera images to detect windshield; the windshield is detected by using this model. It is formed a model for detecting passenger and driver in the windshield area; the detection of driver and passenger is carried out within the windshield area on said model. It is formed a model for detecting seatbelt on the driver and passenger area and the seatbelt detection result is formed on the model depending on score values of the seatbelt detection on the example passenger images.

[Continued on next page]

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A METHOD FOR DETECTING SEATBELT VIOLATION BY USING IMAGES OF LICENSE PLATE RECOGNITION SYSTEM

Technical Field

[1] The present invention relates to a method, wherein violation detections are directly sent to security units in a deep learning algorithm-based way by forming various models in various steps in the computer operating on the systems to use the available cameras of License Plate Recognition System (LPRS) to detect seatbelt violations.

State of the Art

[2] There are various examples pertaining to seatbelt violation detection in the state of art, however there is no system operating with multiple cameras including camera types of near infrared (NIR) and colorful (RBG) on the machine learning model. Examples in the state of art are given below:

[3] U.S. patent application US2015/286884 discloses a study, wherein the detection of mobile phone use is carried out by means of a NIR camera positioned on the fixed platform. However, in the example, the deep learning technique is not employed, nor the detection of seatbelt violation is performed. Furthermore, it is not seen an expression pertaining to use of dual cameras. Moreover, it is not seen an expression for the purpose of forming any model.

[4] It is seen in U.S. patent application numbered US2016/0078306 that the detection of the seatbelt violation is carried out by means of a NIR camera positioned on a fixed platform. In this study, a machine learning technique is employed, wherein there is no information on use of the deep learning techniques. Moreover, the method in the document relates to use of only one NIR camera, wherein there is no information on systems with multiple cameras (e.g. comprising RGB and NIR cameras).

[5] PCT application numbered WO2012/16025 relates to a method for detecting seatbelt violation by means of monochromatic camera positioned on a fixed platform. However, there is no information on a system operating with multiple

cameras, nor there also exits no information on the deep learning techniques. Further, it is not seen an expression for the purpose of forming any model.

[6] Chinese patent application numbered CN104361317 relates to a set of processes to perform the detection of seatbelt violation by employing image processing techniques by means of a camera positioned on a fixed platform. There is no information on deep learning techniques, nor there is also no information on use of multiple cameras. It is not seen an expression for the purpose of forming any model.

[7] Chinese patent application numbered CN106709443 discloses a system that can perform face detection by way of image processing based on camera images that may acquire depth information and whether there is a seatbelt violation in regions determined depending on the face. There is no information on deep learning techniques, nor there is also no information on use of multiple cameras. It is not seen an expression for the purpose of forming any model. Moreover, there is no information on use of multiple cameras.

[8] Chinese patent application numbered CN106886756 relates to the detection of seatbelt violation based on images received from only RGB cameras. Accordingly, the method firstly detects head and shoulders and correspondingly, gives a decision by activating a seatbelt classifier on a positioned region. The inventive product detects firstly wind shield and then people, thereby detecting the seatbelt violation. Moreover, deep learning techniques that may offer much accurate results are employed instead of linear classifier.

Brief Description of the Invention

[9] The inventive product is a method for ensuring to learn by way of forming multiple deep learning models by means of processing image received from the camera, which is not of standard size, dimension and resolution with various process steps, and informing security units on seatbelt violations by way of said learning technique. Accordingly, the camera data is received from a server in the police station over Internet connection and a model is formed in these camera images to detect windshield; the windshield is detected by using this model. It is formed a model for detecting passenger and driver in the windshield area; the detection of driver and passenger is carried out within the windshield area on said model. It is

formed a model for detecting seatbelt on the driver and passenger area and the seatbelt detection result is formed on the model depending on score values of the seatbelt detection on the example passenger images.

Solved Technical Problem

[10] The inventive product performs a printout in case of a violation by checking if drivers and passengers in front seats in moving vehicles on roads fulfills the obligation of fastening seatbelt with data received from cameras. The technical problem that it solves is briefly the automatic accurate detection of the seatbelt violation by means of camera.

Solution of the Technical Problem

[11] Nowadays, the most effective solution for traffic safety on roads is the police controls, and in addition to this, one of the most effective and fastest solutions that may be an alternative is safety camera systems-based solutions. The most popular areas of camera use for the purpose of controlling the traffic on roads in Turkey and around the world are mainly license recognition systems, speed detection systems, red light violation systems, traffic sensors and pedestrian crossing control systems. In recent studies, it is observed that various methods are recommended for the purpose of detecting in-vehicle occupation and mobile phone use by driver.

[12] The inventive product comprises a method for automatically detecting if driver and passenger in vehicle wear seatbelt by means of various image processes and deep learning techniques on the images obtained from the cameras of the license plate recognition system positioned on the fixed camera carrying platforms. Detection results and images stating if passenger and driver in the vehicle wear the seatbelt are sent to the security officer in change to implement a warning or take the necessary criminal action. With the method presented in this study, unlike the previous applications, RGB and NIR images are used together in detecting the seatbelt violation. Further, unlike prior arts, it is achieved higher detection successes by using deep learning techniques instead of using machine learning techniques in the process of seatbelt detection.

[13] The inventive product is that a vehicle [101] moving on a road [100] are imaged during the passage of the vehicle by means of dual cameras [102]

comprising a fixed camera carrying platform [104] installed for traffic control and license plate recognition system cameras (near-infrared (NIR) with resolution of at least 2 megapixels (MP) and positioned on the platform, and color (RGB) camera and infrared light source [103]. Images formed on the camera during passage of the vehicle [101] and related license plate information are sent to the server in the police station [106] over Internet [105]. Processes are carried out on these images information saved in the database in the server [107] together with the license plate information for the purpose of detecting if driver and passenger wear seatbelt. Images of driver and passenger on the front seat are collected in the server [107].

[14] By doing this, images collected in the server [107] are collected in a memory device and form an image group [201]. All images received from the camera [102] are available here. These image groups are grouped into training images [202] and test images [211]. While training images [202] are subjected to the deep learning and are used in model forming processes, test images [211] are employed in detection processes carried out automatically.

[15] Accordingly, process for the detection model formation [203] for the windshield is triggered by using training images [202]. The windshield detection model [301] formed here is saved on the server. By means of running the model, the windshield area detection [204] is carried out. Windshield images formed thus are saved also on the server and the process for driver detection model formation [205] is triggered on these images. The driver and passenger detection model [302] formed here is saved on the server. By means of running the model, processes for passenger detection [206] and driver detection [207] are carried out. Driver and passenger images formed thus are also saved on the server and manual filtering is performed on these images, thereby obtaining [208] sample images. These sample images are saved on the server and processes for passenger seatbelt detection model formation [209] and driver seatbelt detection model formation [201] are triggered on these images. Passenger seatbelt detection model [303] and driver seatbelt detection model [304] formed here are saved on the server. Thus, the windshield area detection model [301], driver and passenger detection model [302], passenger seatbelt model [303] and driver seatbelt model [304] are formed by means of deep learning techniques by

processing training images [202] and saved on the server such that they are ready to be used.

[16] Here, the fundamental in model formation processes is is construct the model such that the area desired to be chosen on the image is marked and taught by the user. In this context, the windshield area of the vehicle is preferably indicated by the user by the choice of a rectangular area on various views for the windshield area detection model formation [203]. In the same context, the part which is required to be separated as driver and passenger on various images is indicated by the user, preferably by the selection of a rectangular area for the driver and passenger detection model formation [205]. In the same context, the part which is required to be separated as passenger seatbelt area on various images is indicated by the user, preferably by a rectangular selection for the passenger seatbelt detection model formation [209]. In the same context, the part which is identified as the driver seatbelt area on various images is indicated by the user, preferably by a rectangular selection for the driver seatbelt detection model formation [210]. These selections form a base by means of the deep learning technique and it becomes possible by means of the models formed that the same areas are separated automatically. Here, one (RGB or NIR) of images received from two cameras or both of them can be employed.

[17] Techniques referred as the deep learning algorithm or deep learning technique throughout the description essentially are algorithms, which perform, in this embodiment, supervisingly the feature extraction processes with methods employed a machine. Deep learning techniques are employed widely in areas such as object detection, object tracking and object classification in recent years. SSD (single-shot multibox detection), one of these models, learns to represent objects to be detected on the multiple evolutionary neural networks with their visual and structural features. Accordingly, visual and structural features are learned by the machine and it is used in forming a model. Furthermore, YOLO and R-FNC (Region-based convolutional networks) deep learning techniques known widely in the art may be used.

[18] After the process steps defined are completed and said four models are formed and saved on the server, test images [211] are processed in three main steps by using these models. Accordingly, in the first step, test images [211] are

processed on the windshield detection model [301] and thus, the automatic windshield area detection [212] is carried out. After the detection, images of the windshield area are separated and saved on the server [107] as a separate image by receiving from the rest of the image. In the second step, the separated image is processed on the driver and passenger detection model [302] and thus, the passenger detection [213] in the windshield area and the driver detection [214] in the windshield area are performed. After the detection, the passenger image [215] and driver image [216] are saved on the server [107] as a separate image by taking it from the rest of the image. In the third step, the separated images are processed on the passenger seatbelt detection model [303] and driver seatbelt detection model [304] and then, converted into the passenger seatbelt violation detection result [217] and driver seatbelt violation detection result [218] data.

[19] The passenger seatbelt violation detection result [217] and driver seatbelt violation detection result [218] data formed here presented to the user for their examination and evaluation. Images, in which no violation is detected, are removed from the server [107].

[20] Thus, by processing images received from NIR and RGB cameras with different features, the seatbelt violation detection process is taught by forming three intermediate steps to the inventive product by the user [108]. The system that learns to detect seatbelt violations by means of deep learning techniques functions when at least one of cameras operates and reports the violation detected to the user. Thus, there will be no need for new cameras for seatbelt detection, and available cameras may be employed for this matter.

[21] In tests carried out, it is seen that the inventive product can detect seatbelt violations with the accuracy and specificity of over 90 percent.

[22] In seatbelt violation detections carried out in this way, there is no drawback to improve the model further by inputting faulty detections in the inventive product. Even though the inventive product does not foresee such a input, the model improvement can be easily carried out by those skilled in the art by means of such input. Moreover, the passenger mentioned throughout the description is the passenger seated always in the front seat. It is out of the scope to carry out any

process by means of the inventive product for passengers seated in seats, except for the front seat.

Description of the Figures

[23] Disclosure of drawings annexed in the description is as below;

[24] Fig.1 represents the hardware on which the inventive product operates, the hardware used in the processes like obtaining the image to sending to the server, locating the hardware and positioning in the opposite of vehicles that are pictured. Accordingly, when a vehicle [101] moving on a road [100] is in the area lightened by infrared light source [103], it enters in field of vision of at least one camera [102] positioned on the camera carrying platform [104] and at least one image is thus taken. Said image is sent to the server [107] preferably by means of Internet [105].

[25] Fig. 2 represents flowchart of the operation method of the inventive product. Accordingly, images are saved on the server [107] and the process is triggered thereby. An image group [201] is formed prior to these images and the image group is grouped into training images [202] and test images [211]. In this grouping, while training images is used as a base for model formation processes, test images [211] are used in running test process. As a result of all these processes, values of the driver violation detection result [218] and passenger violation detection result [217] are formed on the driver image [216] and passenger image [215] and these are subjected to police examination together with images that is started to be processed in the first place, thereby achieving the violation detection accurately and completely.

[26] Fig. 3 represents the selection -for illustration, rectangular and white background- that will be a base for the deep learning algorithm by performing the marking by user [108] during the windshield area detection model formation [203] after a sample image is taken into training images [202]. Here, the selection is carried out by the user for two functions; one of them is processed in the deep learning algorithm and serves to form the model required to carry out the same selection without any interference of the user. The other one is cut for this selection and saved on the server so as to use in next model formation process.

[27] Fig. 4 represents the selection -for illustration, rectangular and white background- that will be a base for the deep learning algorithm by performing the marking by user [108] during the driver and passenger detection model formation [205] by separating the part marked in the windshield area detection model formation [203] after a sample image is taken into training images [202]. Here, the selection is carried out by the user for two functions; one of them is processed in the deep learning algorithm and serves to form the model required to carry out the same selection without any interference of the user. The other one is cut for this selection and saved on the server so as to use in next model formation process. Even though the process for driver and passenger detection model formation [205] depends on the same principles, it is carried out separately for driver and passenger because of graphical grounds; images received from the previous model are saved separately, displayed separately to user, selected separately, the selection carried out is saved separately and processed by the deep learning algorithm separately.

[28] Fig. 5 represents the selection -for illustration, rectangular and white background- that will be a base for the deep learning algorithm with the parts re-marked in the processes of driver seatbelt detection model formation [210] and passenger seatbelt detection model formation [209]; after the part marked by the user [108] during the driver and passenger detection model formation [205] is separated; after the part marked in the process of the windshield area detection model formation [203] is separated; after a sample image is taken into training images [202]. Here, the selection by user is processed only in the deep learning algorithm and even though processes of the driver seatbelt detection model formation [210] and passenger seatbelt detection model formation [209] serving to set up the model required to perform the same selection on other images without any interference of user depend on the same principles, it is performed separately for driver and passenger because of graphical grounds; images received from the previous model is saved separately, displayed separately to user, selected separately, the selection carried out is saved separately and processed by the deep learning algorithm separately.

Description of the Embodiments

[29] Correspondences of the reference signs used in drawings annexed in the description is as below;

[30] 100- Road: Ground, on which the vehicle desired to carry out the seatbelt violation detection progresses. The vehicle moving said ground is monitored with camera [102].

[31] 101- Vehicle: Land vehicle moving on the road [100] and desired to detect if driver and passenger therein constitute a seatbelt violation or not.

[32] 102- Camera: Devices on the camera carrying platform [104] on the road [100] and catching images being near-infrared (NIR) watching the road and visible area (RGB). In domestic applications, License Plate Recognition System (LPRS) cameras may be given as an example.

[33] 103- Infrared Light Source: Devices used for enlightenment to take an infrared image of vehicles moving on the road [100]. It is essential to enlighten the area that the camera sees.

[34] 104- Camera Carrying Platform: It is a fixed structure on which the camera [102] positioned to take image of vehicles [101] on the road [100] is placed.

[35] 105- Internet: General name of the general network, wherein images taken by the camera [100] are sent directly to the server [107] and wherein images are processed and result thereof are sent to the server [107].

[36] 106- Police Station: Physical area, wherein data of the passenger violation detection result [217] and driver violation detection result [218] obtained as a result of operation of the inventive product are sent thereto and evaluated subjecting to police examination. It is not obligatory to exist only one point, but it is possible to send them to multiple station.

[37] 107- Server: Computer and body of computers, wherein the inventive product operates thereon and saves images by performing processes, processes them, saves related results and sends them. It is possible to use one (e.g. cloud server) of server types developed in the art.

[38] 108- User: Person, that performs markings on training images [202], companies to model formation portions, sets up the system and gets it ready to

operate on its own. 109- Criminal Action: Administrative act that is recommended to be taken based on the police examination performed in the police station in case of detection of seatbelt violation depending on the result of the inventive product.

[39] 201- Image Group: Whole of the images collected by the camera [102]. These images are grouped into two and processed.

[40] 202- Training Images: Image group separated from inside of the image group [201] and used in forming the model.

[41] 203- Windshield Area Detection Model Formation: A model formation process taking a basis of training images [202] on the deep learning algorithm. Accordingly, the area desired to be selected on each training image [202] is marked by the user [108]. The marking is performed with a preferably rectangular selection; it is stated as rectangular so as to facilitate that both the user performs marking and the cutting process is performed in later steps, wherein those skilled in the art may select any geometrical shape. Here, the windshield area detection model [301] is formed and saved to be used on the server [107] later. After each of the training images [202] is processed, the windshield area detection model [301] is updated.

[42] 204- Windshield Area Detection: Area marked during the process of the windshield detection model formation [203] is saved on the server as a separate area and thus, the windshield area is detected by the user [108]. Thus, a file is formed to be a basis for next steps.

[43] 205- Driver and Passenger Detection Model Formation: By taking the cut and saved image in the step of the windshield area detection [204] carried out during the process of the windshield area detection model formation [203] from the training images [202] on the deep learning algorithm, it is the process of the driver and passenger detection model [302] on the deep learning algorithm. Accordingly, the area desired to be selected on each image taken is marked by the user [108] on the deep learning algorithm. The marking is performed with a preferably rectangular selection; it is stated as rectangular so as to facilitate that both the user performs marking and the cutting process is performed in later steps, wherein those skilled in the art may select any geometrical shape. Here,

the driver and passenger detection model [302] is formed. After each of the images cut prior to the training images [202] is processed, the driver and passenger detection model [302] is updated. Despite the fact that processes of the driver detection [205] and passenger detection [206] are carried out separately because of geometrical grounds, for illustration, it is mentioned as a single process step, because they are carried out respectively on each training image. Driver and passenger are detected with separate markings because of the seatbelt.

[44] 206- Passenger Detection: Area marked during the process of the driver and passenger detection model formation [205] is saved on the server [107] as a separate area and thus, the passenger area is detected by the user [108] as a passenger area. Thus, a file is formed to be a basis for next steps.

[45] 207- Driver Detection: Area marked during the process of the driver and passenger detection model formation [205] is saved on the server [107] as a separate area and thus, the passenger area is detected by the user [108] as a driver area. Thus, a file is formed to be a basis for next steps.

[46] 208- Sample Images Obtaining: In the process of the driver and passenger detection model formation [205], driver and passenger areas are marked separately with the processes of driver detection [207] and passenger detection [206]. As a result of the marking, images separated are saved on the server [107] as two groups in the process of driver detection [207] as driver area and in the process of passenger detection [206] as passenger area. Since the process of model formation is triggered separately on the two groups of images, there is a need for separating those images. Here, two groups of images may be separated by saving them in different files and may be also separated such that it includes distinctive elements in the file name.

[47] 209- Passenger Seatbelt Detection Model Formation: It is a model formation process depending on passenger images in sample images on the deep learning algorithm. Accordingly, the area desired to be selected on each passenger image is marked by the user [108]. The marking is performed with a preferably rectangular selection; it is stated as rectangular so as to facilitate that the user performs marking, wherein those skilled in the art may select any geometrical

shape. Here, the passenger seatbelt detection model [303] is formed and saved to be used on the server [107] later. After the passenger image corresponding to each of the training images [202], the passenger seatbelt detection model [303] is updated.

[48] 210- Driver Seatbelt Detection Model Formation: It is a model formation process depending on driver images in sample images on the deep learning algorithm. Accordingly, the area desired to be selected on each driver image is marked by the user [108]. The marking is performed with a preferably rectangular selection; it is stated as rectangular so as to facilitate that the user performs marking, wherein those skilled in the art may select any geometrical shape. Here, the driver seatbelt detection model [304] is formed and saved to be used on the server [107] later. After the driver image corresponding to each of the training images [202], the driver seatbelt detection model [304] is updated.

[49] 211- Test Images: Group of the images not determined as training images [202] by separating from the image group [201].

[50] 212- Windshield Area Detection: It is the process of windshield area detection carried out automatically as a result of processing the test images [211] saved on the server [107] with the windshield area detection model [301]. The windshield area is detected and separated on the camera [102] images with any interference of the user [108] by means of using the windshield area detection model [301] formed in the previous stages. The windshield area separated is saved on the server again and used for later processes.

[51] 213- Passenger Detection in the Windshield Area: After the windshield area is detected in the process of windshield area detection [212], it is the process of passenger area detection carried out automatically as a result of processing the saved image with the driver and passenger detection model [302]. The passenger area is detected and separated on the windshield area images cut from the camera [102] images without any interference of the user [108] by means of using the driver and passenger detection model [302] formed in the previous. The passenger area separated is re-sent to the server as the passenger image [215] and used for later processes.

[52] 214- Driver Detection in the Windshield Area: After the windshield area is detected in the process of windshield area detection [212], it is the process of driver area detection carried out automatically as a result of processing the saved image with the driver and passenger detection model [302]. The driver area is detected and separated on the windshield area images cut from the camera [102] images without any interference of the user [108] by means of using the driver and passenger detection model [302] formed in the previous. The driver area separated is save on the server as the driver image [216] and used for later processes.

[53] 215- Passenger Image: Image obtained as a result of the process of the windshield area passenger detection [213]. First status of the passenger image, of which a sample is in Figure 5.

[54] 216- Driver Image: Image obtained as a result of the process of the windshield area driver detection [214]. First status of the driver image, of which a sample is in Figure 5.

[55] 217- Passenger Violation Detection Result: It is the process of evaluating the information without a need for any interference of the user [108], relating to if there is a seatbelt violation by processing the passenger image [215] on the passenger seatbelt detection model [209]. In case of violation, while the result is sent to the next process step together with the received image, in case of no violation, sequence of processes is ended without performing any action.

[56] 218- Driver Violation Detection Result: It is the process of evaluating the information without a need for any interference of the user [108], relating to if there is a seatbelt violation by processing the driver image [216] on the driver seatbelt detection model [210]. In case of violation, while the result is sent to the next process step together with the received image, in case of no violation, sequence of processes is ended without performing any action.

[57] 219- Police Examination: Images evaluated constituting a violation based on the results of the passenger violation detection result [217] and driver violation detection result [218] are presented to be examined by law enforcement officers together with the image in the image group [201] taking place in the beginning of

sequence of the processes. Here, criminal actions upon the detection is implemented by law enforcement officers.

[58] 301- Windshield Area Detection Model: One of the models formed by means of processing the markings carried out by the user on the deep learning algorithm. It is formed with the process of windshield area detection model formation [203] and used with the process of windshield area detection [212].

[59] 302- Driver and Passenger Detection Model: One of the models formed by means of processing the markings carried out by the user on the deep learning algorithm. It is formed with the process of driver and passenger detection model formation [205] and used with the process of driver detection in the windshield area [214].

[60] 303- Passenger Seatbelt Detection Model: One of the models formed by means of processing the markings carried out by the user on the deep learning algorithm. It is formed with the process of passenger seatbelt detection model formation [209] and data of the passenger violation detection result [217] is produced by processing the passenger image [215] with the model.

[61] 304- Driver Seatbelt Detection Model: One of the models formed by means of processing the markings carried out by the user on the deep learning algorithm. It is formed with the process of driver seatbelt detection model formation [210] and data of the driver violation detection result [218] is produced by processing the driver image [216] with the model.

Patent Literature

[62] PTL1:

Non-Patent Literature

[63] NPL1:

Claims

[Claim 1] A method comprising at least one License Plate Recognition System camera [102] monitoring vehicle [101] moving on the road [100] to detect seatbelt violation relating to driver and passengers in the front seat of vehicle moving on the road and an infrared light source [103] enlightening the area around said vehicle [101], a camera carrying platform [104] carrying said infrared light source [103] and camera [102], Internet [105] connection used to send the images received and process results, sending results of the process to police station [106], a server [107] in which images received from the camera [102] and other data and models are kept, a user [108] providing input to the model formation processes on the server and a deep learning technique to implement the criminal action [109] implemented by law enforcement forces in case of violation detection, **characterized in that**; it collects images received from the camera [102] as an image group [201], said image group [201] is grouped into training images [202] and test images [211]; a windshield area detection model formation [203] is performed by means of marking the deep learning algorithm of the training images [202] by the user [108]; said model formed is saved on the server [107] as a windshield area detection model [301]; the windshield area detection [204] is carried out by separating image portions marked and a passenger and driver detection model formation [205] is carried out by means of re-marking the separated images on the deep learning algorithm by the user [108]; the model formed is saved on the server [107] as driver and passenger detection model [302]; the passenger detection [206] and driver detection [207] is carried out by separating said image portions marked; obtaining sample images [208] is carried out by user interference for the samples pertaining if passenger and driver detected wear seatbelt or not; a passenger seatbelt detection model formation [209] and driver seatbelt detection model formation [210] is carried out by means of marking the ones with seatbelt in the sample images by the user [108] on the deep learning algorithm of said images; the windshield area detection [212] is carried out and separated by processing the test images [211] with the

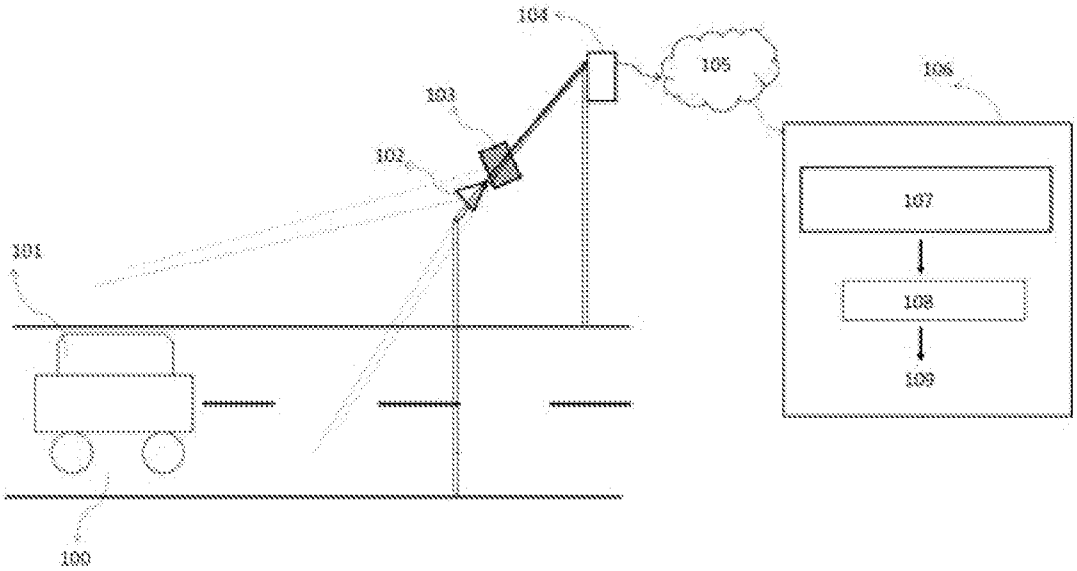
windshield area detection model [301] by way of saving these models formed on the server [107] as passenger seatbelt detection model [303] and driver seatbelt model [304], respectively; passenger detection in the windshield [213] and driver detection in the windshield area [214] is carried out by means of processing separated images of the windshield area with the driver and passenger detection model [302]; extraction of the passenger image [215] and driver image [216], respectively and saving them is carried out; data of the passenger violation detection result [217] is produced by means of processing the passenger image [215] with the passenger seatbelt detection model [303]; data of the driver violation detection result [218] is produced by means of pressing the driver image with the driver seatbelt detection model [304] and both of the data is presented to the police examination [219].

[Claim 2] Method according to Claim 1, **characterized in that**; the camera [102] and server [107] are in the same physical location and sequence of the processes are carried here and related results are presented to the police examination [219] over Internet [105].

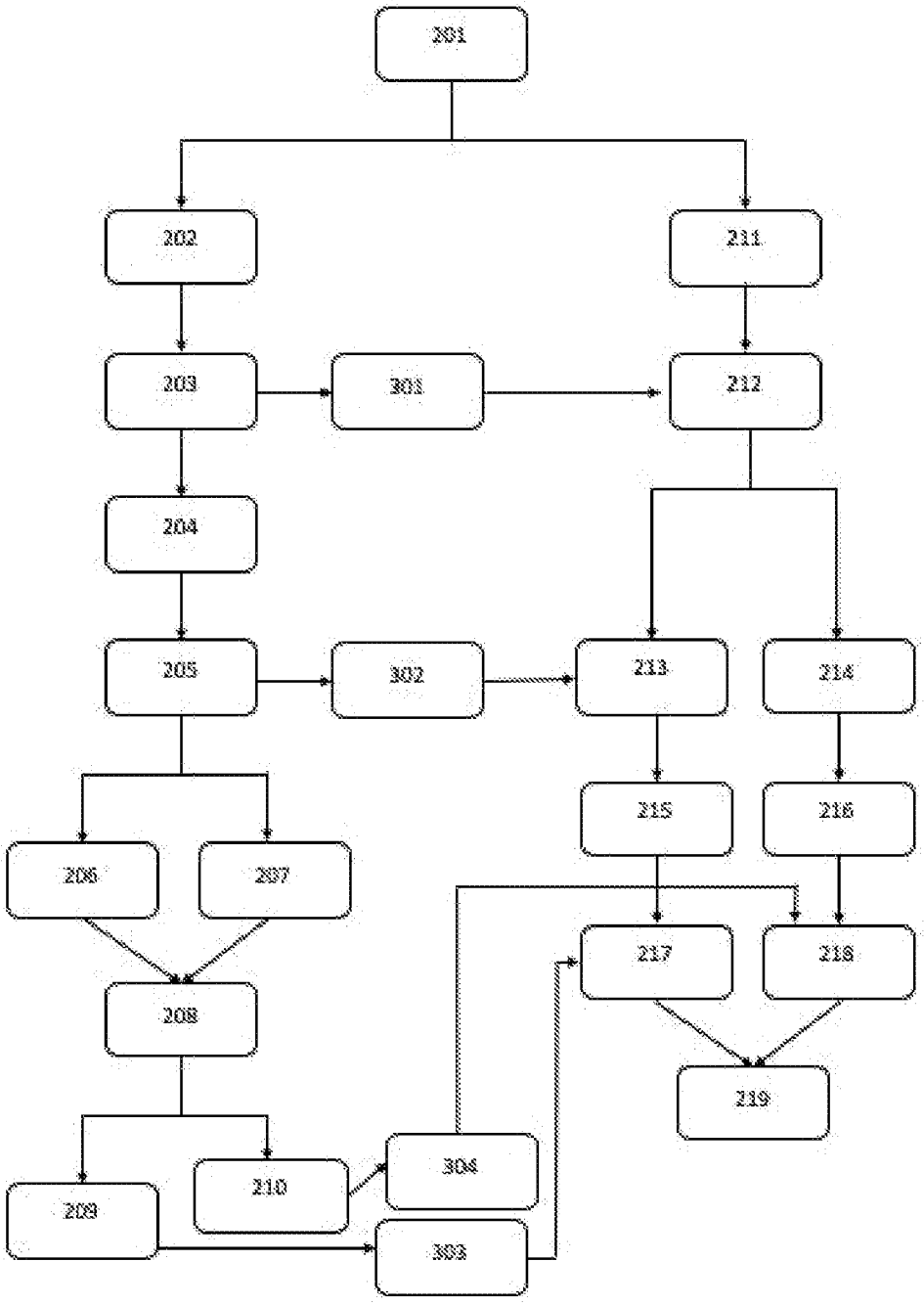
[Claim 3] Method according to Claim 1, **characterized in that**; data of the camera [102] are sent to the server in the police station [106] over Internet [105] and processes are performed here, and related results are presented directly to the police examination [219].

[Claim 4] Method according to Claim 1, **characterized in that**; said deep learning techniques are single-shot multibox detection (SSD), multiple evolutionary neural networks or another deep learning technique known in the art.

[Fig. 1]



[Fig. 2]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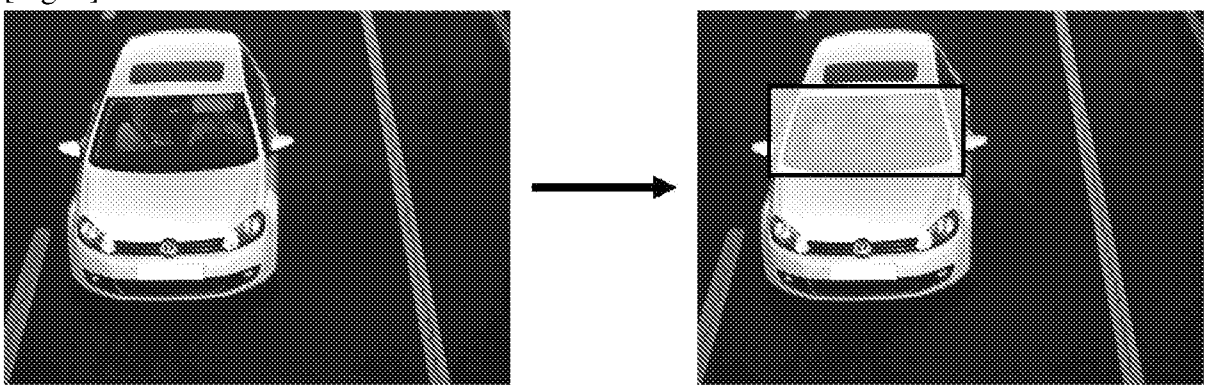
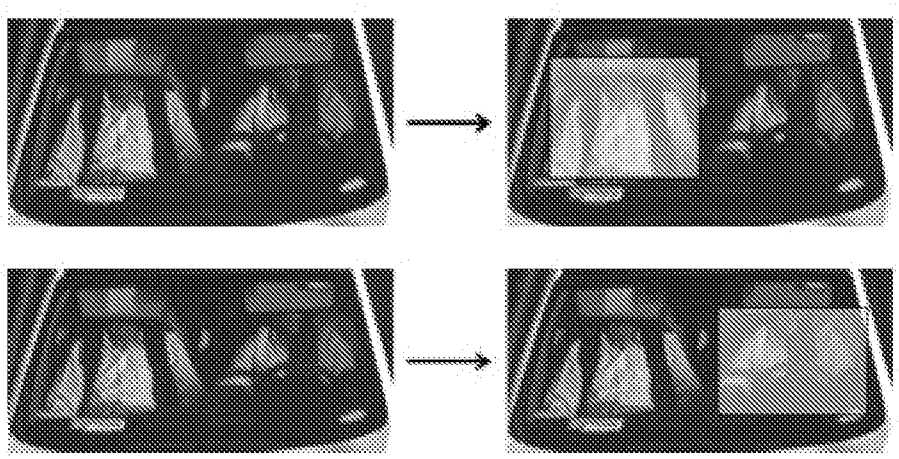
[Fig. 3]



[Fig. 4]



[Fig. 5]