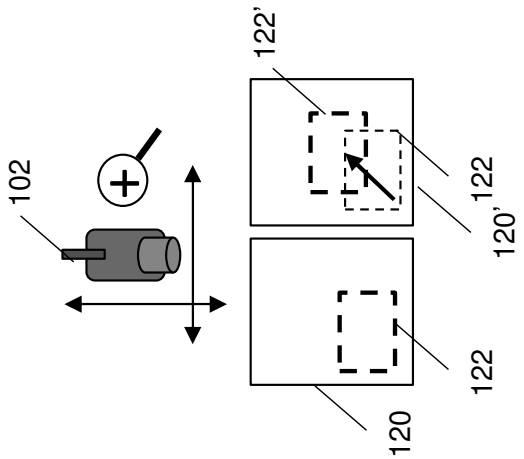


Figure 1C

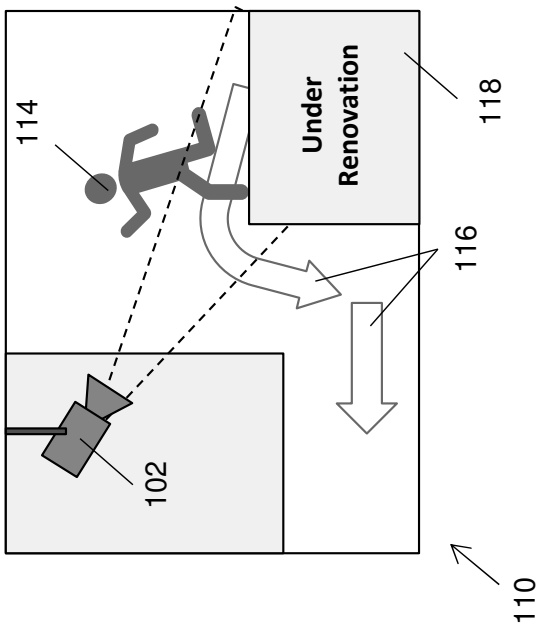


Figure 1B

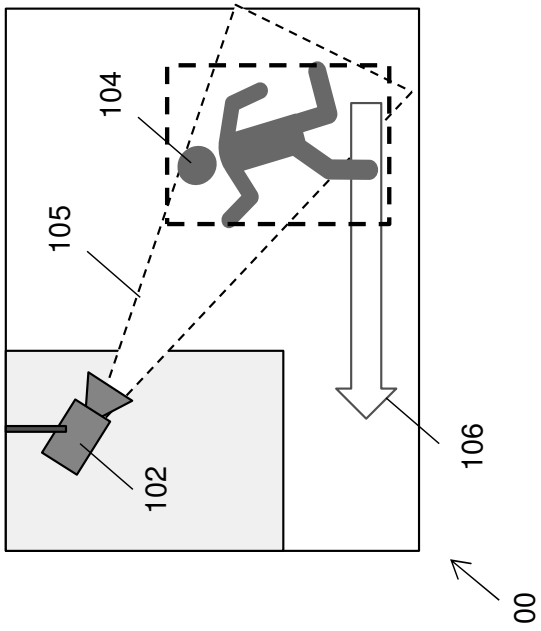


Figure 1A

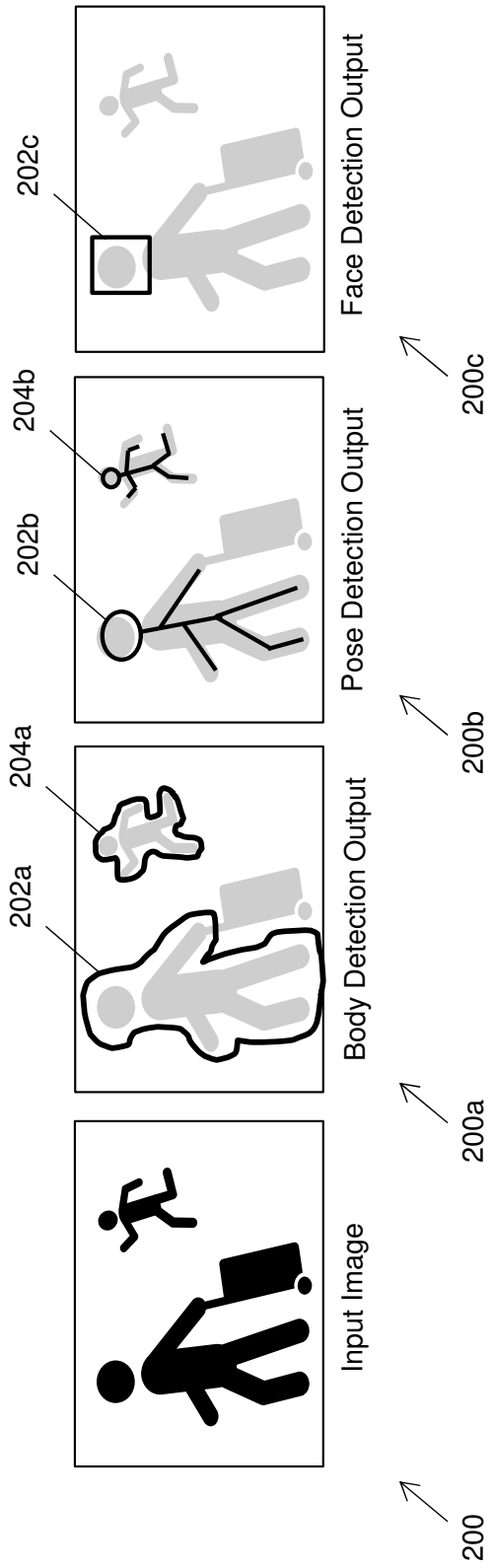

200
Input Image
200a
202a
204a
Body Detection Output
200b
202b
204b
Pose Detection Output
200c
202c
Face Detection Output

Figure 2

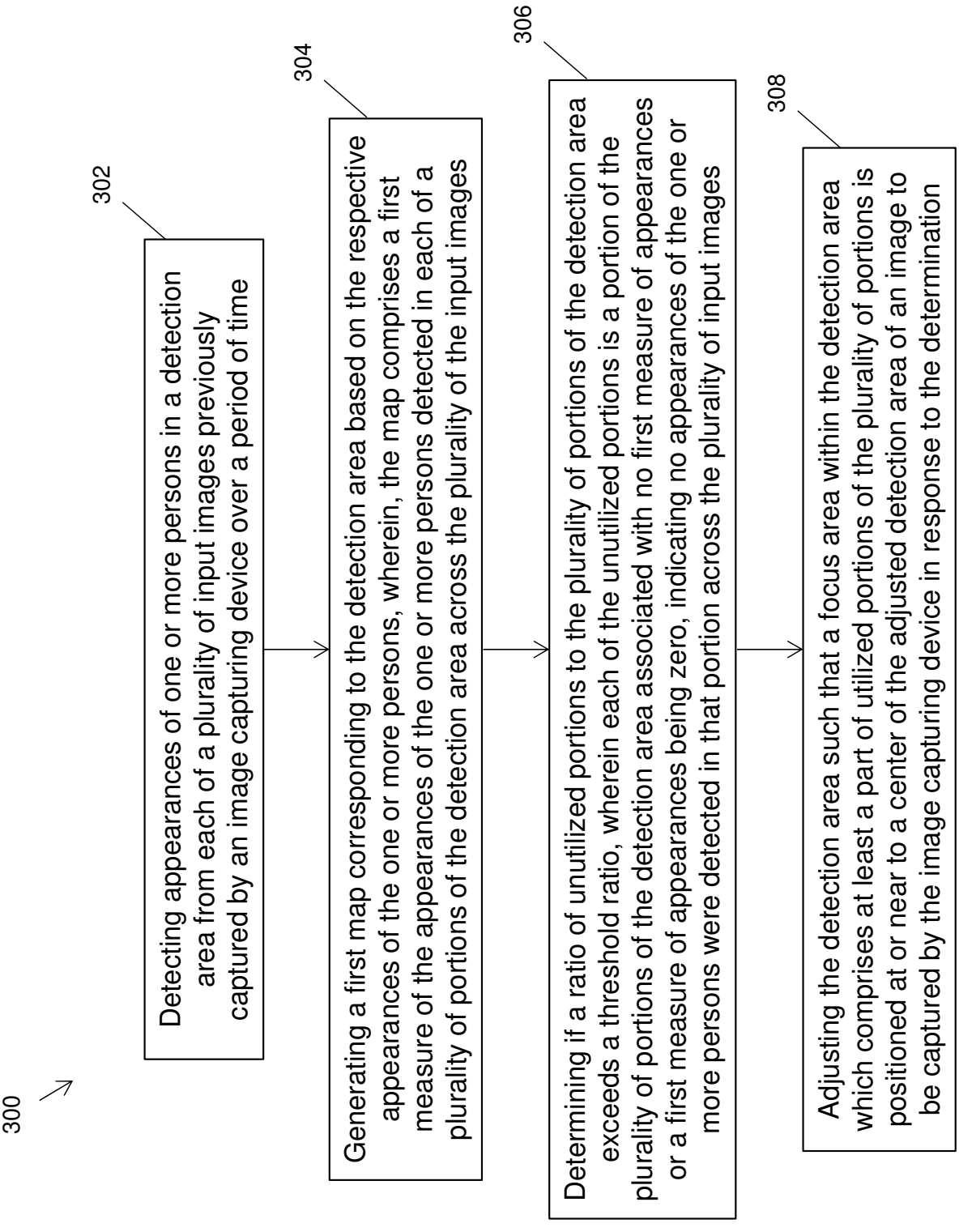

300
302
Detecting appearances of one or more persons in a detection area from each of a plurality of input images previously captured by an image capturing device over a period of time
304
Generating a first map corresponding to the detection area based on the respective appearances of the one or more persons, wherein, the map comprises a first measure of the appearances of the one or more persons detected in each of a plurality of portions of the detection area across the plurality of the input images
306
Determining if a ratio of unutilized portions to the plurality of portions of the detection area exceeds a threshold ratio, wherein each of the unutilized portions is a portion of the plurality of portions of the detection area associated with no first measure of appearances or a first measure of appearances being zero, indicating no appearances of the one or more persons were detected in that portion across the plurality of input images
308
Adjusting the detection area such that a focus area within the detection area which comprises at least a part of utilized portions of the plurality of portions is positioned at or near to a center of the adjusted detection area of an image to be captured by the image capturing device in response to the determination

Figure 3

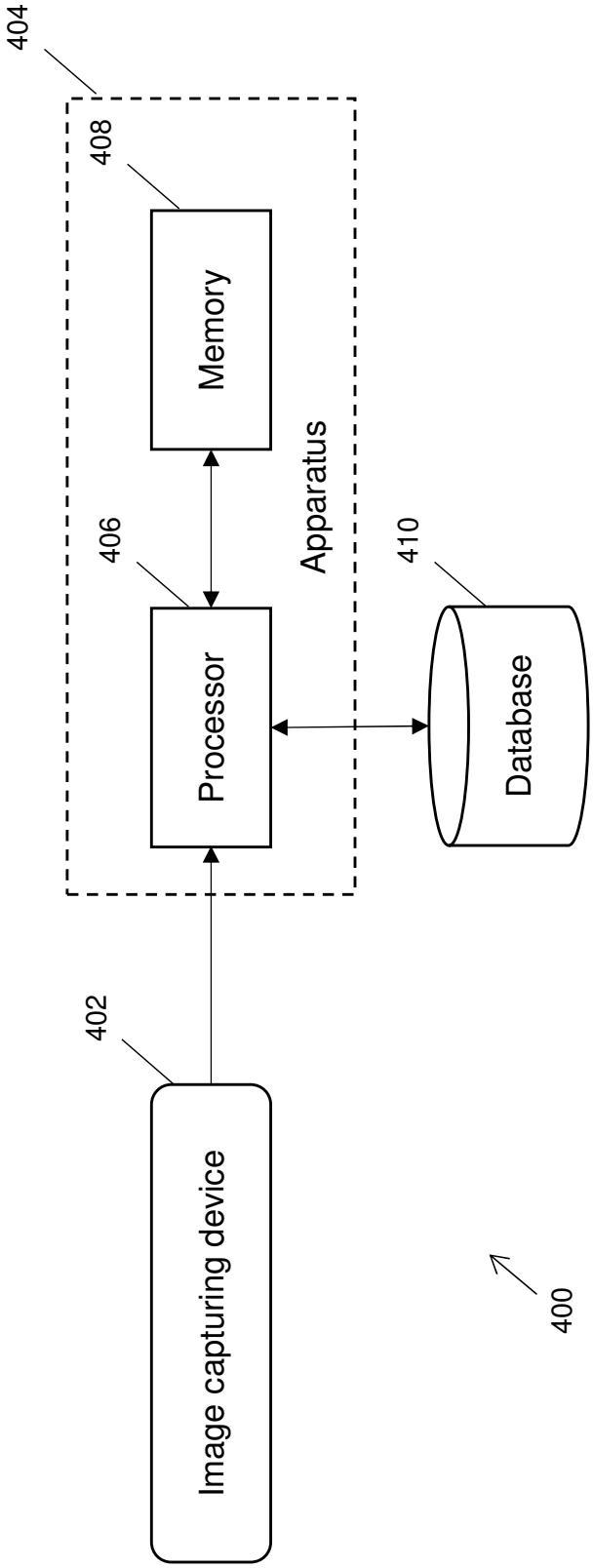

404
408
Memory
Apparatus
406
410
Processor
Database
402
Image capturing device
400

Figure 4

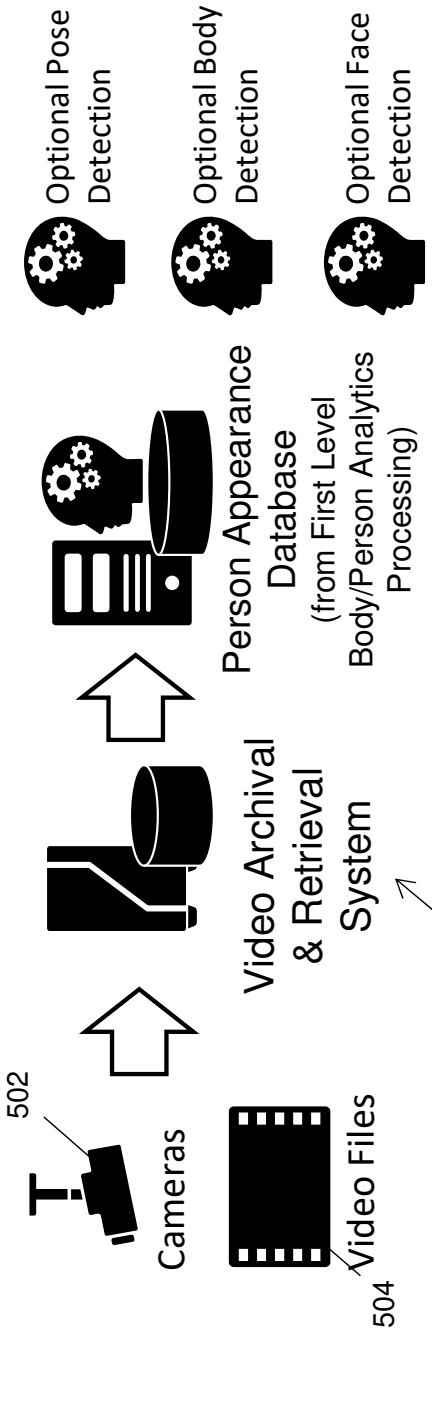

Optional Pose Detection
Optional Body Detection
Optional Face Detection
Person Appearance Database (from First Level Body/Person Analytics Processing)
508
Video Archival & Retrieval System
506
Cameras
Video Files
502
504
500

Figure 5

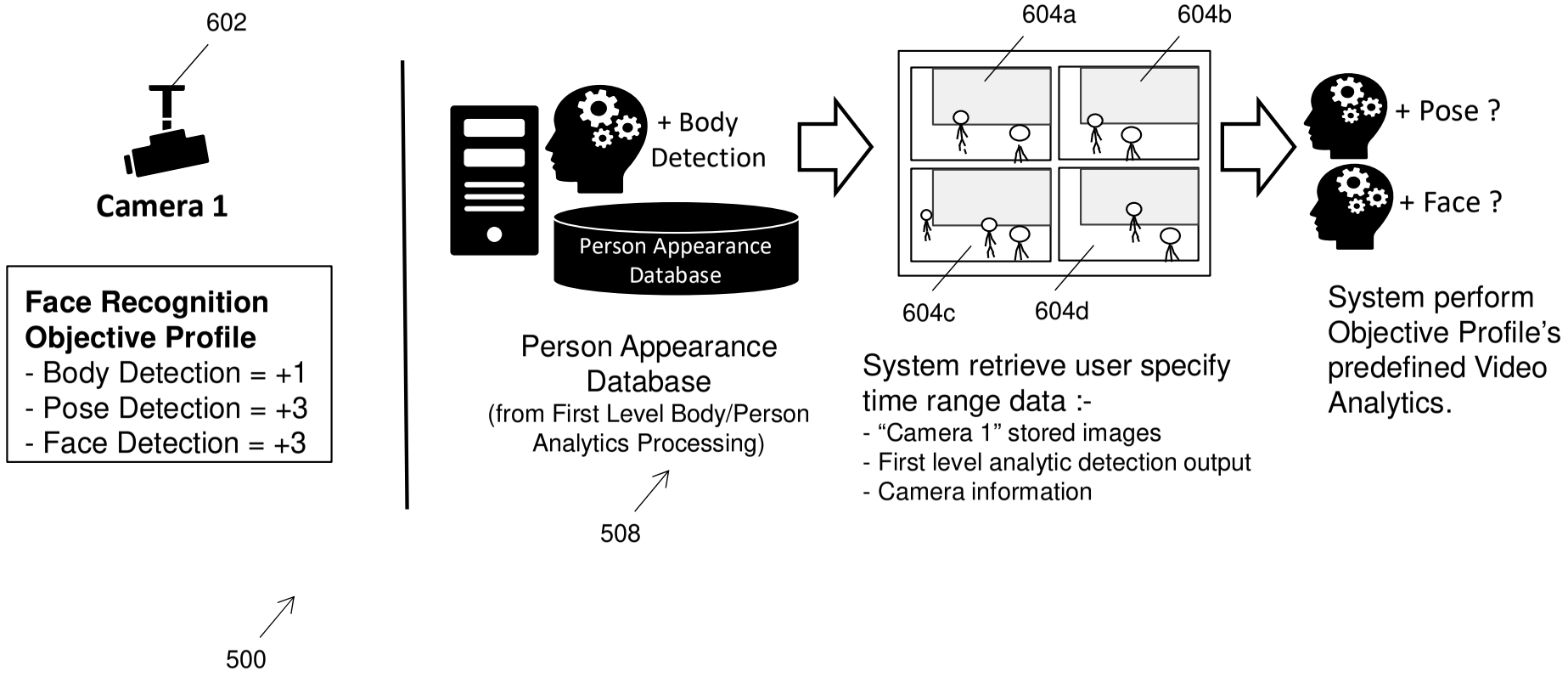

602
Camera 1
Face Recognition Objective Profile
- Body Detection = +1
- Pose Detection = +3
- Face Detection = +3
500
+ Body Detection
Person Appearance Database
Person Appearance Database
(from First Level Body/Person Analytics Processing)
508
604a
604b
604c
604d
System retrieve user specify time range data :-
- "Camera 1" stored images
- First level analytic detection output
- Camera information
+ Pose ?
+ Face ?
System perform Objective Profile's predefined Video Analytics.

Figure 6

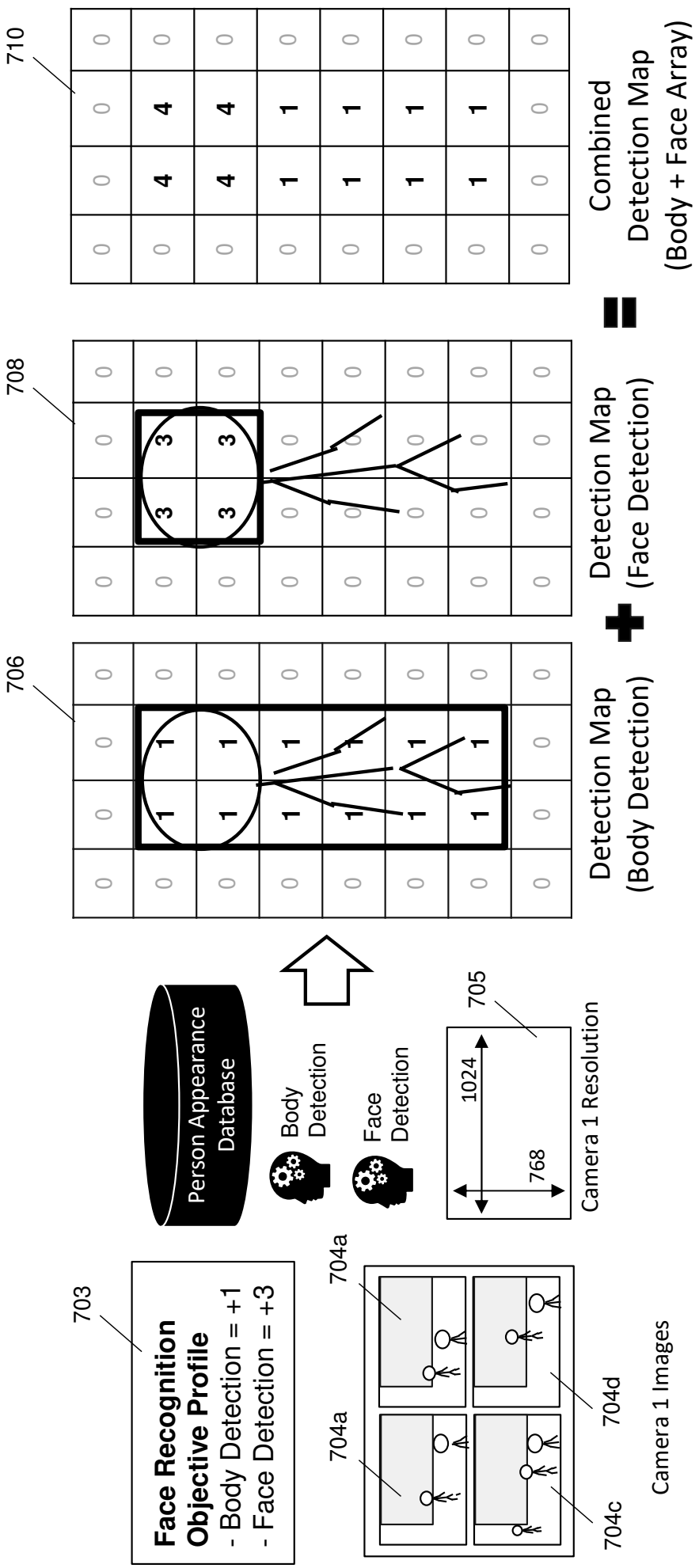

703
Face Recognition
Objective Profile
- Body Detection = +1
- Face Detection = +3
704a
704a
704d
704c
Camera 1 Images
700
Person Appearance Database
Body Detection
Face Detection
705
1024
768
Camera 1 Resolution
706
Detection Map
(Body Detection)
708
Detection Map
(Face Detection)
710
Combined
Detection Map
(Body + Face Array)

Figure 7

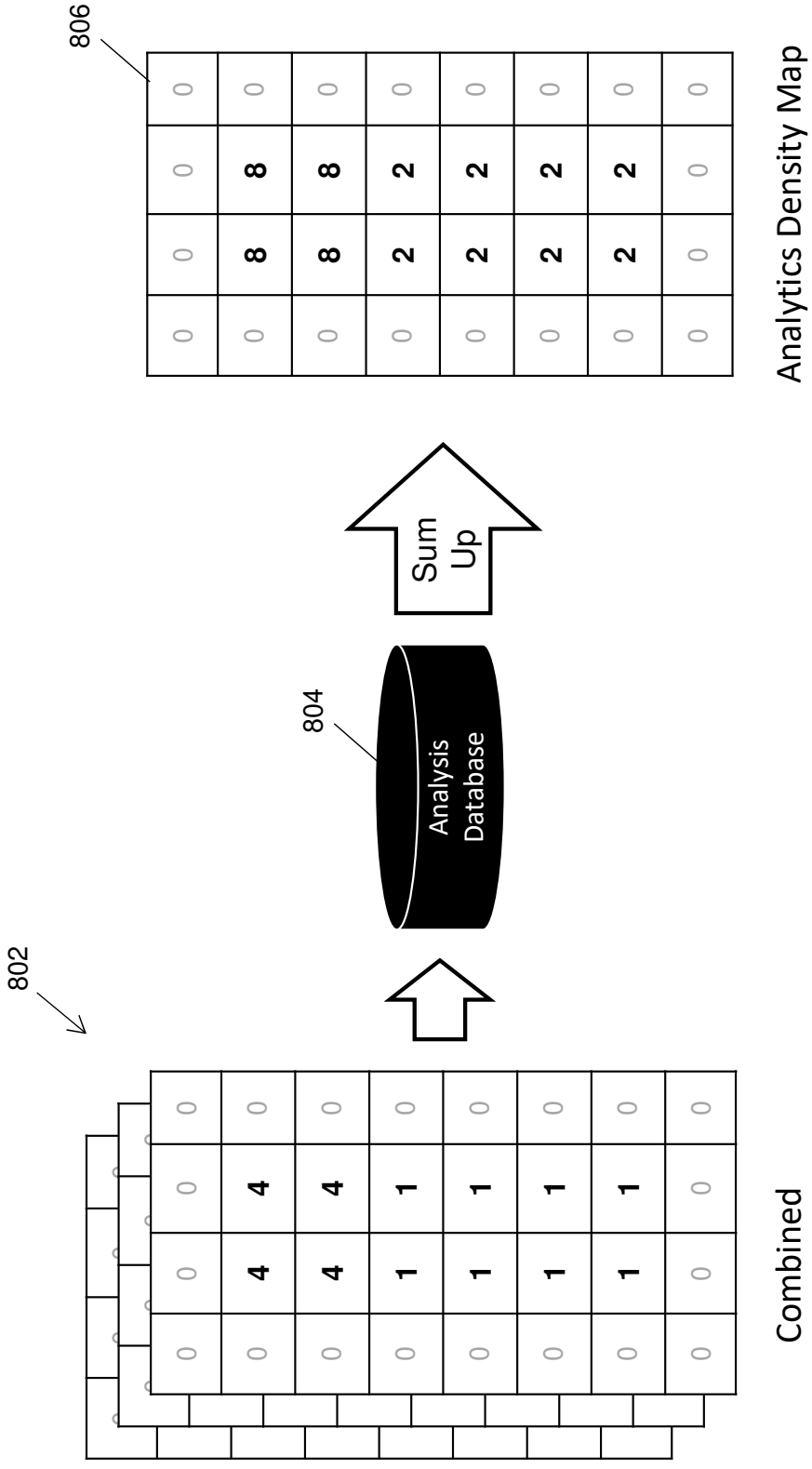

802
Combined
Detection Maps
(1 per image)
804
Analysis
Database
Sum
Up
806
Analytics Density Map

Figure 8

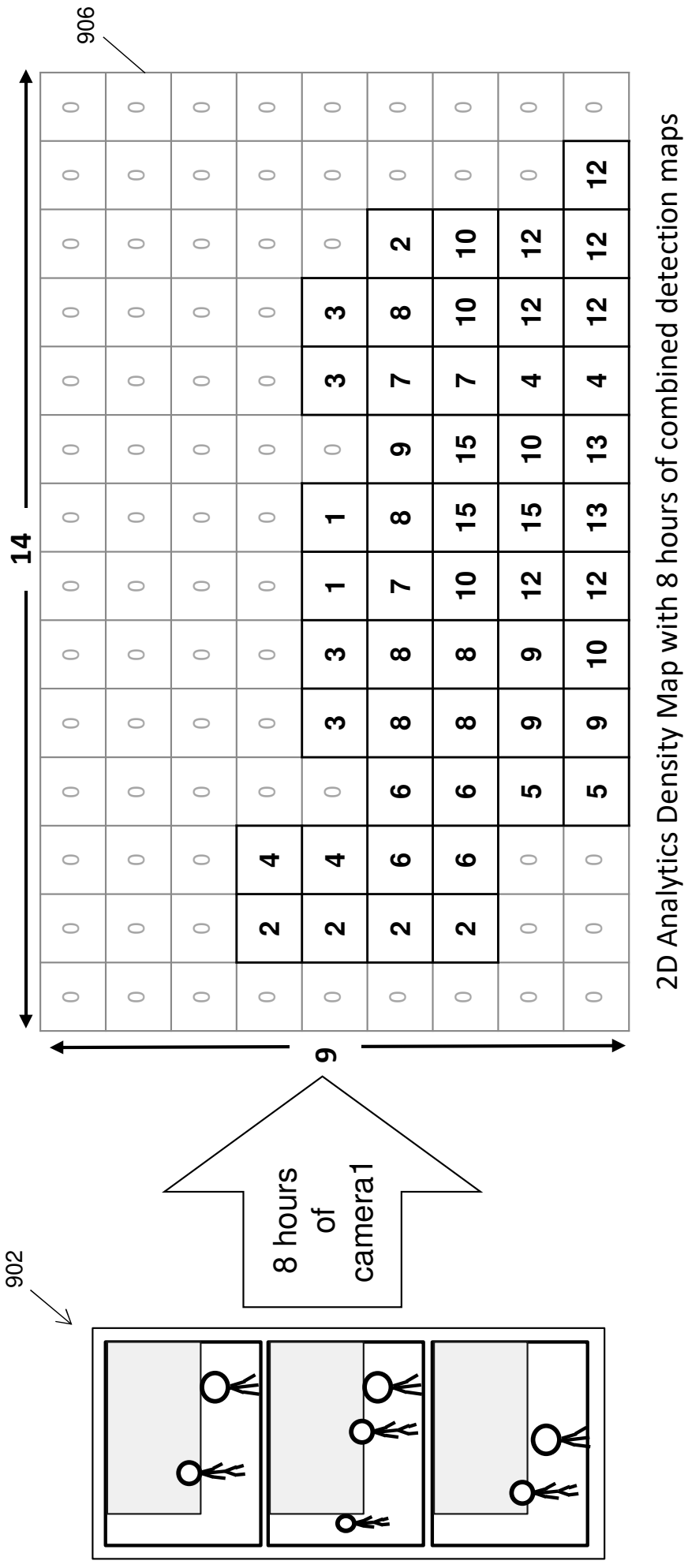

902
8 hours of camera1
906
14
9
2D Analytics Density Map with 8 hours of combined detection maps

Figure 9

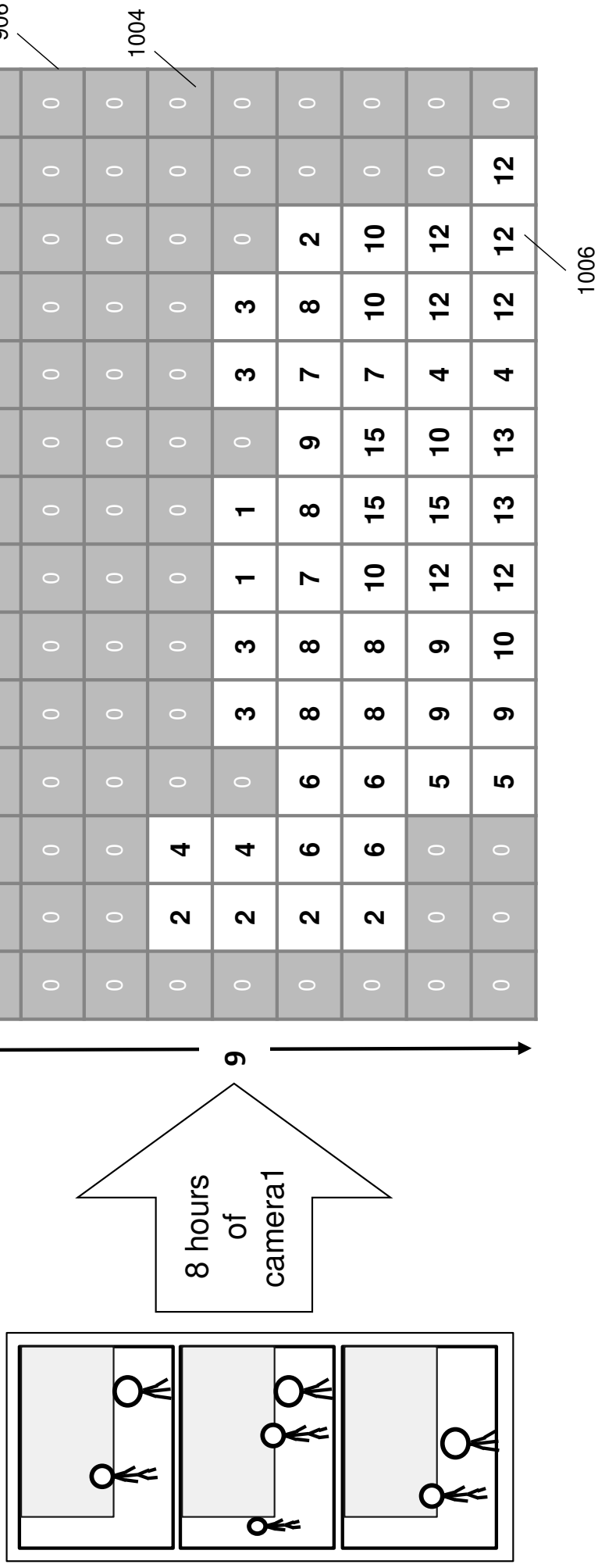

906
1004
1006
14
9
8 hours of camera1
2D Detection Density array with 8 hours of combined analytics output

Figure 10

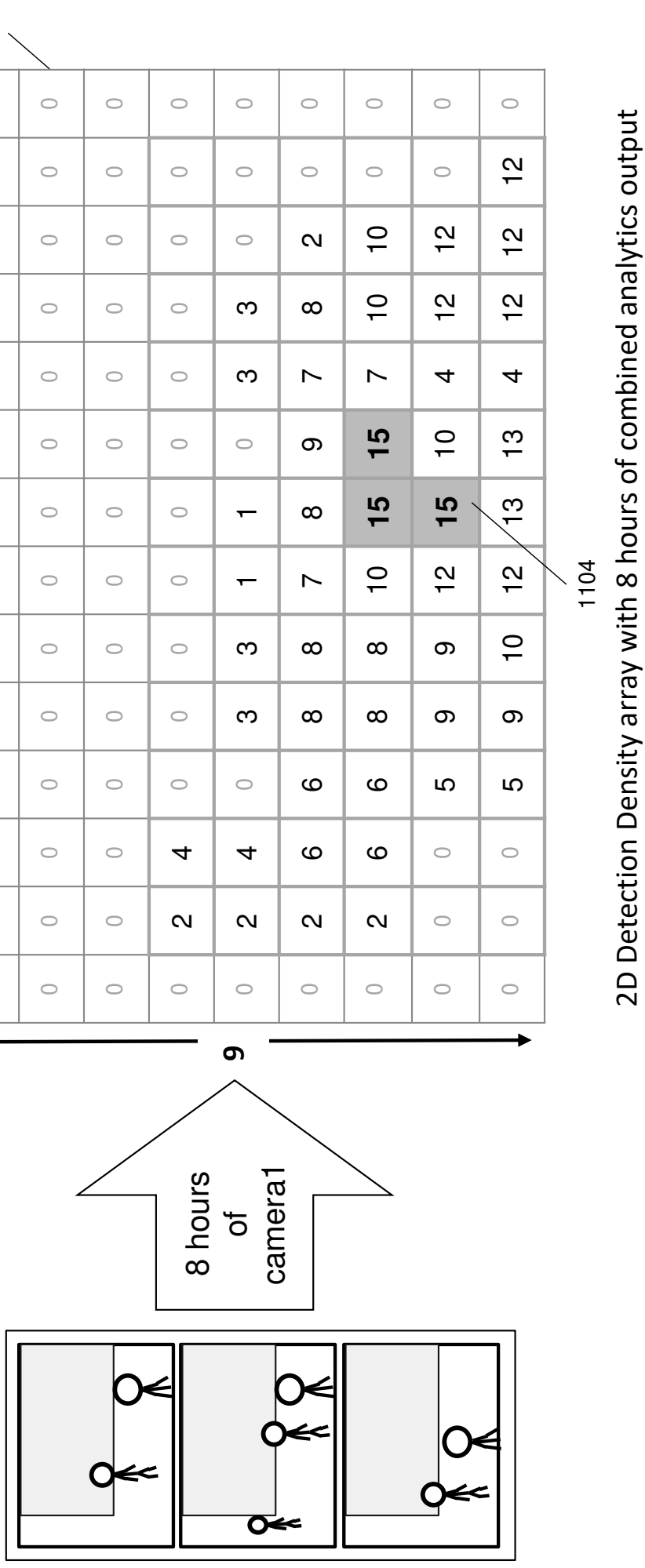
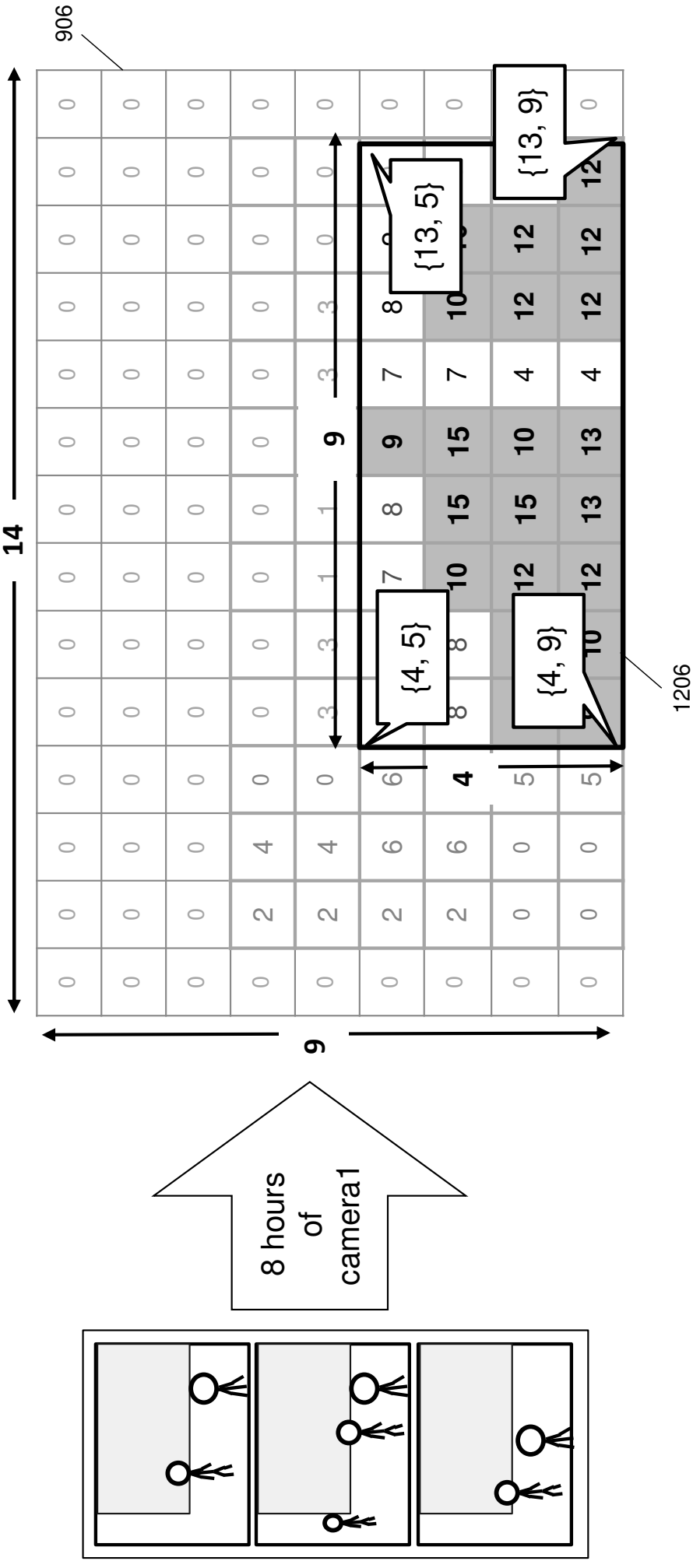

906
14
9
8 hours of camera1
1104
2D Detection Density array with 8 hours of combined analytics output

Figure 11



2D Detection Density array with the selected time range of frame detection data

Figure 12

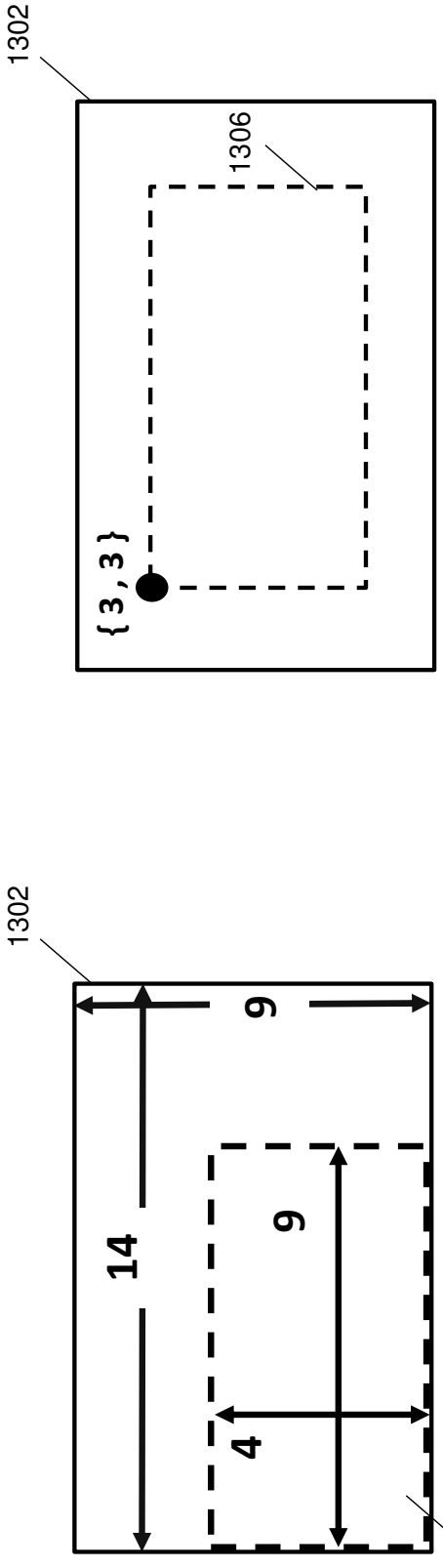


Figure 13

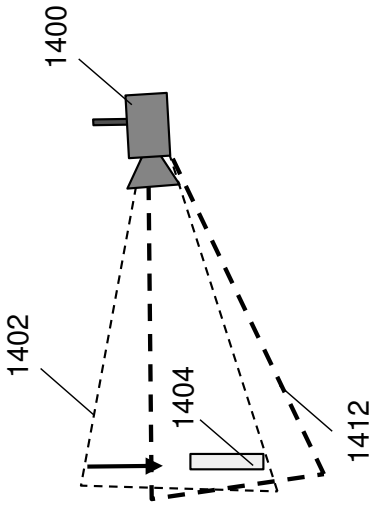


Figure 14

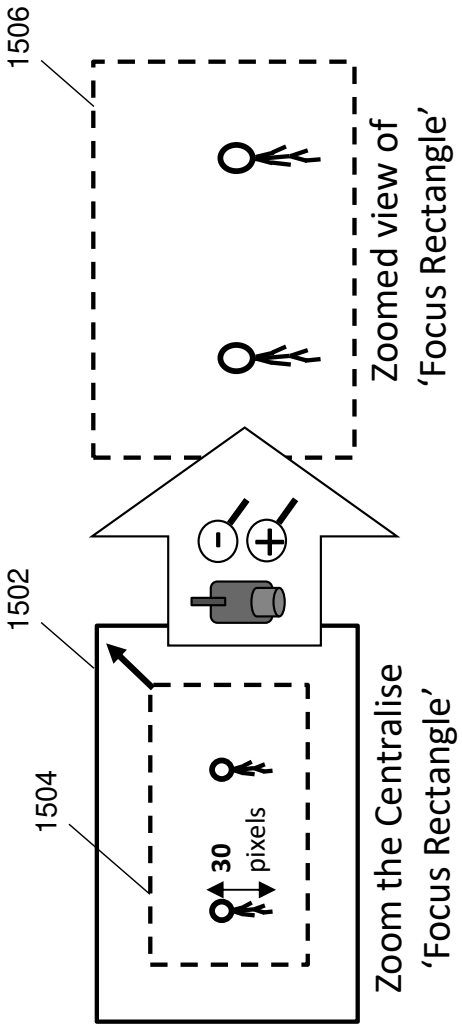
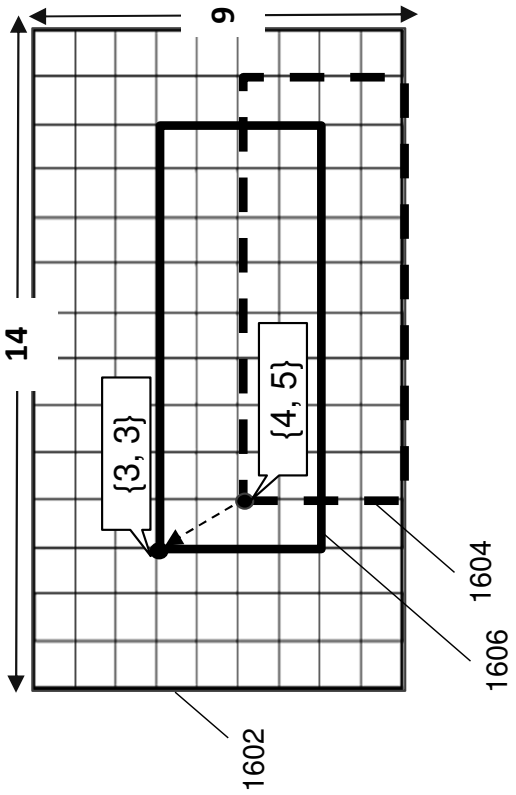
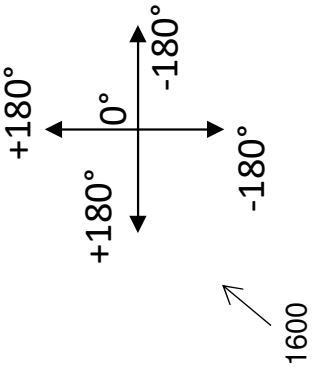

1506
Zoomed view of
'Focus Rectangle'
1502
1504
30
pixels
Zoom the Centralise
'Focus Rectangle'

Figure 15


9
14
{3, 3}
{4, 5}
1602
1604
1606


+180°
0°
-180°
+180°
-180°
1600

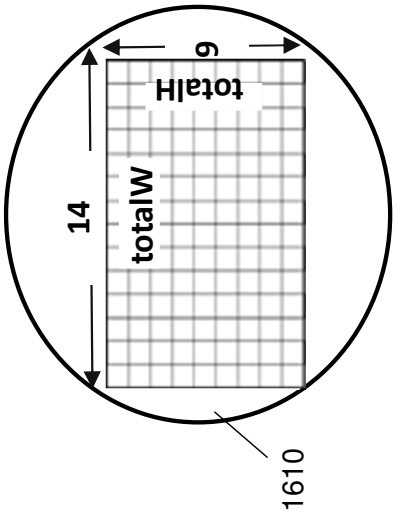

9
totalH
14
totalW
1610

Figure 16

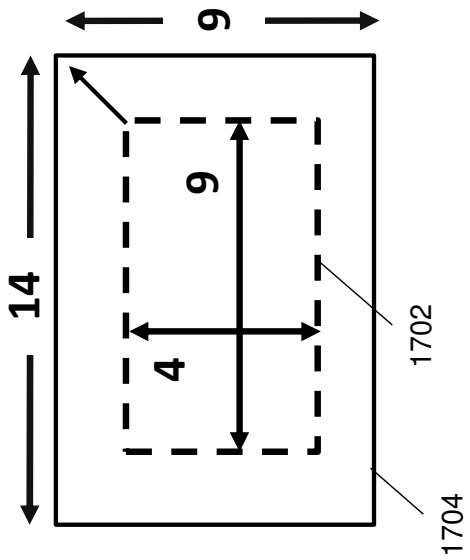


Figure 17

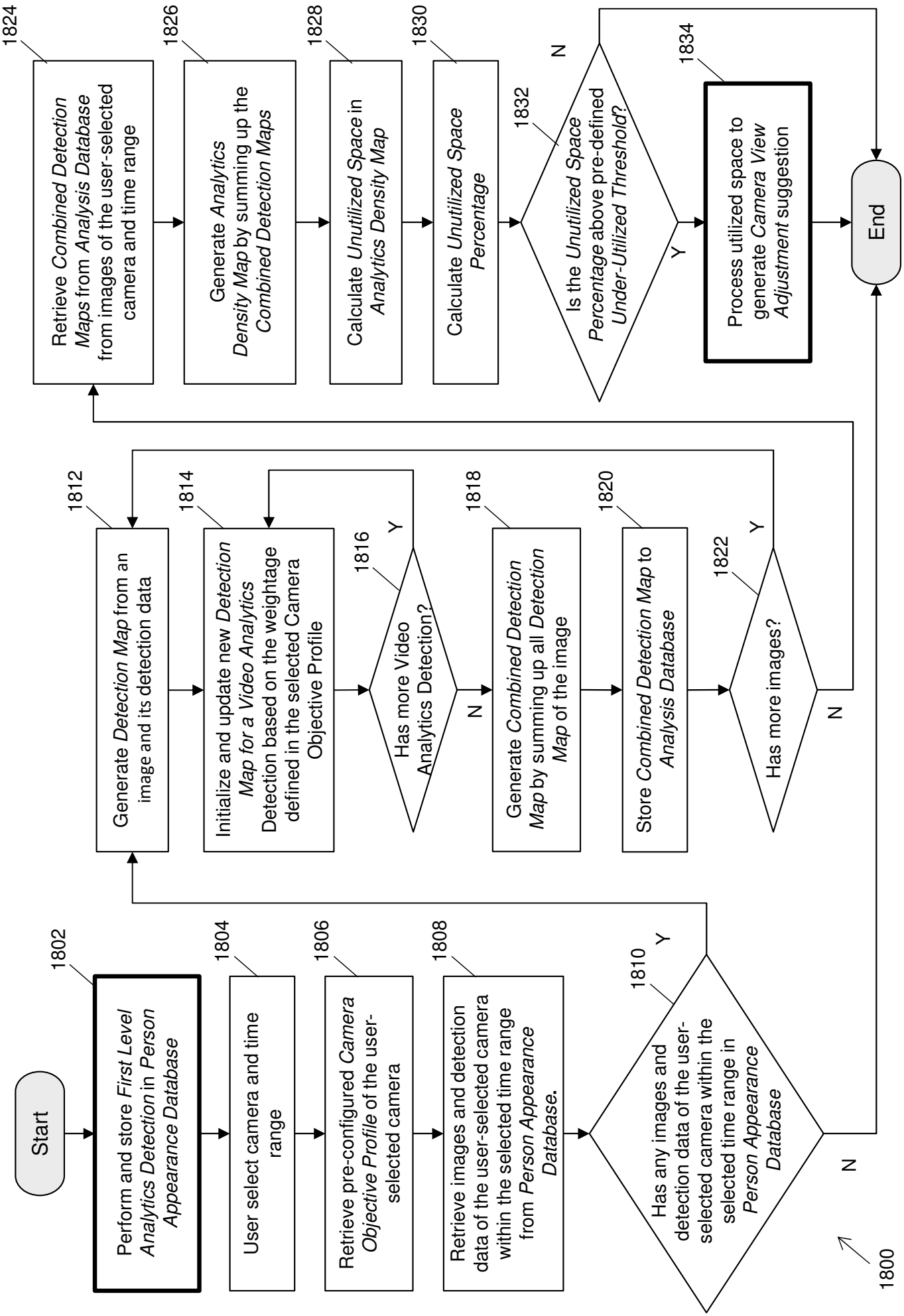

Start
1802
Perform and store First Level Analytics Detection in Person Appearance Database
1804
User select camera and time range
1806
Retrieve pre-configured Camera Objective Profile of the user-selected camera
1808
Retrieve images and detection data of the user-selected camera within the selected time range from Person Appearance Database.
1810
Has any images and detection data of the user-selected camera within the selected time range in Person Appearance Database
Y
N
1812
Generate Detection Map from an image and its detection data
1814
Initialize and update new Detection Map for a Video Analytics Detection based on the weightage defined in the selected Camera Objective Profile
1816
Has more Video Analytics Detection?
Y
N
1818
Generate Combined Detection Map by summing up all Detection Map of the image
1820
Store Combined Detection Map to Analysis Database
1822
Has more images?
Y
N
1824
Retrieve Combined Detection Maps from Analysis Database from images of the user-selected camera and time range
1826
Generate Analytics Density Map by summing up the Combined Detection Maps
1828
Calculate Unutilized Space in Analytics Density Map
1830
Calculate Unutilized Space Percentage
1832
Is the Unutilized Space Percentage above pre-defined Under-Utilized Threshold?
N
Y
1834
Process utilized space to generate Camera View Adjustment suggestion
End
1800

Figure 18

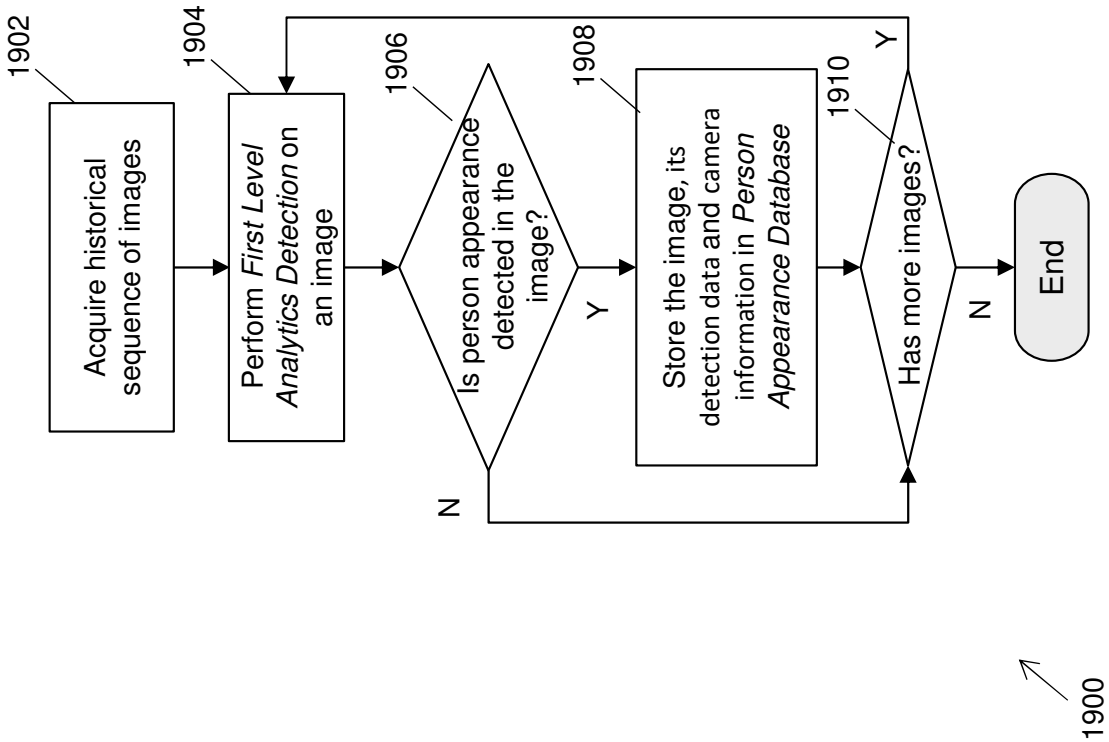

1902
Acquire historical sequence of images
1904
Perform *First Level Analytics Detection* on an image
1906
Is person appearance detected in the image?
Y
N
1908
Store the image, its detection data and camera information in *Person Appearance Database*
1910
Has more images?
Y
N
End
1900

Figure 19

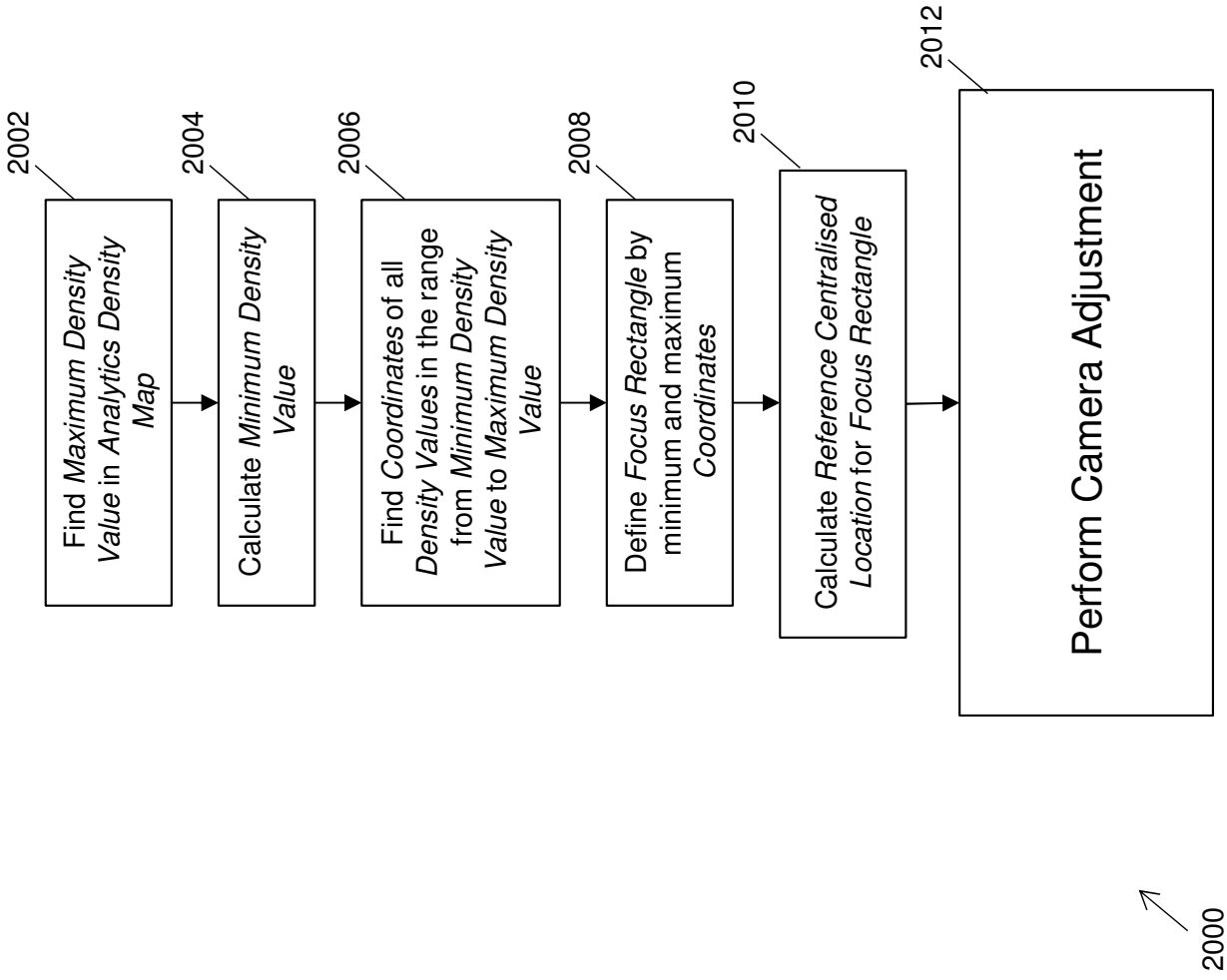

2002
Find *Maximum Density Value* in *Analytics Density Map*
2004
Calculate *Minimum Density Value*
2006
Find *Coordinates* of all *Density Values* in the range from *Minimum Density Value* to *Maximum Density Value*
2008
Define *Focus Rectangle* by minimum and maximum *Coordinates*
2010
Calculate *Reference Centralised Location* for *Focus Rectangle*
2012
Perform Camera Adjustment
2000

Figure 20

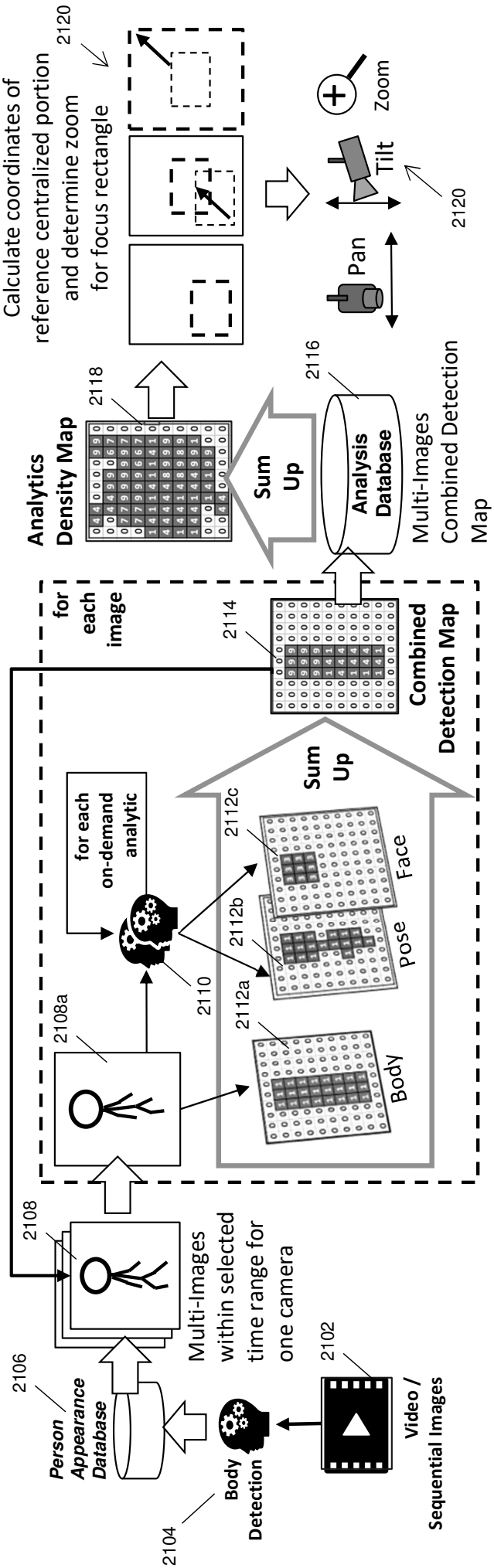

2100
Video / Sequential Images
2102
Body Detection
2104
Person Appearance Database
2106
Multi-Images within selected time range for one camera
2108
2108a
2110
for each on-demand analytic
2112a
Body
2112b
Pose
2112c
Face
Sum Up
2114
Combined Detection Map
for each image
Multi-Images Combined Detection Map
2116
Analysis Database
Sum Up
2118
Analytics Density Map
Pan
Tilt
Zoom
2120
Calculate coordinates of reference centralized portion and determine zoom for focus rectangle
2120

Figure 21

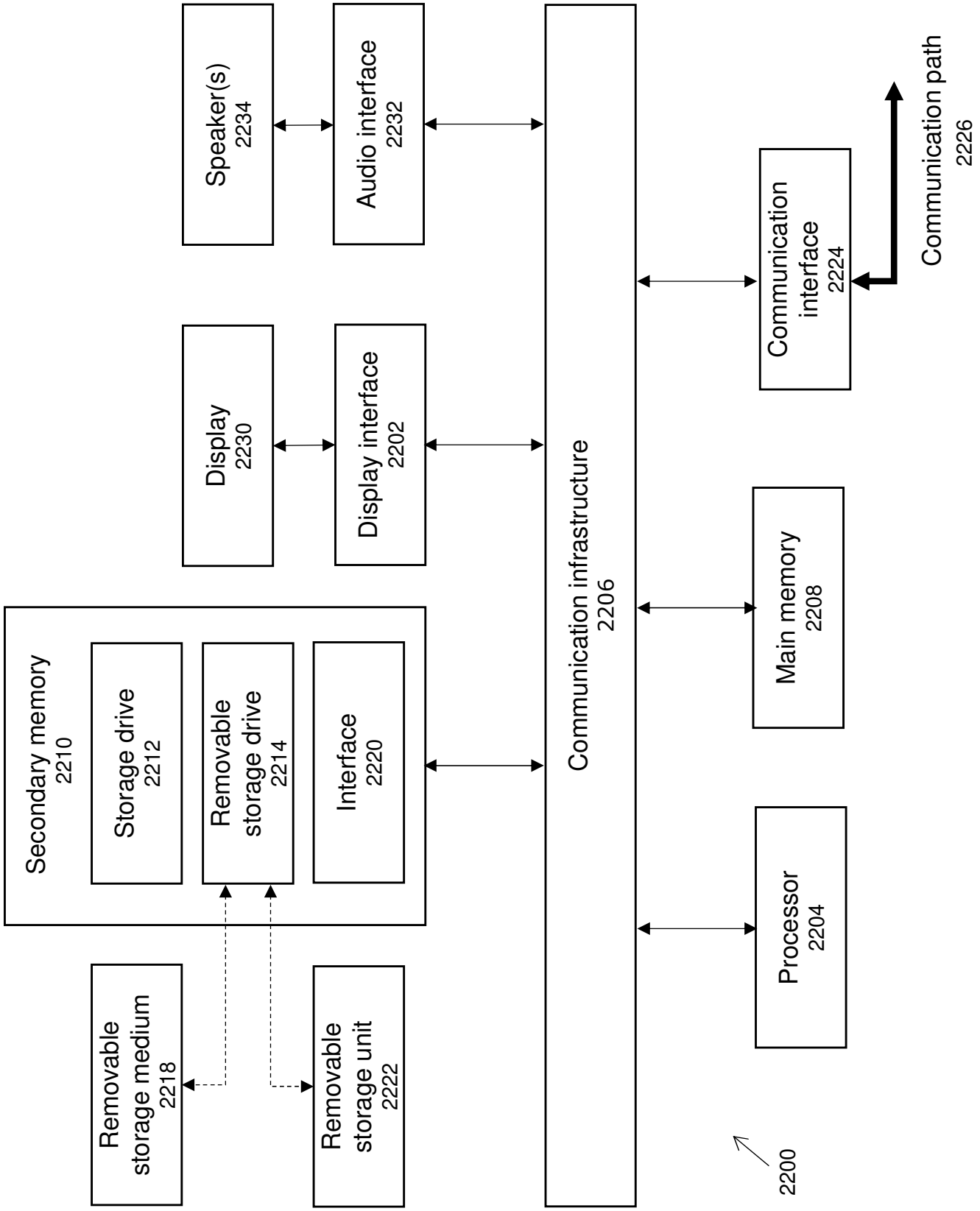

Speaker(s)
2234
Audio interface
2232
Display
2230
Display interface
2202
Secondary memory
2210
Storage drive
2212
Removable
storage drive
2214
Interface
2220
Communication infrastructure
2206
Communication
interface
2224
Communication path
2226
Main memory
2208
Removable
storage medium
2218
Removable
storage unit
2222
Processor
2204
2200

Figure 22