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(54) **REAL-TIME ADVERTISEMENT BASED ON COMMON POINT OF ATTRACTION OF DIFFERENT VIEWERS**

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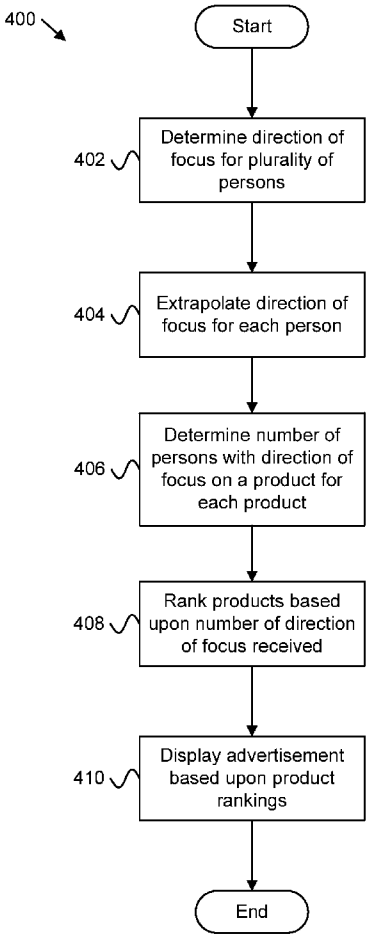
(57) **ABSTRACT**

A method for providing real-time advertisements includes using one or more cameras to determine a direction of focus of attention of a plurality of persons by determining a direction of the head of each person of the plurality of persons located in a vicinity of a plurality of products. The method includes extrapolating the direction of focus for each person of the plurality of persons and determining, for each product of the plurality of products, a number of persons of the plurality of persons that have a direction of focus on the product where the determination is based on the extrapolated direction of focus for each person. The method includes ranking each product based on the number of persons with a direction of focus on a product of the plurality of products and displaying an advertisement where content of the advertisement is based on the ranking of each product.



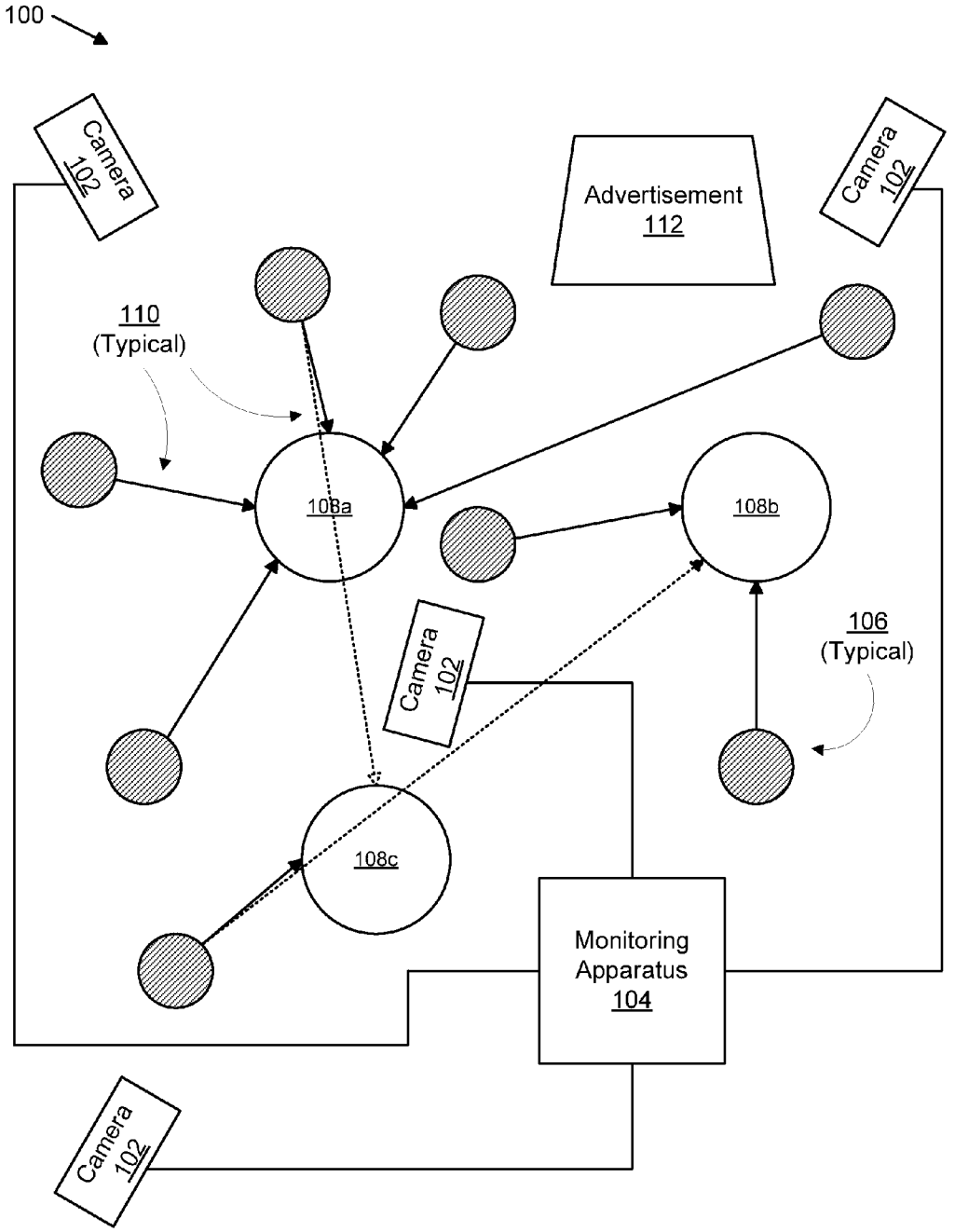

100
Camera 102
Advertisement 112
Camera 102
110 (Typical)
108a
108b
106 (Typical)
Camera 102
108c
Monitoring Apparatus 104
Camera 102

FIG. 1

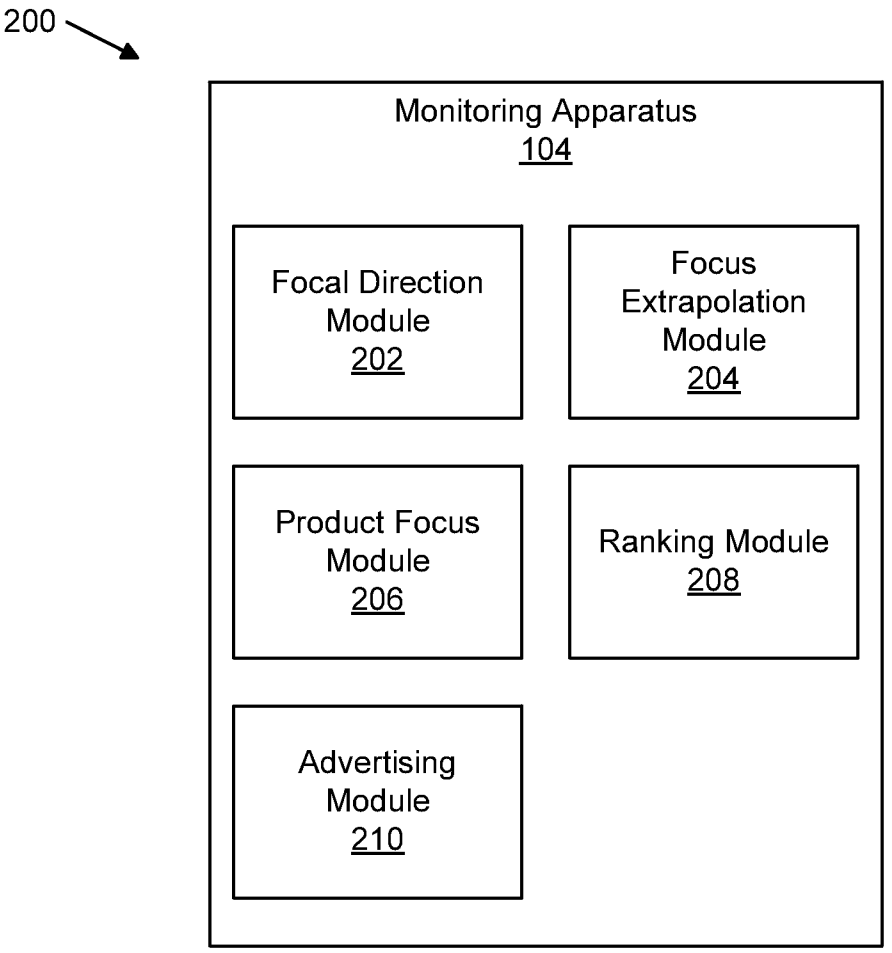

200
Monitoring Apparatus
104
Focal Direction Module
202
Focus Extrapolation Module
204
Product Focus Module
206
Ranking Module
208
Advertising Module
210

FIG. 2

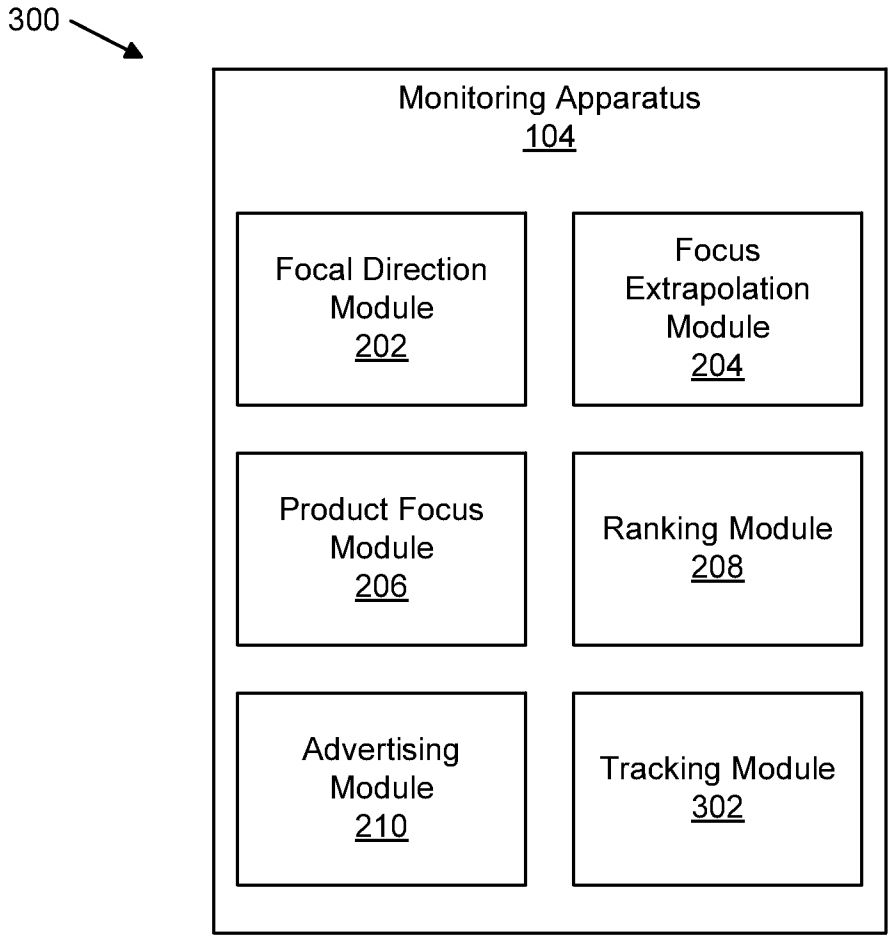

300
Monitoring Apparatus
104
Focal Direction Module
202
Focus Extrapolation Module
204
Product Focus Module
206
Ranking Module
208
Advertising Module
210
Tracking Module
302

FIG. 3

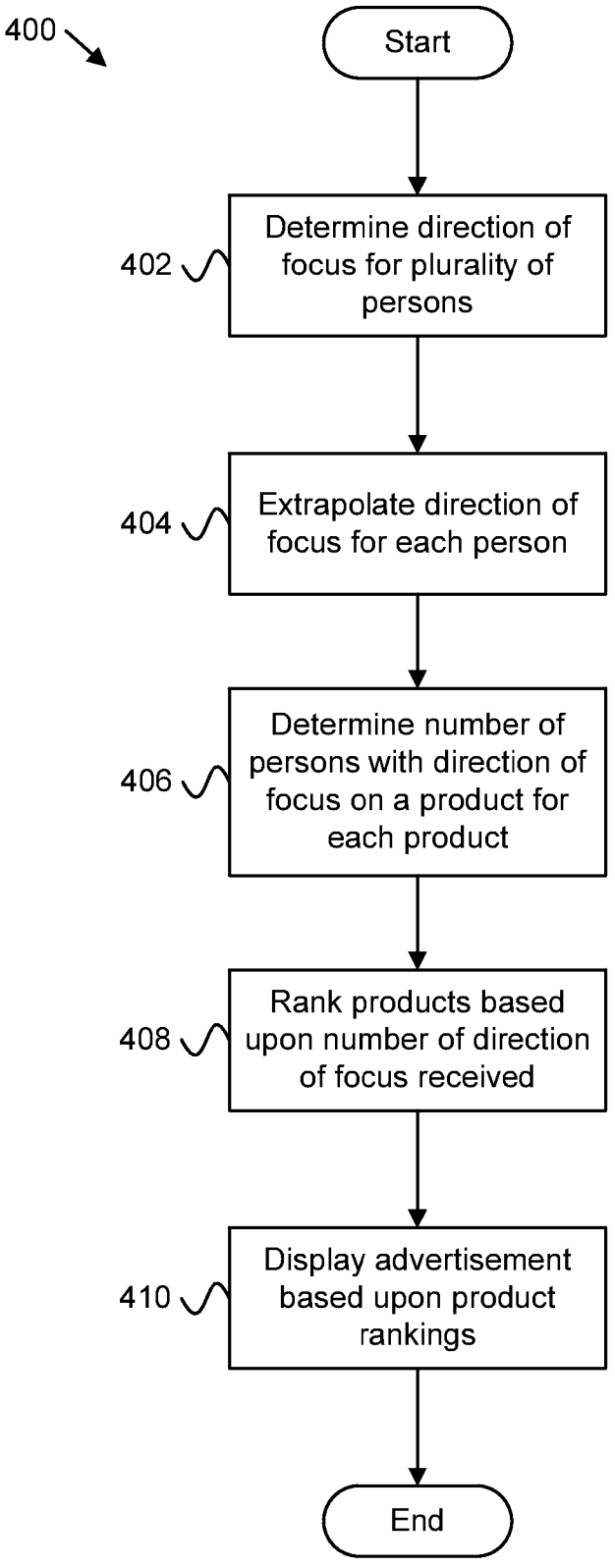

400
Start
402
Determine direction of focus for plurality of persons
404
Extrapolate direction of focus for each person
406
Determine number of persons with direction of focus on a product for each product
408
Rank products based upon number of direction of focus received
410
Display advertisement based upon product rankings
End

FIG. 4

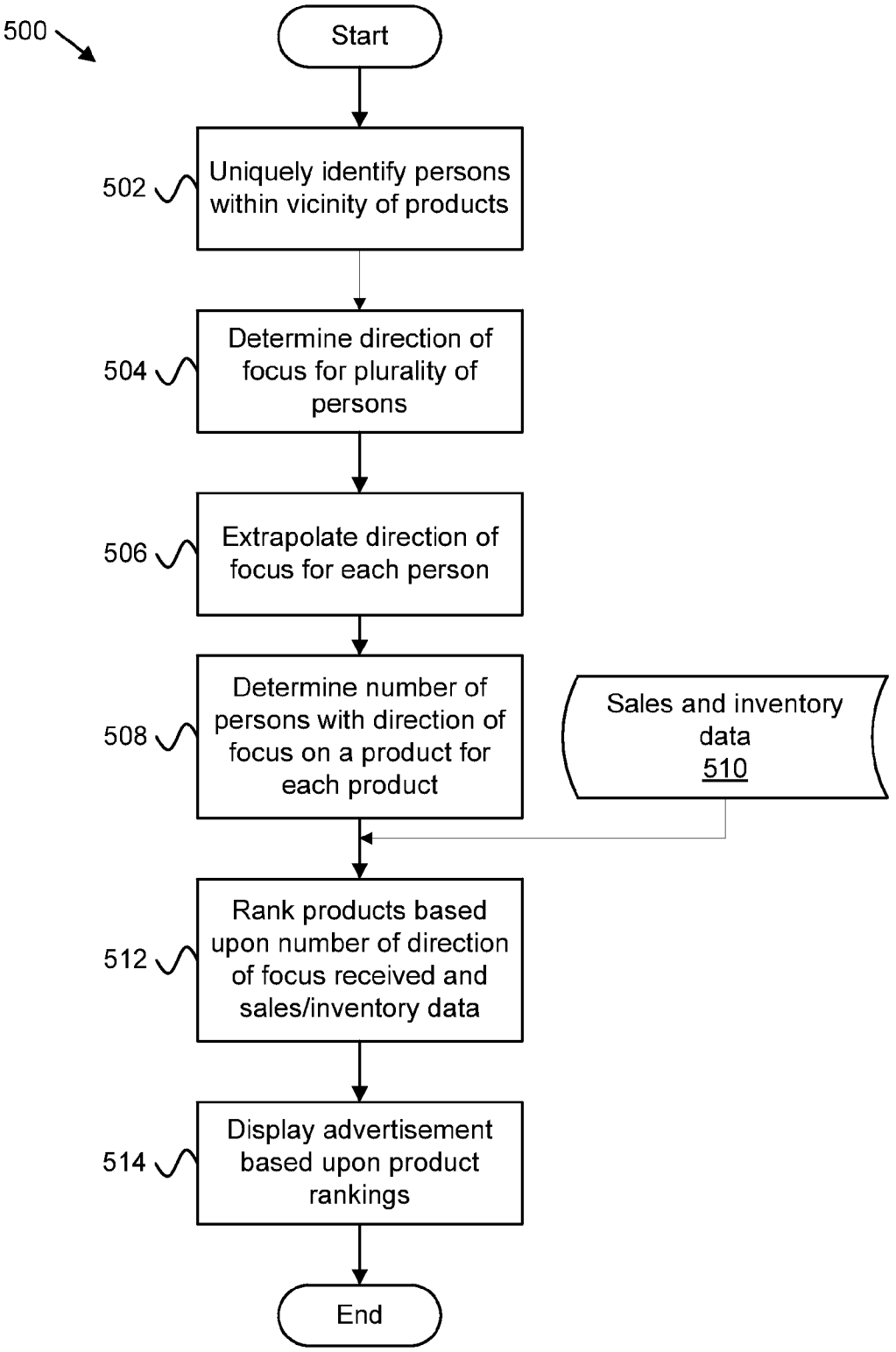

500
Start
502
Uniquely identify persons within vicinity of products
504
Determine direction of focus for plurality of persons
506
Extrapolate direction of focus for each person
508
Determine number of persons with direction of focus on a product for each product
Sales and inventory data
510
512
Rank products based upon number of direction of focus received and sales/inventory data
514
Display advertisement based upon product rankings
End

FIG. 5

REAL-TIME ADVERTISEMENT BASED ON COMMON POINT OF ATTRACTION OF DIFFERENT VIEWERS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation U.S. patent application Ser. No. 13/918,772 entitled "REAL-TIME ADVERTISEMENT BASED ON COMMON POINT OF ATTRACTION OF DIFFERENT VIEWERS" and filed on Jun. 14, 2013 for Barry Alan Kritt, et al. and the entire contents of the above mentioned application is incorporated herein by reference for all purposes.

FIELD

[0002] The subject matter disclosed herein relates to advertising and more particularly relates to targeted advertising based upon the focus of attention of a plurality of persons.

BACKGROUND

[0003] Businesses advertise their products and services in many different ways through a variety of marketing channels. Some businesses advertise only to specific demographic groups and most businesses tailor their advertisements to these target audiences. An advertisement is more effective when consumers are paying attention and have an actual interest in the good and/or service being promoted. Thus, businesses will often promote their goods and services alongside popular television shows, radio programs, or web sites enjoyed by their target consumers. For example, snack food companies and athletic apparel manufacturers will advertise their products during televised sporting events like the Super Bowl. However, often advertising is based on old data so that advertising might not target what consumers are interested in at the time the consumers are shopping.

BRIEF SUMMARY

[0004] An apparatus for advertising includes a focal direction module, a focus extrapolation module, a product focus module, a ranking module, and an advertising module. In one embodiment, the focal direction module uses one or more cameras to determine a direction of focus of attention of a plurality of persons by determining a direction of the head of each person of the plurality of persons. The plurality of persons is located in a vicinity of a plurality of products. In another embodiment, the focus extrapolation module extrapolates the direction of focus for each person of the plurality of persons. In another embodiment, the product focus module determines, for each product of the plurality of products, a number of persons of the plurality of persons that have a direction of focus on the product. The determination is based on the extrapolated direction of focus for each person. In another embodiment, the ranking module ranks each product based on the number of persons with a direction of focus on a product of the plurality of products. In another embodiment, the advertising module displays an advertisement in view of at least a portion of the plurality of persons. Content of the advertisement is based on a ranking by the ranking module.

[0005] In one embodiment, the one or more cameras are positioned to have a range of view of more than 180 degrees. In another embodiment, each product of the plurality of products is viewed by the one or more cameras from a plurality of viewing angles totaling more than 180 degrees in a horizontal plane and/or receives a direction of focus from a plurality of viewing angles totaling more than 180 degrees in a horizontal plane. In an alternative embodiment, the direction of focus for each person of the plurality of persons is substantially perpendicular to the plane of the person's face. In another embodiment, the product focus module determines the number of persons of the plurality of persons that have a direction of focus on a product at regular time intervals. In another embodiment, the ranking for each product of the plurality of products factors in a sales history of the product.

[0006] In one embodiment, the ranking of each product of the plurality of products factors in a duration of time that a direction of focus is maintained on the product. In another embodiment, the ranking of each product of the plurality of products factors in an existing inventory of the product. In another embodiment, the advertising module displays the advertisement using an electronic display, a tablet computer, a phone, and/or a printer. In another embodiment, the advertisement may include a video, an e-mail, a text message, and/or a printed coupon. In another embodiment, the advertisement includes a display located within a vicinity of the product being advertised, a vicinity of a point of sale, and/or a view of a person that has a direction of focus on the product being advertised.

[0007] In one embodiment, the product receiving the most direction of focus has the highest ranking and the advertisement includes a promotion of the product with the highest ranking. In another embodiment, the advertisement includes a promotion of a ranked product, a product related to a ranked product, a product that is complementary to a ranked product, a product similar to a ranked product, a product used with a ranked product, a product that includes a substitute for a ranked product, and/or a service related to a ranked product. In another embodiment, the advertisement includes one or more advertisements for a plurality of ranked products of the plurality of products. In another embodiment, the apparatus includes a tracking module that, for each product of the plurality of products, tracks sales of the product. The ranking module uses the sales information of the tracked sales to rank the plurality of products. In a further embodiment, the tracking module tracks, for a zone within the area of the plurality of products, one or more of the number of directions of focus touching the zone and the duration of time that a direction of focus touches the zone.

[0008] A system for advertising includes one or more cameras, a processor, and a monitoring apparatus executing at least partially on the processor. The monitoring apparatus includes a focal direction module, a focus extrapolation module, a product focus module, a ranking module, and an advertising module. In one embodiment, the focal direction module uses one or more cameras to determine a direction of focus of attention of a plurality of persons by determining a direction of the head of each person of the plurality of persons. The plurality of persons is located in a vicinity of a plurality of products. In another embodiment, the focus extrapolation module extrapolates the direction of focus for each person of the plurality of persons. In another embodiment, the product focus module determines, for each product of the plurality of products, a number of persons of the plurality of persons that have a direction of focus on the product. The determination is based on the extrapolated direction of focus for each person. In another embodiment, the ranking module ranks each product based on the number of persons with a direction of focus

on a product of the plurality of products. In another embodiment, the advertising module displays an advertisement in view of at least a portion of the plurality of persons. Content of the advertisement is based on a ranking by the ranking module.

[0009] A method for advertising includes using one or more cameras to determine a direction of focus of attention of a plurality of persons by determining a direction of the head of each person of the plurality of persons. The plurality of persons is located in a vicinity of a plurality of products. The method includes extrapolating the direction of focus for each person of the plurality of persons. The method includes determining, for each product of the plurality of products, a number of persons of the plurality of persons that have a direction of focus on the product. The determination is based on the extrapolated direction of focus for each person. The method includes ranking each product based on the number of persons with a direction of focus on a product of the plurality of products and displaying an advertisement in view of at least a portion of the one or more persons. Content of the advertisement is based on the ranking of each product.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] In order that the advantages of the embodiments of the invention will be readily understood, a more particular description of the embodiments briefly described above will be rendered by reference to specific embodiments that are illustrated in the appended drawings. Understanding that these drawings depict only some embodiments and are not therefore to be considered to be limiting of scope, the embodiments will be described and explained with additional specificity and detail through the use of the accompanying drawings, in which:

[0011] FIG. **1** is a schematic block diagram illustrating one embodiment of a system for providing real-time advertisements based upon direction of focus;

[0012] FIG. **2** is a schematic block diagram illustrating one embodiment of an apparatus for providing real-time advertisements based upon direction of focus;

[0013] FIG. **3** is a schematic block diagram illustrating another embodiment of an apparatus for providing real-time advertisements based upon direction of focus;

[0014] FIG. **4** is a schematic flow chart illustrating one embodiment of an apparatus for providing real-time advertisements based upon direction of focus; and

[0015] FIG. **5** is a schematic flow chart illustrating another embodiment of an apparatus for providing real-time advertisements based upon direction of focus.

DETAILED DESCRIPTION OF THE INVENTION

[0016] Reference throughout this specification to "one embodiment," "an embodiment," or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. Thus, appearances of the phrases "in one embodiment," "in an embodiment," and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment, but mean "one or more but not all embodiments" unless expressly specified otherwise. The terms "including," "comprising," "having," and variations thereof mean "including but not limited to" unless expressly specified otherwise. An enumerated listing of items does not imply that any or all of the items are mutually exclusive and/or mutually inclusive, unless expressly specified otherwise. The terms "a," "an," and "the" also refer to "one or more" unless expressly specified otherwise.

[0017] Furthermore, the described features, advantages, and characteristics of the embodiments may be combined in any suitable manner. One skilled in the relevant art will recognize that the embodiments may be practiced without one or more of the specific features or advantages of a particular embodiment. In other instances, additional features and advantages may be recognized in certain embodiments that may not be present in all embodiments.

[0018] These features and advantages of the embodiments will become more fully apparent from the following description and appended claims, or may be learned by the practice of embodiments as set forth hereinafter. As will be appreciated by one skilled in the art, aspects of the present invention may be embodied as a system, method, and/or computer program product. Accordingly, aspects of the present invention may take the form of an entirely hardware embodiment, an entirely software embodiment (including firmware, resident software, micro-code, etc.) or an embodiment combining software and hardware aspects that may all generally be referred to herein as a "circuit," "module," or "system." Furthermore, aspects of the present invention may take the form of a computer program product embodied in one or more computer readable medium(s) having program code embodied thereon.

[0019] Many of the functional units described in this specification have been labeled as modules, in order to more particularly emphasize their implementation independence. For example, a module may be implemented as a hardware circuit comprising custom VLSI circuits or gate arrays, off-the-shelf semiconductors such as logic chips, transistors, or other discrete components. A module may also be implemented in programmable hardware devices such as field programmable gate arrays, programmable array logic, programmable logic devices or the like.

[0020] Modules may also be implemented in software for execution by various types of processors. An identified module of program code may, for instance, comprise one or more physical or logical blocks of computer instructions which may, for instance, be organized as an object, procedure, or function. Nevertheless, the executables of an identified module need not be physically located together, but may comprise disparate instructions stored in different locations which, when joined logically together, comprise the module and achieve the stated purpose for the module.

[0021] Indeed, a module of program code may be a single instruction, or many instructions, and may even be distributed over several different code segments, among different programs, and across several memory devices. Similarly, operational data may be identified and illustrated herein within modules, and may be embodied in any suitable form and organized within any suitable type of data structure. The operational data may be collected as a single data set, or may be distributed over different locations including over different storage devices, and may exist, at least partially, merely as electronic signals on a system or network. Where a module or portions of a module are implemented in software, the program code may be stored and/or propagated on in one or more computer readable medium(s).

[0022] The computer readable medium may be a tangible computer readable storage medium storing the program code. The computer readable storage medium may be, for example,

but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, holographic, micromechanical, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing.

[0023] More specific examples of the computer readable storage medium may include but are not limited to a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), a portable compact disc read-only memory (CD-ROM), a digital versatile disc (DVD), an optical storage device, a magnetic storage device, a holographic storage medium, a micromechanical storage device, or any suitable combination of the foregoing. In the context of this document, a computer readable storage medium may be any tangible medium that can contain, and/or store program code for use by and/or in connection with an instruction execution system, apparatus, or device.

[0024] The computer readable medium may also be a computer readable signal medium. A computer readable signal medium may include a propagated data signal with program code embodied therein, for example, in baseband or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including, but not limited to, electrical, electro-magnetic, magnetic, optical, or any suitable combination thereof. A computer readable signal medium may be any computer readable medium that is not a computer readable storage medium and that can communicate, propagate, or transport program code for use by or in connection with an instruction execution system, apparatus, or device. Program code embodied on a computer readable signal medium may be transmitted using any appropriate medium, including but not limited to wire-line, optical fiber, Radio Frequency (RF), or the like, or any suitable combination of the foregoing

[0025] In one embodiment, the computer readable medium may comprise a combination of one or more computer readable storage mediums and one or more computer readable signal mediums. For example, program code may be both propagated as an electro-magnetic signal through a fiber optic cable for execution by a processor and stored on RAM storage device for execution by the processor.

[0026] Program code for carrying out operations for aspects of the present invention may be written in any combination of one or more programming languages, including an object oriented programming language such as Java, Smalltalk, C++, PHP or the like and conventional procedural programming languages, such as the "C" programming language or similar programming languages. The program code may execute entirely on the user's computer, partly on the user's computer, as a stand-alone software package, partly on the user's computer and partly on a remote computer or entirely on the remote computer or server. In the latter scenario, the remote computer may be connected to the user's computer through any type of network, including a local area network (LAN) or a wide area network (WAN), or the connection may be made to an external computer (for example, through the Internet using an Internet Service Provider).

[0027] The computer program product may be shared, simultaneously serving multiple customers in a flexible, automated fashion. The computer program product may be standardized, requiring little customization and scalable, providing capacity on demand in a pay-as-you-go model.

[0028] The computer program product may be stored on a shared file system accessible from one or more servers. The computer program product may be executed via transactions that contain data and server processing requests that use Central Processor Unit (CPU) units on the accessed server. CPU units may be units of time such as minutes, seconds, hours on the central processor of the server. Additionally the accessed server may make requests of other servers that require CPU units. CPU units are an example that represents but one measurement of use. Other measurements of use include but are not limited to network bandwidth, memory usage, storage usage, packet transfers, complete transactions etc.

[0029] The computer program product may be integrated into a client, server and network environment by providing for the computer program product to coexist with applications, operating systems and network operating systems software and then installing the computer program product on the clients and servers in the environment where the computer program product will function.

[0030] Furthermore, the described features, structures, or characteristics of the embodiments may be combined in any suitable manner. In the following description, numerous specific details are provided, such as examples of programming, software modules, user selections, network transactions, database queries, database structures, hardware modules, hardware circuits, hardware chips, etc., to provide a thorough understanding of embodiments. One skilled in the relevant art will recognize, however, that embodiments may be practiced without one or more of the specific details, or with other methods, components, materials, and so forth. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of an embodiment.

[0031] Aspects of the embodiments are described below with reference to schematic flowchart diagrams and/or schematic block diagrams of methods, apparatuses, systems, and computer program products according to embodiments of the invention. It will be understood that each block of the schematic flowchart diagrams and/or schematic block diagrams, and combinations of blocks in the schematic flowchart diagrams and/or schematic block diagrams, can be implemented by program code. The program code may be provided to a processor of a general purpose computer, special purpose computer, sequencer, or other programmable data processing apparatus to produce a machine, such that the instructions, which execute via the processor of the computer or other programmable data processing apparatus, create means for implementing the functions/acts specified in the schematic flowchart diagrams and/or schematic block diagrams block or blocks.

[0032] The program code may also be stored in a computer readable medium that can direct a computer, other programmable data processing apparatus, or other devices to function in a particular manner, such that the instructions stored in the computer readable medium produce an article of manufacture including instructions which implement the function/act specified in the schematic flowchart diagrams and/or schematic block diagrams block or blocks.

[0033] The program code may also be loaded onto a computer, other programmable data processing apparatus, or other devices to cause a series of operational steps to be performed on the computer, other programmable apparatus or other devices to produce a computer implemented process such that the program code which executed on the computer or other programmable apparatus provide processes for

implementing the functions/acts specified in the flowchart and/or block diagram block or blocks.

[0034] The schematic flowchart diagrams and/or schematic block diagrams in the Figures illustrate the architecture, functionality, and operation of possible implementations of apparatuses, systems, methods and computer program products according to various embodiments of the present invention. In this regard, each block in the schematic flowchart diagrams and/or schematic block diagrams may represent a module, segment, or portion of code, which comprises one or more executable instructions of the program code for implementing the specified logical function(s).

[0035] It should also be noted that, in some alternative implementations, the functions noted in the block may occur out of the order noted in the Figures. For example, two blocks shown in succession may, in fact, be executed substantially concurrently, or the blocks may sometimes be executed in the reverse order, depending upon the functionality involved. Other steps and methods may be conceived that are equivalent in function, logic, or effect to one or more blocks, or portions thereof, of the illustrated Figures.

[0036] Although various arrow types and line types may be employed in the flowchart and/or block diagrams, they are understood not to limit the scope of the corresponding embodiments. Indeed, some arrows or other connectors may be used to indicate only the logical flow of the depicted embodiment. For instance, an arrow may indicate a waiting or monitoring period of unspecified duration between enumerated steps of the depicted embodiment. It will also be noted that each block of the block diagrams and/or flowchart diagrams, and combinations of blocks in the block diagrams and/or flowchart diagrams, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and program code.

[0037] The description of elements in each figure may refer to elements of proceeding figures. Like numbers refer to like elements in all figures, including alternate embodiments of like elements.

[0038] FIG. **1** is a schematic drawing illustrating one embodiment of a system **100** for providing real-time advertisement based upon direction of focus. The system **100** includes one or more cameras **102**, a monitoring apparatus **104**, a plurality of persons (i.e. people) **106** (**106**, as used herein may include one person or several people), a plurality of products **108***a*, **108***b*, **108***c* (collectively "**108**"), a direction of focus **110**, and an advertisement **112**, which are described below.

[0039] The system **100** includes one or more cameras **102** connected to a monitoring apparatus **104**. In one embodiment, using one or more cameras **102**, the monitoring apparatus **104** observes a plurality of persons **106** in the vicinity of a plurality of products **108** to provide targeted advertisements in real-time to these people **106**. The people **106** may be individuals in a store, mall, a car dealership, an amusement park, a convention center, a museum, a public space, or the like. The products **108** can include food, clothing, automobiles, furniture, appliances, and/or other goods. The products **108** can be arranged in any number of geometric configurations, such as straight lines, circles, or a random distribution. For example, the products **108** may be food items sitting on a shelf in a supermarket aisle or clothing displays in a department store. As another example, the products **108** may be automobiles parked in a showroom. At any given time, people **106** may view a product (e.g. **108***a*) from a number of different directions and angles, including from all directions or only certain directions. For example, a person can view items on a shelf or clothing in a display window from the front, and to a certain degree, from off to the side. At the same time, an automobile on a showroom floor or a sculpture in the middle of a room at a museum may be viewed by several people **106** from all directions.

[0040] In another embodiment, the cameras **102** are positioned to view the plurality of persons **106** and products **108** from a variety of angles. In one embodiment, the cameras **102** may view the people **106** in three dimensions. Numerous types of cameras may be used with the system **100**. For example, a camera **102** may be a commercial closed circuit camera, a wireless camera, and/or a webcam. A camera's orientation may be fixed and thus only manually adjustable. Alternatively, a camera's rotation may be remotely controlled by an operator or can be automated using motion sensing technology. An example of a remote controlled camera is a PTZ (Pan-Tilt-Zoom) camera commonly used in casinos and hotels. In another embodiment, the one or more cameras **102** may be positioned in the middle of an area containing a plurality of products **108**. For example, a camera may be placed in the ceiling of a store or showroom to observe one or more customers walking amongst products **108** on a sales floor. In another example, a closed circuit camera may be placed on a shelf in a grocery store aisle near or above eye level. In a different embodiment, the cameras **102** may be placed around the perimeter of the area holding the plurality of products **108**, such as one or more corners of a store. In an alternative embodiment, a camera **102** may be positioned to face in substantially one direction, such as in a store window display pointing outward in the direction of passersby.

[0041] The cameras **102** may be directly or indirectly connected to the monitoring apparatus **104**. For example, a camera **102** can be directly connected to the monitoring apparatus **104** through one or more cables or through a wireless connection using specific radio frequencies. Alternatively, a camera **102** may be connected to the monitoring apparatus **104** through a network, such as a local area network ("LAN"), a wide area network ("WAN"), the internet, or a wireless network (e.g., Wi-Fi, cellular, etc.). One of skill in the art will recognize alternative ways that a camera **102** can be connected to a monitoring apparatus **104**. Through the use of one or more cameras **102**, the monitoring apparatus **104** is able to determine the direction of focus **110** for a plurality of persons **106** in the vicinity of the products **108**. The monitoring apparatus **104** may then provide targeted advertising as described with regard to the apparatuses **200**, **300** of FIGS. **2** and **3**.

[0042] FIG. **2** is a schematic drawing illustrating one embodiment of an apparatus **200** for providing real-time advertisements based upon direction of focus **110**. The apparatus **200** includes one embodiment of a monitoring apparatus **104** with a focal direction module **202**, a focus extrapolation module **204**, a product focus module **206**, a ranking module **208**, and an advertising module **210**, which are described below.

[0043] In one embodiment, the focal direction module **202** analyzes video captured by the one or more cameras **102** to identify a direction of focus **110** for the plurality of persons **106**. The focal direction module **202**, in one embodiment, uniquely identifies each person **106**, for example, to avoid miscounting the number of directions of focus **110**. In one instance, uniquely identifying each person **106** is accom-

plished by positioning each camera **102** to capture an exclusive zone within the area holding the products **108**. For example, at a certain point in time, a person's image may be captured by one camera **102**.

[0044] In another embodiment, the cameras **102** have overlapping fields of view and a partition is assigned to an area viewed by a camera. For example, one camera **102** may have a field of view that is 30 feet wide with 10 feet overlapping a field of view of another camera **102**. The overlapping 10 feet of the first camera **102** may be ignored so that each camera **102** monitors a unique zone. Alternatively, the focal direction module **202** may keep track of the physical locations of each person **106** and each product **108** within the area of the products **108**, such that if multiple cameras capture separate images of the same person **106**, the focal direction module will be able to determine that the same person **106** appears in both images based upon the physical location of the person **106**.

[0045] The focal direction module **202** may identify the direction of focus **110** of a person **106** in different ways. For example, the focal direction module **102** may determine a direction of focus **110** of a person **106** by identifying which way the person **106** is facing. If a person's face is visible, in one embodiment, the direction of focus **110** of the person **106** may be accomplished by identifying the person's face through facial recognition software and then determining the tilt of the person's face. In one embodiment, the direction of focus **110** of a person **106** is substantially perpendicular to the direction of the person's face. Alternatively, a person's direction of focus **110** may be determined by tracking the person's gaze, including but not limited to the direction of the person's pupils. In this embodiment, a person's direction of focus **110** may be substantially parallel to the direction of the person's gaze. In one embodiment, if a person's face is not visible, the focal direction module **102** may determine the person's direction of focus **110** based on one or more views of the person's head, including the tilt and rotation of the head. For example, a view of the back of a person's head may indicate that the person's direction of focus **110** is substantially opposite from the direction of the back of the person's head. In another embodiment, in the event that a person's head is not visible, the focal direction module **102** may determine the person's direction of focus **110** based upon the orientation of the person's body, such as the orientation of the person's shoulders and/or torso. In this case, a person's direction of focus **110** may be substantially perpendicular to a plane formed by the person's shoulders and the midpoint of his or her lower back.

[0046] The focal extrapolation module **204**, in one embodiment, extrapolates the direction of focus **110** for each person **106**. For example, the focus **110** extrapolation module **204** may use the direction of focus **110** of a person **106** found by the focal direction module **106** to extrapolate a line of direction of focus **110** of a person **106**. The line may be used by the product focus module **206** to determine if direction of focus **110** is on a product **108**. The focus extrapolation module **204** may, for instance, use a location of the person **106** in an area being monitored by the cameras **102**, a direction of focus **110** of the person **106**, dimensions of the area being monitored, etc. to extrapolate the direction of focus **110** of the person **106**.

[0047] In another embodiment, the focus extrapolation module **204** may extrapolate the direction of focus **110** by determining an area of focus for a person **106**. For example, the focal extrapolation module **106** may extrapolate to include a zone that includes a range. The range may include, for example, an angle on each side of a line that corresponds to a direction of focus **110**. For instance, if the focus extrapolation module **204** extrapolates a direction of focus **110** of a person **106** to determine a line from the person **106**, the focus extrapolation module **204** may extrapolate the line to include a zone that is 5 degrees either side of the line.

[0048] The focus extrapolation module **204**, in another embodiment, determines an area of focus in the vicinity of the products **108** based upon a spatial projection of each person's direction of focus **110**. For example, an area of focus of a person **106** may be a column of space extending in the direction of the person's direction of focus **110**. The dimensions for an area of focus may be pre-defined, or set dynamically based upon a variety of factors, including but not limited to, (i) the height of a camera **102**, a person **106**, or the ceiling; (ii) the distance between a person **106** and the border of the area holding the plurality of products **108**, another person **106**, or a visual obstruction (e.g., support column); and (iii) the width of the person's head or torso.

[0049] In another embodiment, the product focus module **206** determines, for each product in a plurality of products **108**, the number of persons within the plurality of persons **106** that have a direction of focus **110** on the product **108**. There are different ways to determine the number of persons **106** that have a direction of focus **110** on a product **108**. In one embodiment, the focus module **206** counts, for each product (e.g. **108***a*), the number of areas of focus intersecting the product **108***a* or an area assigned to a product **108***a*. A direction of focus **110** may, for example, intersect more than one product (e.g. **108***a*, **108***c*). The product focus module **206**, in one embodiment, determines that a direction of focus **110** is on the two or more products **108** that intersect the direction of focus **110**. In another embodiment, the product focus module **108** determines that the direction of focus **110** of a person **106** is the product **108** nearest the person **106** that intersects the direction of focus **110** of the person **106**.

[0050] In another embodiment, the product focus module **206** determines, within the area holding the plurality of products **108**, regions where areas of focus overlap. For the product(s) **108** nearest or intersecting an overlap region, the product focus module **206** may determine the number of persons that have a direction of focus **110** on the product **108** as the sum of (i) the number of overlap regions touching the product **108** and (ii) the number of directions of focus **110** forming the each overlap region. Other ways of determining the number of persons **106** having a direction of focus **110** on a product may include a timing component. For example, the product focus module **206** may calculates the number of directions of focus **110** received by a product at set time intervals (e.g., every five seconds). The product focus module **206**, for example, may have a sampling rate and may determine the number of persons **106** that have a direction of focus **110** on a product **108** at each sampling time. In another embodiment, the product focus module **206** determines, for each product **108**, a number of persons **106** with a direction of focus **110** on a product **108** using a window of time. In one embodiment, the product focus module **206** determines the number of persons **106** with a direction of focus **110** on a product **108** during a fixed window of time. The window of time may be, for example, 10 minutes.

[0051] In another embodiment, the product focus module **206** determines the number of persons **106** with a direction of focus **110** on a product **108** during a moving window of time.

For example, the moving window may average the number of persons **106** with a direction of focus **110** on a product **108** or may update a counter that count up for new occurrences of a direction of focus **110** on a product **108** while decreasing the counter for older occurrences at the back end of the window. In another embodiment, the product focus module measures the total duration of time that a direction of focus **110** is maintained on a product **108**. One of skill in the art will recognize other ways for the product focus module **206** to determine a number of persons **106** with a direction of focus **110** on a product **108**.

[0052] The ranking module **208**, in one embodiment, ranks each product **108** of the plurality of products **108** based on the number of persons **106** with a direction of focus **110** on the product **108**. In one example, the ranking module **208** assigns the highest ranking to the product **108** receiving the most directions of focus **110**. Other ranking methodologies used by the ranking module **208** may incorporate other factors in addition to the number of directions of focus **110** received when assigning rankings. For example, a ranking methodology may take into account the sales history of a product, such that given two products receiving nearly the same number of directions of focus **110**, the product with the better (or worse) sales history will receive a higher ranking. A different ranking methodology may take into account the duration of time that a direction of focus **110** is maintained on a product, such that given two products receiving nearly the same number of directions of focus **110**, the product receiving longer lasting directions of focus **110** may be ranked higher. Yet another ranking methodology may also take into account the existing inventory of a product **108**, such that given two products **108** receiving nearly the same number of directions of focus **110**, the product **108** that is better stocked may receive a higher ranking.

[0053] In one embodiment, the ranking module **208** determines a single product **108** with a highest rank. In another embodiment, the ranking module **208** returns a list of products **108** in an order reflective of the ranking determined by the ranking module **208**. In another embodiment, the ranking module **208** updates product rankings at a pre-determined rate. For example, the ranking module **208** may update product rankings each time the product focus module **206** updates a count for each product **108** of a number of persons **106** with a direction of focus **110** on a product **108**. One of skill in the art will recognize other ways that the ranking module **208** may determine a product ranking.

[0054] The advertising module **210**, in one embodiment, displays an advertisement **112** in view of at least one person **106** in a plurality of persons **106** in the vicinity of the plurality of products **108** based upon a ranking by the ranking module **208**. The advertising module **210** may display the advertisement **112** in a variety of formats, including but not limited to a video, an e-mail, a text message, a printed coupon, or some combination thereof. One skilled in the art will recognize other advertising formats. The advertisement module **210** may display the advertisement **112** by a variety of devices, including an electronic display, a tablet computer, a phone, a printer, etc. The advertising module **210** may display the advertisement **112** in a variety of locations, including but not limited to within the vicinity of the product being advertised, within the vicinity of a point of sale (e.g., checkout counter), or within a view of a person that has a direction of focus **110** on the product being advertised.

[0055] The content of the advertisement **112** may also vary based upon a ranking by the ranking module **208**. In one embodiment, the advertising module **210** displays the advertisement **112** as a promotion for the product **108** with the highest ranking. Alternatively, the advertising module **210** may display the advertisement **112** as a promotion for multiple ranked products **108**. The advertisement **112** is not limited to being a promotion of a ranked product. For example, the advertising module **210** may display an advertisement **112** that promotes a product related to a ranked product **108** (e.g., mop and broom). Alternatively, the advertising module **210** may display an advertisement **112** that promotes a complementary product (e.g., peanut butter and jelly).

[0056] As another example, the advertising module **210** may display an advertisement **112** that promotes a similar product (e.g., cheddar cheese and swiss cheese made by the same company). In another embodiment, the advertising module **210** displays an advertisement **112** that promotes a product used with a ranked product **108** (e.g., socks and athletic shoes). In a particular embodiment, the advertising module **210** displays an advertisement **112** that promotes a product that can substitute for a ranked product **108** (e.g., different brand of facial tissue). In another embodiment, the advertising module **210** displays an advertisement **112** that can also promote a service related to a ranked product **108** (e.g., dry cleaning services and clothes). One of skill in the art will recognize other ways that the advertisement module **210** may display an advertisement based on the product ranking of the ranking module **208**.

[0057] FIG. **3** is a schematic block diagram illustrating one embodiment of an apparatus **300** for providing real-time advertisements based upon direction of focus **110**. The apparatus **300** includes another embodiment of the monitoring apparatus **104** with a focal direction module **202**, a focus extrapolation module **204**, a product focus module **206**, a ranking module **208**, an advertising module **210**, which are substantially similar to those described above in relation to the apparatus **200** of FIG. **2**. The monitoring apparatus **104** also includes tracking module **302**, which is described below.

[0058] The tracking module **302**, in one embodiment, records sales data for each product **108** of the plurality of products **108** that is used by the ranking module **208** to adjust the ranking of each product **108**. For example, the tracking module **302** can record, over a set period of time, how many persons **106** had a direction of focus **110** on a product **108** versus the total sales for that product **108**. The tracking module **302** may also track, over a set period of time, how long on average a person **106** maintains a direction of focus **110** on a product **108** versus the total sales for that product **108**. The information recorded by the tracking module **302** may also be used to determine the effectiveness of an advertisement **112**, a product's packaging, or a product's physical placement. For example, a low number of directions of focus **110** on a product **108** may indicate that the product **108** is unpopular, has unattractive packaging, has been placed in an undesirable location, etc. As another example, a product **108** with a high number of directions of focus **110** but low sales may indicate that the advertisement **112** for the product **108** is ineffective or that the price of the product **108** is too high. In another embodiment, the tracking module **302** may determine, over time, area(s) within the vicinity of the plurality of products are potentially strategically important for product placement. For example, the vicinity of the plurality of products **108** may be divided into individual zones. Each zone may be further

divided into smaller vertical or horizontal zones, where one or more products are placed in each zone. The tracking module **302** may track, over a period of time, (i) the number of directions of focus **110** that touches on a zone, (ii) the total duration of time that a direction of focus **110** touches on a zone, or (iii) both. This information may be further combined with other data, such as the ranking or sales data of a product **108** within the zone, to determine the effectiveness of the location for product placement. For example, a zone that has the most number of directions of focus **110** touching on it or the longest duration of time where it is part of a direction of focus **110**, but where the sales of the product(s) **108** placed within the zone are low, may indicate that the zone attracts direction of focus **110** independent of a product **108**, and thus is a desirable location for product placement. Thus, the tracking module **312** may provide valuable feedback on both products **108** and related marketing strategies.

[0059] FIG. **4** is a schematic flow chart diagram illustrating one embodiment of a method **400** for providing real-time advertisements based upon direction of focus **110**. The method **400** begins and uses one or more cameras **102** to determine **402** a direction of focus **110** of a plurality of persons **106**. In one embodiment, the focal direction module **202** determines **402** the direction of focus **110** for each person **106** of the plurality of persons **106**. The method **400** extrapolates **404** the direction of focus **110** for each person **106**. In one embodiment, the focal extrapolation module **204** extrapolates **404** the direction of focus **110** for each person **106**.

[0060] The method **400** determines **406**, for each product **108**, the number of persons **106** that have a direction of focus **110** on a product **108**. In one embodiment, the product focus module **206** determines **406** the number of directions of focus **110** received by a product **108**. The method **400** ranks **408** each product **108** based upon the number of directions of focus **110** received by the product **108**. In one embodiment, the ranking module **208** ranks **408** the products **108**. The method **400** displays **410** an advertisement **112** based upon the products' rankings and the method **400** ends. In one embodiment, the advertising module **210** displays **410** the advertisement **112**.

[0061] FIG. **5** is a schematic flow chart diagram illustrating another embodiment of a method **500** for providing real-time advertisements based upon direction of focus **110**. The method **500** begins and uniquely identifies **502** a plurality of persons **106** within the vicinity of a plurality of products **108**. In one embodiment, uniquely identifying **502** persons **106** with a direction of focus **110** on a product **108** helps to prevent double counting of persons **106** and directions of focus **110**. The method **500** determines **504** the direction of focus **110** for each person **106**. The method **500** also extrapolates **506** the direction of focus **110** for each person **106**.

[0062] The method **500** determines **508**, for each product **108**, the number of persons **106** that have a direction of focus **110** on a product **108**. The method **500** ranks **512** the plurality of products **108** based upon the number of directions of focus **110** a product **108** received and the sales/inventory data **510** for that product **108**. In one embodiment, the ranking module **208** ranks **512** the products **108** and the tracking module **302** provides the sales/inventory data **510**. The method **500** displays **514** an advertisement **112** based upon the products' rankings, and the method **500** ends.

[0063] The embodiments may be practiced in other specific forms. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes which come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A method comprising:

using one or more cameras to determine a direction of focus of attention of a plurality of persons by determining a direction of the head of each person of the plurality of persons, the plurality of persons located in a vicinity of a plurality of products;

extrapolating the direction of focus for each person of the plurality of persons;

determining, for each product of the plurality of products, a number of persons of the plurality of persons that have a direction of focus on the product, the determination based on the extrapolated direction of focus for each person;

ranking each product based on the number of persons with a direction of focus on a product of the plurality of products; and

displaying an advertisement in view of at least a portion of the one or more persons, content of the advertisement based on the ranking of each product.

2. The method of claim **1**, wherein the one or more cameras are positioned to have a range of view of more than 180 degrees.

3. The method of claim **1**, wherein each product of the plurality of products is one or more of

viewed by the one or more cameras from a plurality of viewing angles totaling more than 180 degrees in a horizontal plane; and

receiving a direction of focus from a plurality of viewing angles totaling more than 180 degrees in a horizontal plane.

4. The method of claim **1**, wherein the direction of focus for each person of the plurality of persons is substantially perpendicular to the plane of the person's face.

5. The method of claim **1**, wherein the product focus module determines the number of persons of the plurality of persons that have a direction of focus on a product at regular time intervals.

6. The method of claim **1**, wherein determining a number of persons of the plurality of persons that have a direction of focus on the product comprises determining the number of persons of the plurality of persons that have a direction of focus on a product within a window of time.

7. The method of claim **1**, wherein determining a number of persons of the plurality of persons that have a direction of focus on the product comprises determining an amount of time that a direction of focus is maintained on a product.

8. The method of claim **1**, wherein the ranking for each product of the plurality of products factors in a sales history of the product.

9. The method of claim **1**, wherein the ranking of each product of the plurality of products factors in a duration of time that a direction of focus is maintained on the product.

10. The method of claim **1**, wherein the ranking of each product of the plurality of products factors in an existing inventory of the product.

11. The method of claim **1**, wherein displaying an advertisement comprises displaying the advertisement using a device comprising one or more of an electronic display, a tablet computer, a phone, and a printer.

12. The method of claim **1**, wherein the advertisement comprises one or more of a video, an e-mail, a text message, and a printed coupon.

13. The method of claim **1**, wherein the advertisement comprises a display located one or more of

within a vicinity of the product being advertised;

within a vicinity of a point of sale; and

within a view of a person that has a direction of focus on the product being advertised.

14. The method of claim **1**, wherein the product receiving the most direction of focus has a highest ranking and the advertisement comprises a promotion of the product having the highest ranking.

15. The method of claim **1**, wherein the advertisement comprises a promotion of one or more of

a ranked product;

a product related to a ranked product;

a product that is complementary to a ranked product;

a product similar to a ranked product;

a product used with a ranked product;

a product that comprises a substitute for a ranked product; and

a service related to a ranked product.

16. The method of claim **1**, wherein the advertisement comprises one or more advertisements for a plurality of ranked products of the plurality of products.

17. The method of claim **1**, further comprising, for each product of the plurality of products, tracking sales of the product and wherein the sales information of the tracked sales is used to rank the plurality of products.

18. The method of claim **17**, wherein tracking sales of each product further comprises tracking, for a zone within the area of the plurality of products, one or more of

the number of directions of focus touching the zone; and

the duration of time that a direction of focus touches the zone.

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