Method and System for Gender-oriented Targeted Advertising

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Abstract: This paper provides an original and convenient rendering of advertisements targeted to a specific audience. The system includes a detection unit for detecting a person, a control module connected to the information rendering panel and to the detection unit. The control module detects age, gender and/or emotional state of a detected person. This data is provided to the information rendering panel for selecting and displaying advertisements appropriate for the detected person.

1 INTRODUCTION

Many conventional advertising systems have an information rendering panel with a surface that is used (entirely or partially) for rendering advertisements (Ramer, 2013); (Van Datta, 2007); (Tang, 2012); (Tung, 2011) when a presence of a person is detected. Such systems include a detection device for detecting a presence of a person and a control module that connects and synchronizes the information between rendering panel and the detection device. These advertisement systems are disclosed in the following publications: US 2006/024867A1 (Paik, 2006), JP 2000-112418 (Miyagi, 2000), etc.

A main common shortcoming of these conventional systems is that the advertising is directed towards a broad audience and is not targeted to a particular person. This makes advertisements significantly less effective. Furthermore, the advertiser cannot keep track of the advertisements that were shown to potential customers. The advertiser prefers to pay for each time the advertisement is shown. The conventional systems do not allow for pay-per-show billing.

Accordingly, there is a need in the art for an efficient and effective system for detecting a person and rendering advertisements that are targeted specifically for this person.

2 GENDER-ORIENTED TARGETED ADVERTISING

The present invention deals with the system and method for detecting a presence of a person in a public area and providing targeted advertisement of goods and services to the detected person according to gender.

The information rendering panel is located in a public place. When the advertisements are not displayed, the information rendering panel appears as a regular mirror and serves as a part of a room ambience. However, once a person appears in a field of the video camera`s view, an image is acquired and sent to the control module (i.e., a computer) in real-time. The control module determines personal parameters (i.e., gender, age, race and an emotional state) (Aristov, 2012; Pronichkin, 2013; Nosik, 2013).

Subsequently, based on the personal parameters, appropriate advertisement is selected for rendering to the detected person. The selection of advertisement is made according to pre-stored data reflecting potential (most likely) preferences of a person of a detected age, race, gender and/or emotional state. Then, the selected advertisement is rendered to the person via a monitor located behind the information rendering panel.

For example, if a potential customer is determined to be a young woman, the advertisement of cosmetics, make up or beauty products are

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rendered. Yet, if a potential customer is determined to be a middle-aged man, an advertisement of wrist watch, beer or alcoholic beverage may be selected and rendered. As soon as the person exits the camera's field of view (or based on a pre-set time out), the rendering of the advertisement is terminated and the information rendering panel begins to serve as a regular mirror again.

Those skilled in the art will appreciate that a surprise effect from a sudden advertisement displayed from a regular mirror (once a person looks at it) combined with an original and convenient way of delivering the targeted advertisement messages significantly increases the advertisement effect (and impression) on the person. Thus, the effectiveness of the overall advertisement campaign is increased, as well.

Furthermore, an additional data about potential customers are collected. For example, an aggregate data reflecting age and gender (or race) of patrons of a particular establishment can be used for selecting the advertisements that are of interest to this group of people, including new people within a camera's field of view.

A system includes an information rendering panel having a mirror or similar transparent surface that is used (entirely or partially) for rendering advertisements upon detection of a person in a vicinity of the system.

The system comprises a detection unit for detecting a person and a control module connected to the information rendering panel and to the detection unit. The detection unit includes a video camera. The control module detects at least age, gender and emotional state of a detected person. This data are provided to the information rendering panel for displaying advertisements appropriate for the detected person.

The control module includes a storage medium with recorded advertisement data. A camera can be in a form of a web-cam and the control module can download advertisement data from a web-server. The control module determines data related to a detected person and stores these data for future references. In particular, the data can be used for analyzing the needs of potential customers and for developing future advertising campaigns.

The information rendering panel has a mirror surface that deflects optical rays received from the outside. At least a portion of the information rendering panel is implemented as a display, which can render the advertisements upon detection a person within a field of view of the video camera.

The information rendering panel allows through the optical rays generated by an advertisement source (e.g., a special monitor) located behind the information rendering panel (or within the system). The control module can be in a form of a computer that runs applications for determining person's age, gender and emotional state based on a person's image(s). For example, applications developed by agisoft.ru can be used (Agisoft, 2014).

Additionally, voice analysis alone, or in combination with visual analysis, can be applied to identify a person's gender, for example, and, the subject matter of conversation between several people, to further target the advertisement. Also social network data (particularly, photographs in people's profiles, which can be matched to the image received by the camera) can be used to identify the person, and to assist in targeting the advertisement based on data in the profile. Then, the targeted advertisement is rendered to the person via a monitor. The system can also ask the user questions, and, in response, provide him or her with both advertisements and relevant information (e.g., from the server), based on his responses, geographic location and identified personal characteristics.

The control module can include a storage medium for storing pre-recorded advertisements (i.e., for example, a hard drive of a computer). Then, the personal data of the detected persons can be also stored onto the hard drive by the control module.

Figure 1 illustrates a system for targeted advertising. A media source is connected to a control server over the Internet and includes a web-camera with an infra-red (IR) filter for detecting persons and acquiring their images. The IR filter allows through only the rays from the infra-red illuminated zone that are produced by an IR projector. The IR lighting allows for camera to operate in low (or dimmed) lighting and increases the accuracy of person recognition and determination of gender, race and age.

The media source includes a computer which has the following applications (components) installed:

- a person recognition system;
- a system for loading advertisement clips from the control server;
- a billing system for billing an advertiser for the clips shown by a rendering device.

The computer allows for classification of a person and selection of advertisement clips in real-time, on the order of tens of milliseconds.

The media source also includes a rendering device, which can be implemented in a form of an LCD or plasma display for showing advertisement video clips to potential customers. The rendering

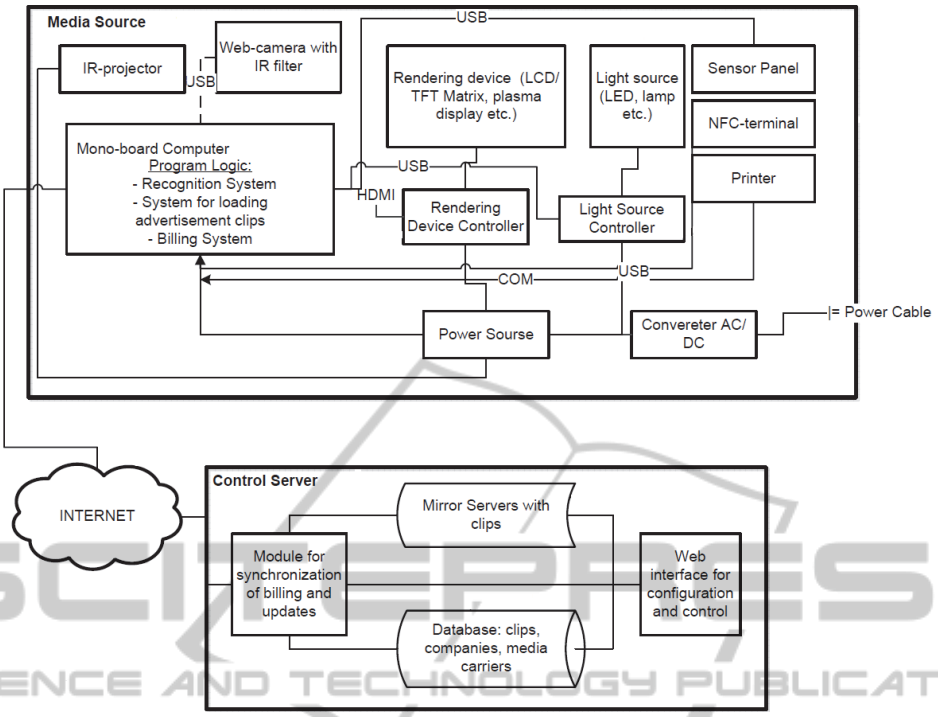

Figure 1: Diagram of a system for targeted advertising.

device controller selects and loads the advertisement video clips from the computer.

The computer receives information from a sensor panel, which acquires parameters of a person. The sensor panel can include a microphone, an X-ray source, a distance measuring module, a presence detector, a smell detector, a weight platform, a detector of ultra sound volume, an infrared-ray measuring device, Kinect or similar systems, etc.

With additional system improvement it will be able to determine parameters such as dress style (brands of clothing etc.), body type, degree of intoxication, hear style (color), presence of cigarettes, injuries, scars, accessories (hat, glasses, jewelry, ear rings etc.), special features (beard, mustache, degree of shaving, etc.), mobile phone (tablet computers, smart-phones, laptops, Bluetooth devices, etc.), walking characteristics, presence of pets, person's speed of movement and a number of people in front of the media source (a mirror).

Figure 2 illustrates a method for teaching the targeted advertising system. In order for the recognition system of the media source to be effective, it needs to be trained (or taught) for creation of accurate classifiers for determining gender, age and emotional state of persons.

Various sets of test images (containing facial features) need to be provided.

For example, in order to teach an age classifying

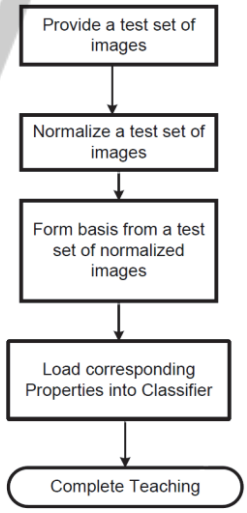

Figure 2: A method for teaching the targeted advertising system.

module, a number of images of children's faces, adult faces and elderly people faces are provided along with their classifying properties. Subsequently, the age classifying module learns what properties classify a particular age group. The more test sets are processes, the more accurately the age recognition is performed by the system. The same training principle is applied to gender classification, as well as emotional state

classification.

A teaching process is initiated in the step where a test set of images is loaded into a recognition system. A test set of images is normalized by a method of principal component analysis, that allows to reduce significantly the data dimensions by converting the image into a set of uncorrelated vectors called "properties". Then, properties corresponding to the test images are loaded into a classifier module of the recognition system. After that the teaching process is completed.

The teaching process can be repeated with a new set of test images. Thus, separate teaching cycles can be performed for gender, age and emotional state definitions.

A recognition process, shown in Figure 3, is initiated by detecting a person and acquiring a person's image. Definition of face, mouth and eyes within the image is performed using a feature recognition algorithm (for example, Viola-Jones algorithm). Then facial image rotation is normalized.

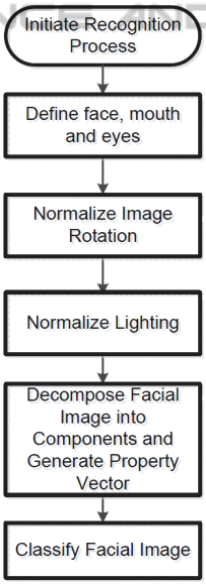

Figure 3: A flow chart of a person recognition method.

Normalization is performed as an affinity transformation, when a new coordinate system is selected and every point from one system to another is mapped, which rotates, moves and resizes the image using three pairs of given points.

After the transformation, coordinates of a first point from each pair coincide with coordinates of a second point from this pair. Coordinates of detected eyes and mouth are used as the first point coordinates, while coordinates of these features calculated for an average face (out of a test set) are used as the second point coordinates. The average face is positioned horizontally and the eyes are directed forward. (Minin, 2012)

Then lighting is normalized as well, using, for example, a known method of histogram transformation. The facial image is decomposed into components and after that – into a set of images that represent certain typical areas of the facial image. A property vector is generated and provided to a classifier. The image is classified based on the property vector reflecting properties defining age, gender and emotional state. (Froimson, 2013)

Different advertisements can be provided to the same person based on his emotional state (or, alternatively, the same advertisements running at different speeds, since an angry person is likely to more positively react to a slow-moving advertisement, while a calm person may be more likely to want to see a fast-moving ad, or, alternatively, different advertisements for the same subject matter selected based on the person's emotional state).

A centralized system having a plurality of interconnected media sources is implemented. The media sources are connected over the Internet. One or several control servers (i.e., web-servers) are used for supplying the media sources with advertisement media data stored in a distributed database.

The information provided by a video system can include information on where an advertised product can be purchased, directions and traffic. A person's reflection in the mirror panel of the media system can use "added reality" virtual features. For example, a person can be displayed wearing a hat, glasses or a different hairstyle provided by local vendors. Alternatively, only an audio advertisement can be provided.

Based on personal data detected by sensors, a person can be offered information about local food places, pharmacy, hair salon, fashion boutique, etc. Additionally, brand names of items that a person is wearing can be identified (for example, many jewelry or accessories or clothing items have a distinctive look, or display logos, etc.), and other items of that brand can be displayed to that person (or, alternatively, items of direct competitors).

Video feeds from another media source (located at another point of a shopping mall or a city) are provided, optionally showing the nearby address of the location where the goods or services can be purchased.

Multiple people can be detected, and advertise ment can be selected, for example, based on highest likelihood of purchase, highest cost of goods being

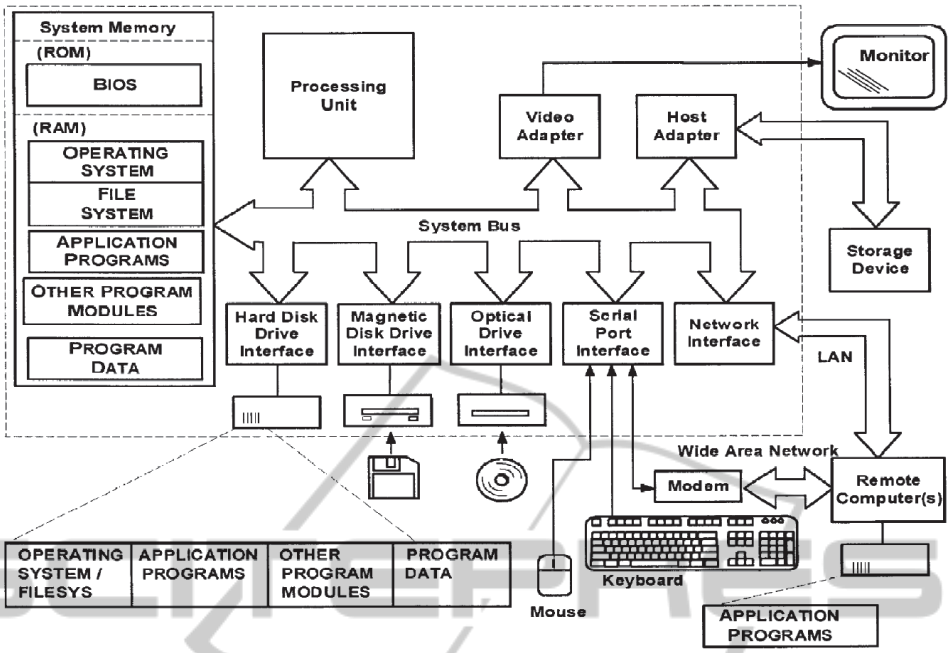

Figure 4: Scheme of an exemplary computer system that can be used for implementation of the invention (Aboba, 2009).

advertised, highest price paid by a particular advertiser, highest likelihood of interest to an average person, etc.

As a further option, different advertisements can be simultaneously displayed to viewers who see the screen from different angles. Also, the system can keep track of which advertisement is shown to whom and when, including counters of how many times the ad was shown to the same person, and overall and optionally any reaction from the target audience, permitting an analysis of the effectiveness of the advertising. The system can track whether the person is looking at the advertisement, for example, by analyzing the eye position (as opposed to away from the advertisement).

The media system can accept payments for product orders using a touch screen. Payments can be made by SMS, cash, debit or credit card, PayPass, PayWave, PayPal, etc. The media system can display QR-code or bar-code for reading it by a mobile phone after which a link to a mobile site for purchasing the product is provided. It can provide product information via NFC and NSDT technologies and also offer a person to provide product-related data to his mobile phone via Bluetooth or Wi-Fi.

With reference to Figure 4, a system for implementing the invention comprises a general purpose computing device in the form of a computer or a server or the like, including a processing unit, a system memory, and a system bus that couples various system components as well as the system memory to the processing unit. (Aboba, 2009; Jones, 2010; Johnson, 2013)

The media system can be placed on a bus, metro, plane, train, elevator, or in a hotel. For any of these locations, the system determines an advertisement that can be of interest to an average person in the vicinity of the media panel.

In case of a bus or a train, geo-location is taken into consideration. A tracker determines the location of the bus (or train) using the geo-location data from cell stations, satellite navigation systems and Wi-Fi access points and the advertisement may be directed to stores, or other places based on their location.

In case of a gym or a fitness center the mirror of the media system can be placed in front of a training machine and, based on acquired images, a person can be given exercise advises or advertisements of fitness-related products (weight belts, gloves, weights, vitamins, etc.).

3 CONCLUSIONS

The described above media system for gender-oriented targeted advertising provides:

- person detection in a vicinity of an advertising system;
- acquirement of a facial image of the detected person;

- provision of the facial image to a classification module;
- classification of the detected person using the image based on pre-stored properties;
- selection of an advertisement based on the detected person's classification;
- provision of the advertisement to the advertising system; and
- rendering of the advertisement to the detected person.

This system will improve the efficiency of advertising in public places saving money for advertisers.

The testing experiments and further system improvements are underway to increase the quality of data analysis and providing the person with appropriate gender-oriented advertisement.

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