SYSTEM AND METHOD FOR MONITORING RETAIL STORE PERFORMANCE

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A system for monitoring the performance of at least one task associated with operation of a retail store. The system includes at least one monitoring device positioned and adapted to provide images of at least one location within the retail store, with each image showing at least one factor related to performance of the at least one task. A controller is adapted to obtain and store images from the at least one monitoring device. An interface is adapted to enable a user to selectively view stored images and to manually analyze the at least one factor shown in the viewed images to evaluate the performance of the at least one task.
POSITION CAMERAS AT DESIRED STORE LOCATIONS

OBTAIN IMAGES FROM THE CAMERAS

STORE IMAGES IN A DATABASE

VIEW SELECTED IMAGES FROM THE DATABASE

MANUALLY EVALUATE PERFORMANCE OF TASK

ADJUST PERFORMANCE OF TASK BASED ON EVALUATION

Fig. 5
270

272 PROVIDE IMAGES OF CHECK LANES

274 STORE IMAGES IN A STORAGE DEVICE

276 VIEW SELECTED IMAGES

278 COUNT CUSTOMERS AWAITING SERVICE

280 DETERMINE STAFFING REQUIREMENTS BASED ON COUNT

Fig. 6
SYSTEM AND METHOD FOR MONITORING RETAIL STORE PERFORMANCE

BACKGROUND OF THE INVENTION

[0001] As the retail industry continues to become more competitive, customer satisfaction is of paramount importance in establishing and maintaining customers. Customer satisfaction depends on a variety of factors such as a customer’s perception of price, product availability, well-stocked shelves, ease of finding products within a retail store, cleanliness of the store, and friendliness of employees.

[0002] However, perhaps the most important factor regarding customer satisfaction is customer service. Of primary concern with regard to customer service is the amount of time a customer must wait when requiring assistance from a store employee. This includes, for example, time spent waiting for assistance at a customer service counter, at a merchandise counter and, of course, time spent waiting in check-out lanes. Generally speaking, the less time spent waiting for assistance, the more satisfied the customer.

SUMMARY OF THE INVENTION

[0003] One embodiment of the present invention relates to a system for monitoring the performance of at least one task associated with operation of a retail store. The system comprises at least one monitoring device positioned and adapted to provide images of at least one location within the retail store, with each image showing at least one factor related to performance of the at least one task. The system further includes a controller and an interface. The controller is adapted to obtain and store images from the at least one monitoring device. The interface is configured to enable a user to selectively view stored images and to manually analyze the at least one factor shown in the viewed images to evaluate the performance of the at least one task.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Embodiments of the invention will be described with respect to the figures, in which like reference numerals denote like elements, and in which:

[0005] FIG. 1 is block diagram illustrating one embodiment of a performance monitoring system according to the present invention.

[0006] FIG. 2 is a block diagram illustrating one embodiment of a performance monitoring system according to the present invention.

[0007] FIG. 3 is a block diagram illustrating one embodiment of a performance monitoring system according to the present invention.

[0008] FIG. 4A is an illustration of a graphical user interface for use with one embodiment of a performance monitoring system according to the present invention.

[0009] FIG. 4B illustrates in greater detail a portion of the graphical user interface of illustrated in FIG. 4A.

[0010] FIG. 5 is a flow diagram illustrating one embodiment of a process for monitoring the performance of a retail store according to the present invention.

[0011] FIG. 6 is a flow diagram illustrating another embodiment of a process for determining staffing requirements of a retail store according to the present invention.

DETAILED DESCRIPTION

[0012] FIG. 1 is a block diagram generally illustrating one embodiment of a performance monitoring system 10 according to the present invention for monitoring the performance of at least one task associated with operation of a retail store 12. Performance monitoring system 10 includes a plurality of monitoring devices 14, each positioned to view a corresponding location 16 within retail store 12 and adapted to provide images of the corresponding location 16, each image showing at least one factor related to performance of at the at least one task. In one embodiment, monitoring devices 14 comprise cameras. In one embodiment, monitoring devices 14 comprise analog video cameras adapted to provide analog video of corresponding locations 16. In one embodiment, monitoring devices 14 comprise digital video cameras adapted to provide digital video of corresponding locations 16. As illustrated, analog video cameras 14a through 14f respectively correspond to store locations indicated as checkout lanes 14a, customer service desk 14b, electronics counter 14c, jewelry counter 14d, stockroom 14e, and receiving area 14f. Although illustrated as having analog video cameras 14a through 14f, monitoring system 10 can include more or fewer cameras 14 at locations other than locations 16 indicated by FIG. 1. Additionally, multiple cameras may be used to monitor a single store location, such as check lanes 16a.

[0013] FIG. 1 is a block diagram illustrating one embodiment of a performance monitoring system 10 according to the present invention for monitoring the performance of at least one task. Examples of such factors include number of employees and an amount of unloading time required when evaluating the task of unloading an incoming shipment of products at receiving dock 16f and a number of customers awaiting service when evaluating the tasks of processing customers at check lanes 16a or assisting customers at customer service area 16b, electronics counter 16c, and jewelry counter 16d. Any number of other tasks associated with operation of retail store 12 can be similarly monitored by providing and positioning cameras 14 at other locations within retail store 12 as required.

[0014] Interface 20 is adapted to enable a user, such as a store manager, to selectively view the stored images and to manually analyze the at least one factor shown in the viewed images to evaluate the performance of the at least one task. Examples of such factors include number of employees and an amount of unloading time required when evaluating the task of unloading an incoming shipment of products at receiving dock 16f and a number of customers awaiting service when evaluating the tasks of processing customers at check lanes 16a or assisting customers at customer service area 16b, electronics counter 16c, and jewelry counter 16d. Any number of other tasks associated with operation of retail store 12 can be similarly monitored by providing and positioning cameras 14 at other locations within retail store 12 as required.
Components of the present invention can be implemented in hardware via a microprocessor, programmable logic, or state machine, in firmware, or in software with a given device. In one aspect, at least a portion of the software programming is web-based and written in HTML and JAVA programming languages, including links to user interfaces, such as a Windows based operating system, and each of the main components may communicate via a network using a communication protocol. For example, the present invention may or may not use a TCP/IP protocol for data transport. Other programming languages and communication protocols suitable for use with the present invention will become apparent to those skilled in the art after reading the present application. Components of the present invention may also reside in software on one or more computer-readable mediums, which is defined herein to include any kind of memory, volatile or non-volatile, such as floppy disks, hard drives, read-only memory (ROM), CD-ROMs, flash memory, and random access memory (RAM).

FIG. 2 is a block and schematic diagram illustrating one embodiment of performance monitoring system 10 for retail store 12 as illustrated generally by FIG. 1. Performance monitoring system 10 includes a plurality of analog video cameras 14, such as analog video cameras 14a through 14z. Each camera 14 is coupled to a digital video recorder (DVR) 30 via a corresponding link 32. Each camera 14 is configured as a unique channel and provides an analog video signal of its associated store location 16 via corresponding link 32 to DVR 30. DVR 30 includes an analog-to-digital converter (A/D) 34 which converts the analog video signal of each camera (or channel) 14 to a corresponding digital video having a digital video format, such as AVI, for example. DVR 30 is configured to store a predetermined amount of the digital video for each camera 14. In one embodiment, for example, DVR 30 stores a day’s worth of digital video for each camera 14, with the stored digital video being replaced with the digital video for each subsequent day.

A server 40 is coupled to DVR 30 via a link 42. In one embodiment, controller 18 comprises a monitoring system application (MSA) comprising an electronically readable code which is installed and operating on server 40. In one embodiment, in addition to MSA 18, server 40 includes various other applications 44 related to operation of retail store 12. MSA 18 is adapted to automatically retrieve digital still images for each camera 14 at regular intervals from DVR 30 via link 42. In one embodiment, MSA 18 is adapted to retrieve the digital still images for each camera by selecting a single frame from a selectable time period of the digital video of each camera stored in DVR 30 and by converting the selected digital video frame from a digital video from, such as AVI, to a digital still picture format, such as JPG. In one embodiment, MSA 18 stores the retrieved digital still images for each camera in a memory 46 according to a directory and file naming convention. In an alternate embodiment, MSA 18 stores the retrieved digital still images in a database 48. Although illustrated as being within server 40, in other embodiments, database 48 could be located external to server 40.

In one embodiment, interface 20 comprises a graphical user interface (GUI) adapted to display the digital still photos stored in database 46 and which is viewable via a personal computer (PC) 50 coupled to server 40 via a link 52. Although illustrated as being viewed via PC 50, in other embodiments, GUI 20 may be viewed via other electronic viewing devices, such as a personal digital assistant (PDA) or Blackberry device, for example.

In one embodiment, DVR 30 comprises a portion of a security system 60 which further includes a plurality of analog video cameras 62 providing surveillance video of retail store 12 for purposes of assets protection. Surveillance system 60 is controlled by a security system application (SSA) 64 comprising a computer readable code which is installed and operating on server 40. In one embodiment, analog video cameras 16 are dedicated for use as surveillance cameras for assets protection and analog video cameras 14 are employed both as surveillance cameras by security system 60 and as monitoring cameras by performance monitoring system 10. Security system 60 utilizes the entire video signal of analog video cameras 14 and 62 stored in DVR 30, while performance monitoring system 10 utilizes the digital images obtained by controller 18 and stored in database 46.

In one embodiment, security system 60 represents an existing surveillance system within retail store 12. If analog video cameras 62 of security system 60 are already positioned or can be repositioned to view all locations desired to be monitored by performance monitoring system 10 (e.g., locations 16 as illustrated by FIG. 1), analog video cameras 14 are not required and MSA 18 of performance monitoring system 10 can obtain images as necessary from existing analog video cameras 62. However, if analog video cameras 62 of security system 60 are not, or cannot, be positioned to view all desired store locations 16, analog video cameras 14 are added to security system 60 and positioned to view the otherwise non-observed areas. In such a scenario, while the primary function of analog video cameras 14 is to provide images for performance monitoring system 10, analog video signals provided by analog video cameras 14 via links 32 can also be utilized for assets protection purposes by security system 60.

In one embodiment, in lieu of a digital recording device, recording device 30 comprises some type of analog recording device, such as one or more video tape recording devices adapted to record the analog video signals received via links 32 from each camera, or channel. In such an embodiment, performance monitoring system 10 further includes a “frame grabber” (FG) 70 adapted to capture at regular intervals a single frame of the analog video signal provided by each camera 14 prior to the analog video signal being recorded by the analog recording device, and to convert the single frame to a digital still image which is subsequently stored in memory 46.

In one embodiment, cameras 14 comprise digital still cameras configured to provide digital still images of store locations 16 at intervals as directed by MSA 18. In this embodiment, digital still images from cameras 14 can be
stored directly to database 46 as directed by MSA 18. As such, recording device 30 is not required in this embodiment.

In one embodiment, as described briefly above, intranet communications link 184 comprises a controlled-access communications link between stores 112 and headquarters facility 113. In one embodiment, to access the digital photos stored in memories 146, a user, such as a manager of retail store 112a, enters the URL (Uniform Resource Location), or address, of website 190 into a Web browser located on PC 150a which subsequently locates website 190 via intranet connection 186. To access website 190, the user enters a username and password. Upon entering a valid username and password, the user can access and view selected stored digital images via GUI 120a which is displayed by PC 150a. Although described as being accessed via PC 150, website 190 can be accessed via other types of electronic viewing devices, such as a PDA, for example, and from any location that provides a communication link to intranet 184.

In one embodiment, access to viewing stored images is limited based on a user's logon ID. For example, in one embodiment, based on the user's unique logon ID, a user associated with a given retail store 112 can access only stored images corresponding to the given retail store 112. For example, a manager of retail store 112a can access only images of locations within retail store 112a which are stored within memory 146a, and cannot access images of other retail stores, such as retail store 112b. In other embodiments, other users, such as certain employees associated with headquarters facility 113, can access images of all retail stores 112a to 112n respectively stored in memories 146a to 146n. In one embodiment, access to viewing stored images is limited based on a location from which access is initiated. For example, in one embodiment, each PC, or workstation, 150 has unique hardware identifier which corresponds, at least in part, to the retail store 112 in which PC 150 is located. As such, a user accessing stored images via PC 150a, for example, is limited to viewing only those images stored in memory 146a corresponding to retail store 112a.

FIG. 4A is an illustrative example of GUI 120 for accessing and viewing digital images provided by performance monitoring systems 110 via website 190 as described above by FIG. 3. GUI 120 includes an options menu 200, an image selection menu 202, and an image display area 204. Options menu 200 includes a pull-down menu 206 that enables a user to select a retail store 112 from which the user would like to view digital images provided by the stores performance monitoring system 110. In one embodiment, pull-down menu 206 comprises a list of unique identification numbers corresponding to each retail store 112 (for example, "RS123" as illustrated in FIG. 4) from which the user can select, such as by selecting the identification number corresponding to the desired retail store with a mouse. Similarly, options menu 200 includes a pull-down menu 208 that enables a user to select a desired date from which the user would like to view images for the desired retail store 112 as selected via pull-down menu 206.

As described above, in one embodiment, access of images is limited based on a user’s unique logon ID or location. As such, in one embodiment, pull-down menu 206 comprises the unique identification numbers of only those retail stores 112 to which the user is allowed access as based on the user’s password. Thus, for a user having access to only one retail store 112, options menu 200 will include only pull-down menu 208a enabling the user to select a desired...
date from which to view images of only the retail store 112 with which the user is associated. In lieu of pull-down menu 206, only the unique identification number of the store with which the user is associated will be displayed.

[0033] Image selection menu comprises a column 210 of descriptions of monitored locations within the selected retail store (e.g., locations 16 of retail store 12 as illustrated by FIG. 1). Each description of column 210 is followed by a row 212 of icons 214 representative of stored images corresponding to the described location within the selected retail store. In one embodiment, each row comprises 24 icons with each icon representative of images acquired during one hour of the day selected via pull-down menu 208. In one embodiment, as indicated at 216, the columns of icons are labeled as columns “01” through “23” with the icons in the column labeled “00” representative of digital images acquired between 12:00 am and 1:00 am, the icons in the column labeled “01” representative of digital images acquired between 1:00 am and 2:00 am, and so on.

[0034] In one embodiment, wherein images of desired locations within a retail store are obtained on 15-minute intervals, each icon 214 is partitioned into four areas 214a through 214d, with each area being representative of one of the four photos acquired during the corresponding hour. For example, as illustrated by the enlarged view of FIG. 4B, icon 214 is representative of images of a first group of check lanes (“check lanes 1”) acquired during time period “23”, wherein time period “23” corresponds to the time period between 11:00 pm to 12:00 am. As such, areas 214a, 214b, 214c and 214d respectively represent images of the first group of check lanes acquired at 11:00 pm, 11:15 pm, 11:30 pm and 11:45 pm.

[0035] After selecting a desired store and a desired date via pull-down menus 206 and 208, a user chooses an image to be viewed by selecting one of the icons 214. In one embodiment, a user selects a desired icon, or desired area of an icon, by mouse-clicking the desired icon 214. Upon selecting a desired image, the image is displayed within image viewing area 204. In one embodiment, image viewing area 204 includes a title field 218 displaying the description of the store location from column 210 corresponding to the selected image (i.e. the camera from which the selected image originated) and an indication of the time frame 220 corresponding to the selected image.

[0036] FIG. 5 is a flow diagram illustrating one embodiment of a process 250 according to the present invention for monitoring performance of at least one task associated with operation of a retail store. Process 250 begins at step 252 where cameras are provided at desired locations within the retail store where certain tasks which are desired to be monitored are performed, such as positions 16 illustrated by FIG. 1. In one embodiment, as described above, the cameras may be analog video cameras providing analog video signals which are converted into digital video format. In one embodiment, the cameras may be digital video cameras providing a digital video signal. In one embodiment, the cameras may be digital still cameras providing digital still photos. In one embodiment, the cameras may comprise a portion of an existing security surveillance system.

[0037] At step 254, images are obtained at selectable intervals from the cameras positioned at step 252. In one embodiment, the images are obtained at regular intervals, such as, for example, 15-minute intervals. In one embodiment, wherein the cameras are analog video cameras, digital still photos are extracted from the digital video signals obtained from the cameras’ analog video signals, wherein the extracted images comprise digital still photos of the corresponding areas monitored by the cameras. At step 254, the images obtained at step 254 are stored in a memory. In one embodiment, the obtained images are stored in a database.

[0038] At step 258, a user, such as a store manager, views selected images obtained and stored via steps 254 and 256. At step 260, the user manually analyzes at least one factor shown in the viewed images that is related to the performance of a given task in order to evaluate how well the given task was performed. For example, a user may select images of a given location provided by one or more cameras over a certain time period to evaluate the performance of a task that is carried out at a location. For example, a user may select one or more cameras positioned at receiving dock 16 to monitor how long it takes to unload an incoming shipment of products. In this instance, factors related to the unloading of the incoming shipment may include the number of employees engaged in unloading the truck, the size of packages being unloaded, and the time required to unload the truck. From the images, the store manager can evaluate generally the number of employees engaged in unloading the truck and from the time interval of the images selected, estimate how long it took to unload the truck.

[0039] At step 262, based on the evaluation of the images at step 260, the user may determine that performance of the task needs to be improved. For example, if the truck took too long to unload, more employees may be assigned to this task for future shipments. Also, if from the images it appeared that there were too many employees assigned to unload the truck, fewer employees may be assigned to unload future shipments.

[0040] FIG. 6 is a flow diagram illustrating one embodiment of a process 270 according to the present invention for determining staffing requirements at one or more check lanes of a retail store. Process 270 begins at step 272 where still images of the one or more check lanes are provided. In one embodiment, the still images are digital images. At step 274, the still images are stored in a storage device.

[0041] At step 276, a user, such as a store manager, selects for viewing one or more images of the one or more check lanes corresponding to a desired time interval. In one embodiment, the digital still images are viewed via an electronic viewing device, such as via the display of a personal computer or a personal digital assistant (PDA). At step 278, the user manually analyzes the one or more selected images to assess generally the customer conditions at the one or more check lanes. If the images permit, a store manager may thoroughly assess customer conditions by manually counting a number of customers awaiting service at the one or more check lanes. The user may also determine the number of cashiers on duty and estimate a length of time customers wait before being served.

[0042] At step 278, the store manager may adjust the number of cashiers on duty at that time of the day based on the conditions shown in the images viewed during step 276. For example, with reference to FIG. 1, a store manager may view images obtained from camera 14a during a selected
time interval, such as between 4 pm and 5 pm on a given date, to evaluate the performance of check lanes 16a. For instance, if controller 18 obtains images from camera 14c at fifteen minute intervals, the store manager can view the five images (i.e., 4:00, 4:15, 4:30, 4:45, and 5:00) to determine the number of check lanes open (i.e., staffed with a cashier) and the number of customers at each open check lane in order to determine whether more or few check lanes should be open during that time of the day. Also, a store manager may view images of a same time period each day over an extended time period (e.g., a week, a month, etc.) to determine trends in customer patterns in order to predict how many cashiers should be available and how many check lanes should be open at a given time.

[0043] One aspect of the present invention, as described briefly above with respect to FIG. 2, relates to retrofitting a retail store's existing security system to provide a performance monitoring system according to the present invention, wherein the existing security system includes a plurality of video cameras each providing a video signal of a corresponding location within the retail store. The retrofitting process includes evaluating the positions of the existing video cameras and to select those existing video cameras that provide images of store locations desired to be monitored. If all desired store locations are not adequately monitored, the process includes adding one or more video cameras to the existing security system in order to adequately monitor such store locations.

[0044] The process further includes providing a controller adapted to capture digital images from the video signals of selected existing video cameras and newly added video cameras. The process further includes providing a storage device in which to store the captured digital images and providing an interface adapted to enable a user to selectively view the stored digital images in order to evaluate performance of one or more operations taking place at the one or more locations viewed in the digital images.

[0045] Although the invention has been described with respect to particular embodiments, such embodiments are for illustrative purposes only and should not be considered to limit the invention. Various alternatives and changes will be apparent to those of ordinary skill in the art.

What is claimed is:

1. A system for monitoring the performance of at least one task associated with operation of a retail store, the system comprising:

   a. a controller adapted to obtain and store images from the at least one monitoring device;

   b. an interface adapted to enable a user to selectively view stored images and to manually analyze the at least one factor shown in the viewed images in order to evaluate performance of the at least one task.

2. The system of claim 1, wherein the at least one monitoring device comprises a video camera providing a video signal of the at least one location.

3. The system of claim 1, wherein the at least one monitoring device comprises a digital still camera.

4. The system of claim 1, wherein the controller is adapted to obtain and store images at selectable intervals.

5. The system of claim 1, wherein the controller comprises an electronically readable code.

6. The system of claim 1, wherein the interface comprises a graphical user interface including icons representative of selected stored images.

7. The system of claim 1, wherein the at least one factor comprises a number of retail store customers awaiting service at the at least one location.

8. A performance evaluation system comprising:

   a. a first monitoring system adapted to provide and store images of at least one task being performed at a first facility;

   b. a second monitoring system adapted to provide and store images of at least one task being performed at a second facility; and

   c. an interface adapted to enable selective viewing of the stored images and manual evaluation of the at least one task based on the viewed images, wherein a first user associated with the first facility can view only stored images of the first facility, a second user associated with the second facility can view only stored images of the second facility, and a third user associated with the first and second facilities can view stored images of both the first and second facilities.

9. The system of claim 8, wherein the first facility is a first retail store, the second facility is a second retail store, and the third user is associated with a headquarters facility of a retail corporation that includes the first and second retail stores.

10. The system of claim 8, wherein the interface and the first and second monitoring systems are coupled via a communications link.

11. The system of claim 10, wherein the communications link includes the Internet.

12. The system of claim 11, wherein the communications link comprises an intranet having restricted access.

13. The system of claim 12, wherein the interface comprises a website.

14. The system of claim 8, wherein the first monitoring system stores images locally at the first facility and the second monitoring system stores images locally at the second facility.

15. The system of claim 8, wherein the first and second monitoring systems store images at a location remote from the first and second facilities.

16. A performance monitoring system for a retail store, the system comprising:

   a. means for providing images of at least one location within the retail store;

   b. means for storing the images; and

   c. means for viewing stored images to enable a user to manually evaluate a performance of at least one task associated with operation of the retail store occurring at the at least one location.

17. The system of claim 16, wherein the means for providing images includes means for providing images at selectable intervals.
18. The system of claim 16, wherein means for providing images further comprises:

means for providing a digital video signal of the at least one location; and

means for obtaining digital still images from the digital video signal at selectable intervals.

19. A method of operating a retail store, the method comprising:

capturing images of at least one location within the retail store;

storing the captured images at a storage location;

viewing selected images stored at the storage location; and

evaluating a performance of at least one task occurring at the least one location within the retail store by manually analyzing the viewed images.

20. The method of claim 19, further including:

adjusting the performance of the at least one task based on the evaluation.

21. The method of claim 19, wherein capturing images further comprises:

positioning at least one camera to view the at least one location; and

providing images of the at least one location with the at least one camera.

22. The method of claim 21, wherein the at least one camera comprises a digital video camera providing a digital video signal, and wherein capturing images further comprises:

obtaining digital still photos from the digital video signal at selectable intervals.

23. A method for determining staffing requirements of a retail store, the method comprising:

providing digital images of one or more check lanes at selectable intervals each day;

storing the digital images in a storage device;

viewing selected stored digital images;

counting manually a number of customers awaiting service at each of the one or more check lanes in the selected digital images; and
determining staffing requirement based on the counting.

24. The method of claim 23, further comprising:
determining customer trends based on the number of customers counted in the selected digital images.

25. The method of claim 24, further comprising:

providing a number of cashiers based on the customer trends.

26. The method of claim 24, further comprising determining customer trends for a given day of the week during a selected time period by counting the number of customers awaiting service at each of the one or more check lanes in each stored digital image at each selectable time interval for each given day of the week over the selected time period.

27. A method of retrofitting a retail store’s existing security system to provide performance monitoring of store operations, the existing security system including a plurality of video cameras, each video camera providing a video signal of a corresponding location within the retail store, the method comprising:

providing a controller adapted to capture digital images from the video signals of selected video cameras of the existing security system;

providing a storage device to store the captured digital images; and

providing an interface adapted to enable a user to selectively view the stored digital images in order to evaluate performance of one or more operations occurring at one or more locations corresponding to the digital images viewed.

28. The method of claim 27, further comprising:

adding one or more video cameras to the existing security system to provide video of additional locations within the retail store to enable monitoring of operations occurring at the additional locations, wherein the additional locations would not otherwise be monitored for security purposes.