Figure 1

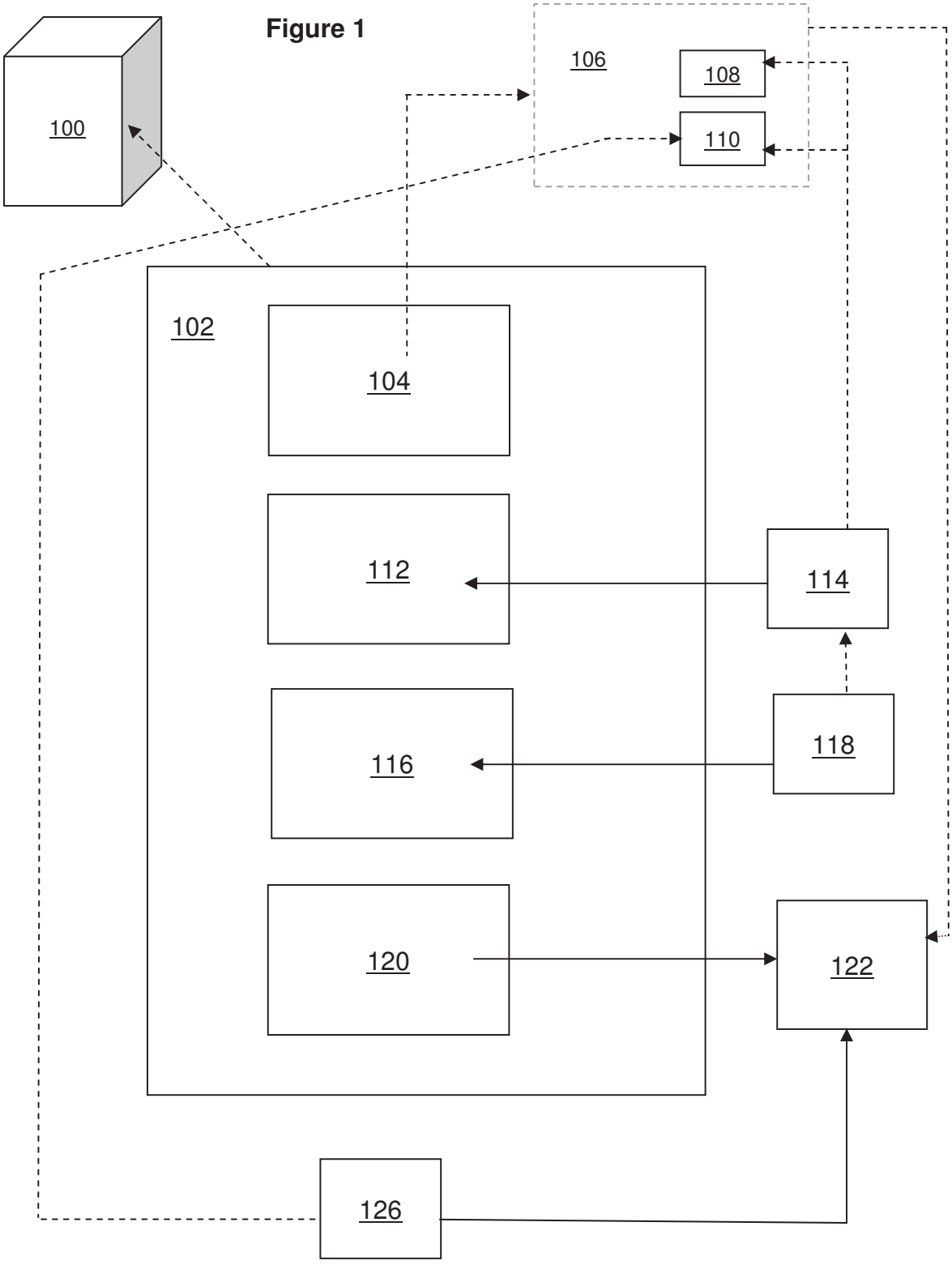


Figure 2A

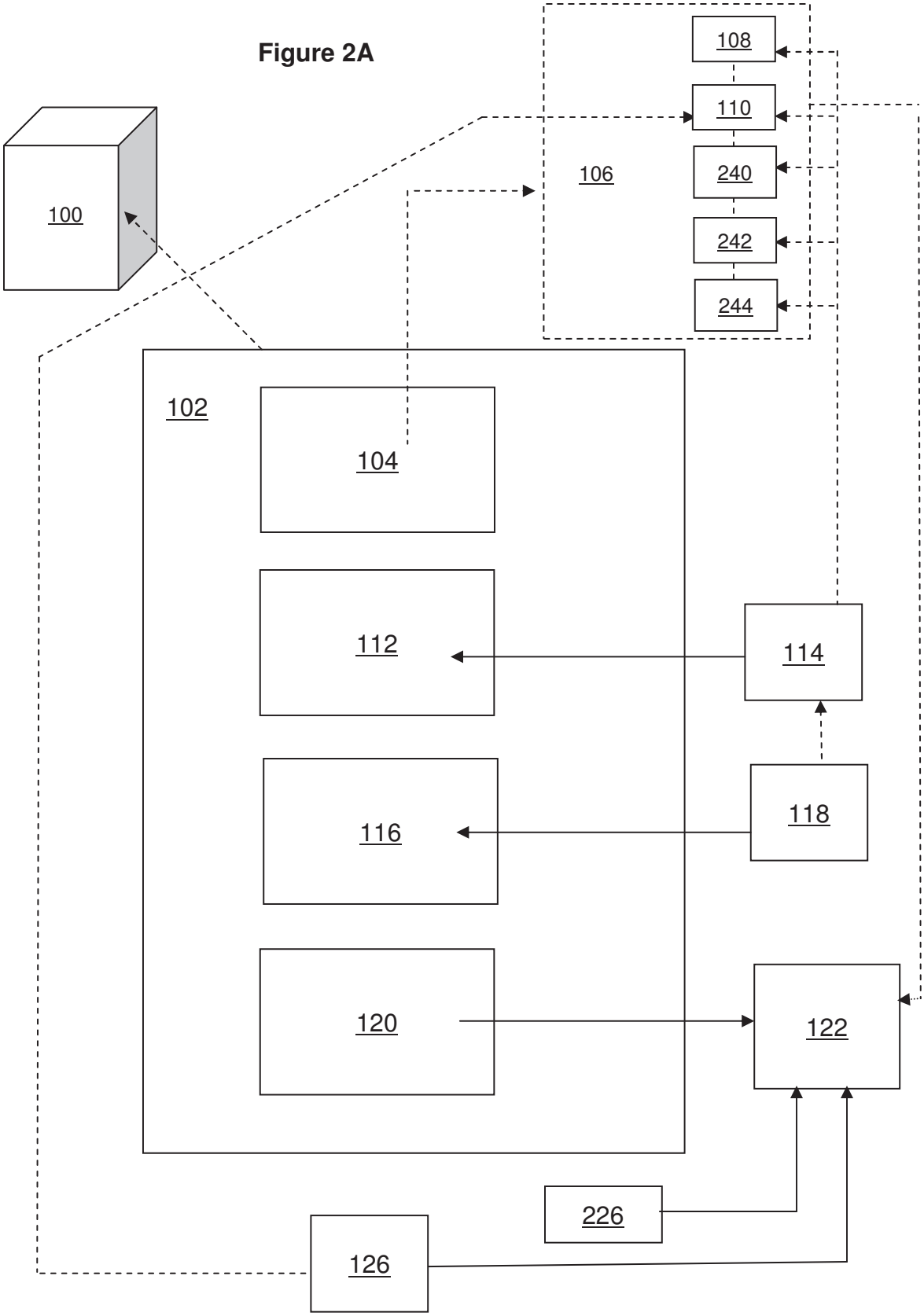

108
110
106
240
100
242
244
102
104
112
114
116
118
120
122
226
126

Figure 2B

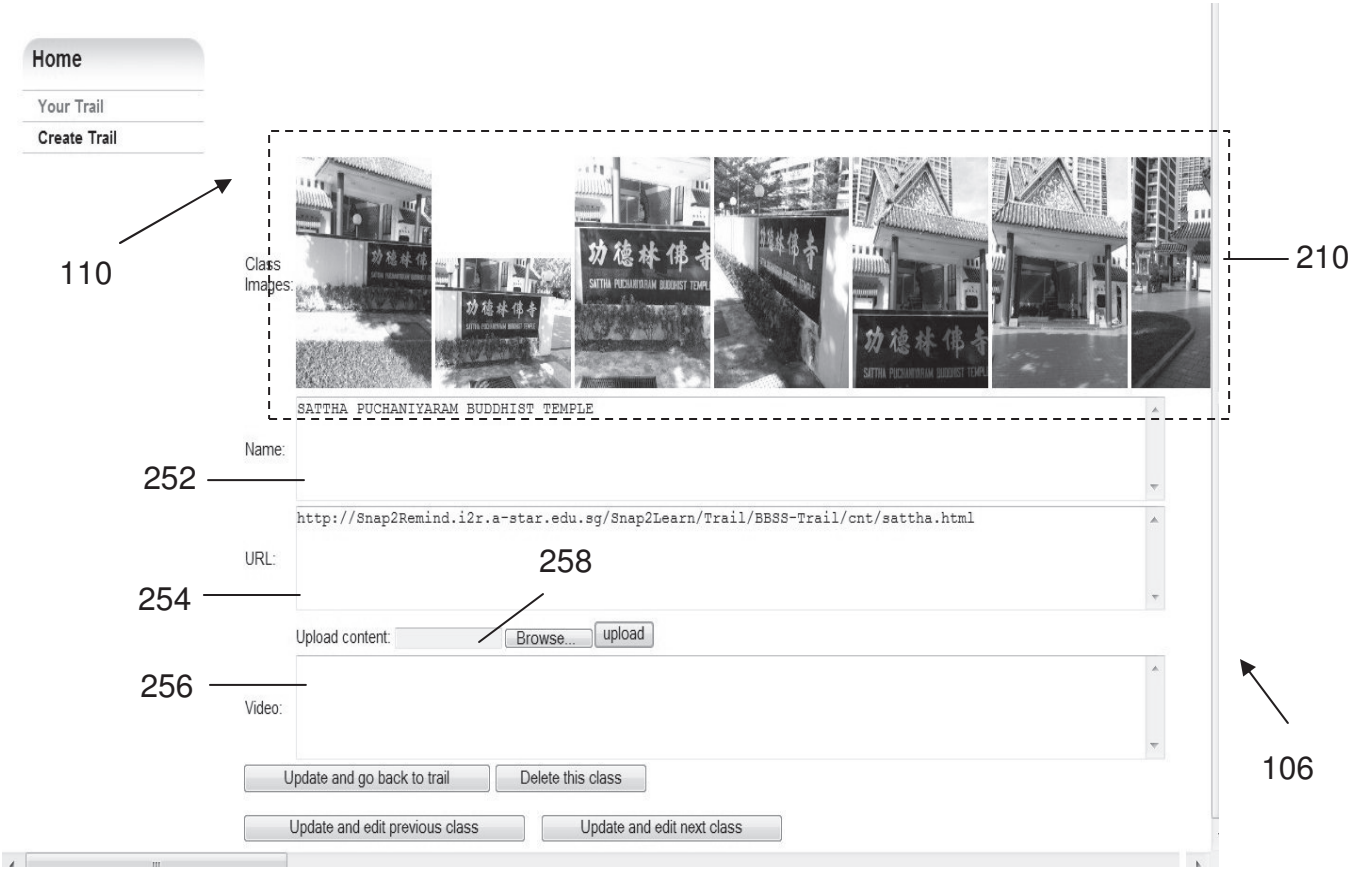

Home
Your Trail
Create Trail
110
Class Images:
210
SATTHA PUCHANIYARAM BUDDHIST TEMPLE
Name:
252
http://Snap2Remind.i2r.a-star.edu.sg/Snap2Learn/Trail/BBSS-Trail/cnt/sattha.html
URL:
258
254
Upload content:
Browse...
upload
256
Video:
106
Update and go back to trail
Delete this class
Update and edit previous class
Update and edit next class

Figure 3A

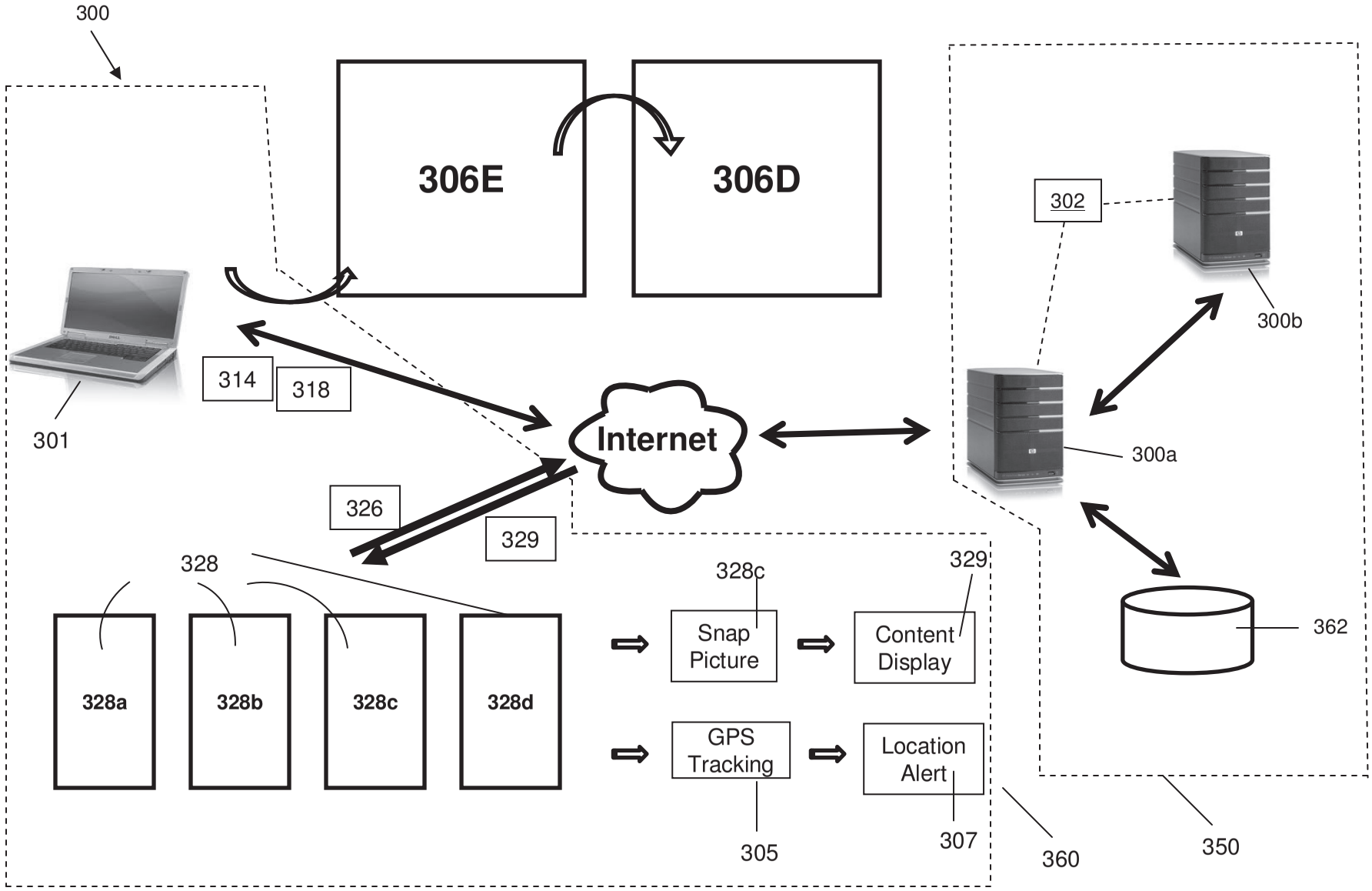

300
306E
306D
302
300b
314
318
301
Internet
300a
326
329
328
328c
329
Snap Picture
Content Display
362
328a
328b
328c
328d
GPS Tracking
Location Alert
305
307
360
350

Figure 3B

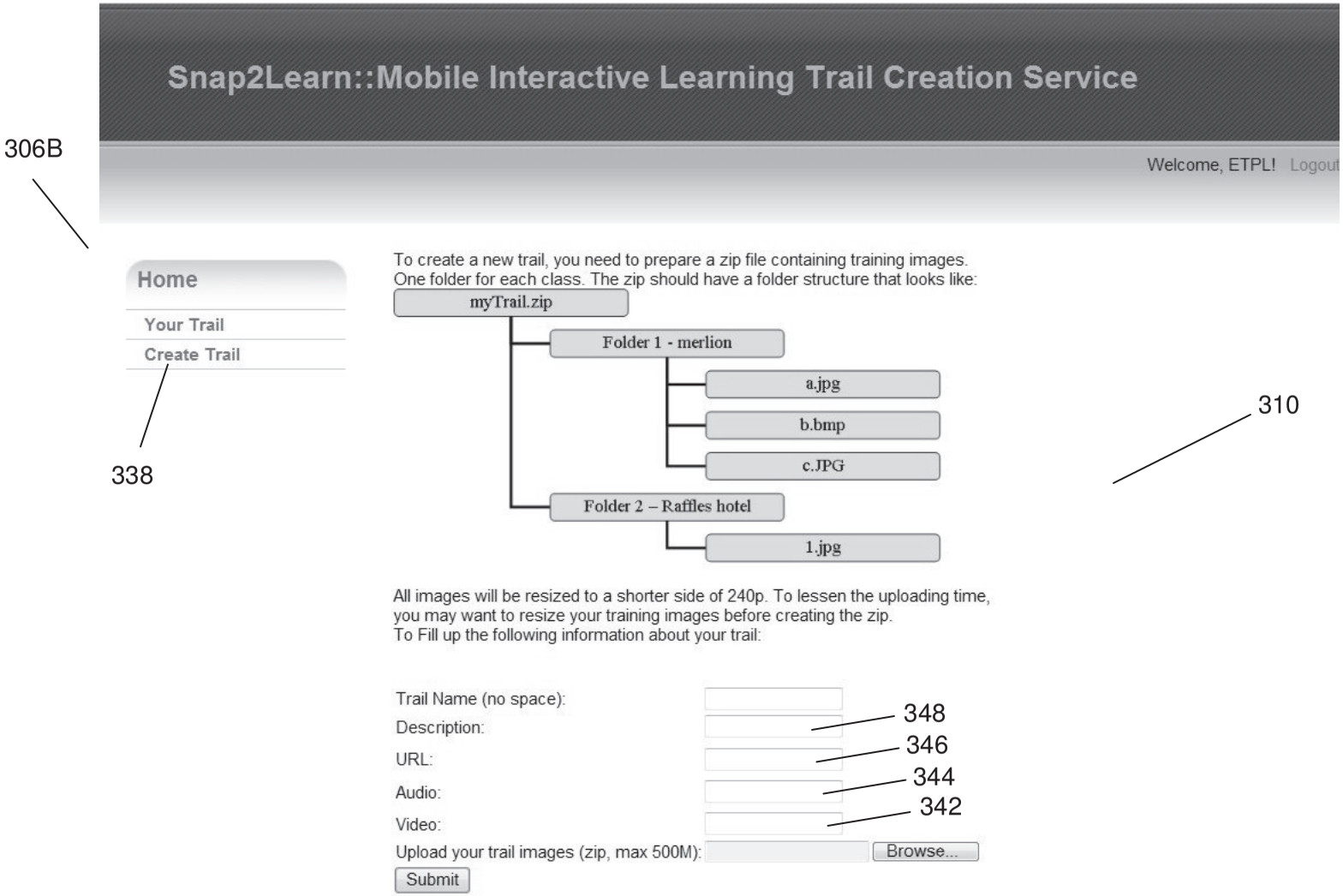

Snap2Learn::Mobile Interactive Learning Trail Creation Service
306B
Welcome, ETPL! Logout
Home
Your Trail
Create Trail
338
To create a new trail, you need to prepare a zip file containing training images.
One folder for each class. The zip should have a folder structure that looks like:
myTrail.zip
Folder 1 - merlion
a.jpg
b.bmp
c.JPG
Folder 2 – Raffles hotel
1.jpg
310
All images will be resized to a shorter side of 240p. To lessen the uploading time,
you may want to resize your training images before creating the zip.
To Fill up the following information about your trail:
Trail Name (no space):
Description:
348
URL:
346
Audio:
344
Video:
342
Upload your trail images (zip, max 500M):
Browse...
Submit

Figure 3C

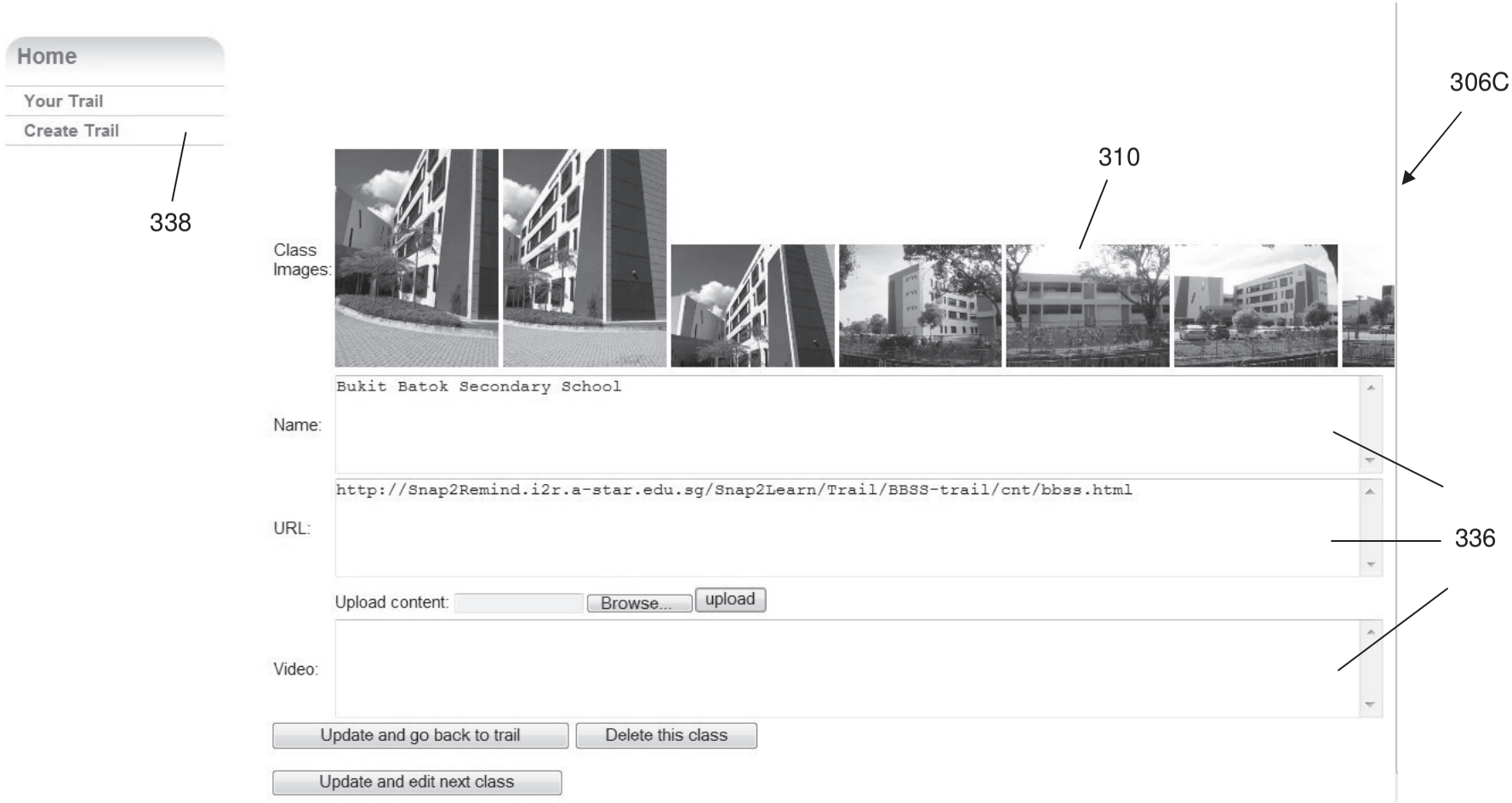

Home
Your Trail
Create Trail
338
306C
310
Class Images:
Name:
Bukit Batok Secondary School
URL:
http://Snap2Remind.i2r.a-star.edu.sg/Snap2Learn/Trail/BBSS-trail/cnt/bbss.html
336
Upload content:
Browse...
upload
Video:
Update and go back to trail
Delete this class
Update and edit next class

Figure 3D

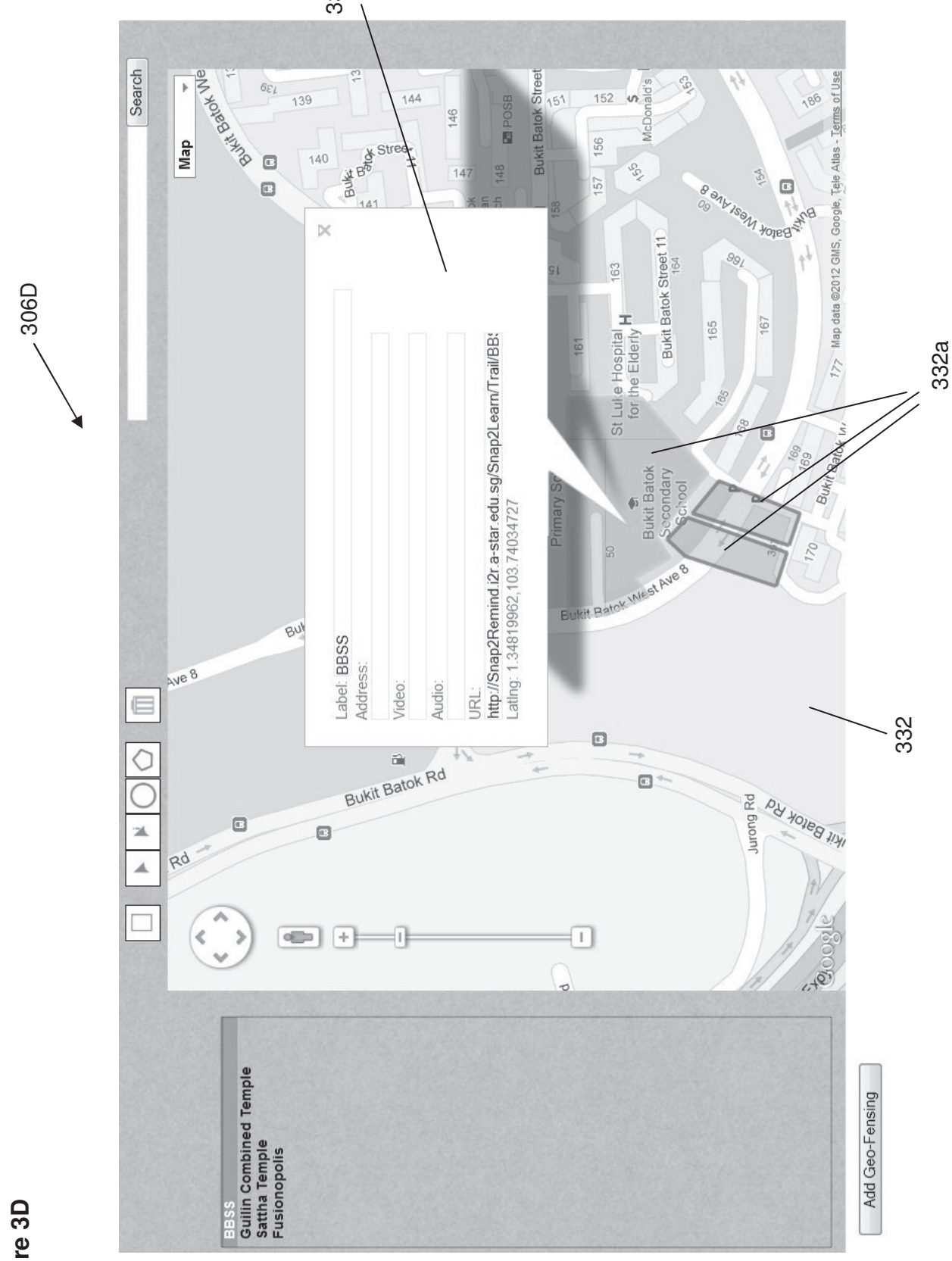

306D
332b
332a
332
Search
Map
Bukit Batok Rd
Bukit Batok West Ave 8
Bukit Batok Street 11
Bukit Batok Secondary School
St Luke Hospital for the Elderly
Label: BBSS
Address:
Video:
Audio:
URL:
http://Snap2Remind.i2r.a-star.edu.sg/Snap2Learn/Trail/BB
Latlng: 1.34819962,103.74034727
BBSS
Guilin Combined Temple
Sattha Temple
Fusionopolis
Add Geo-Fensing

Figure 3E

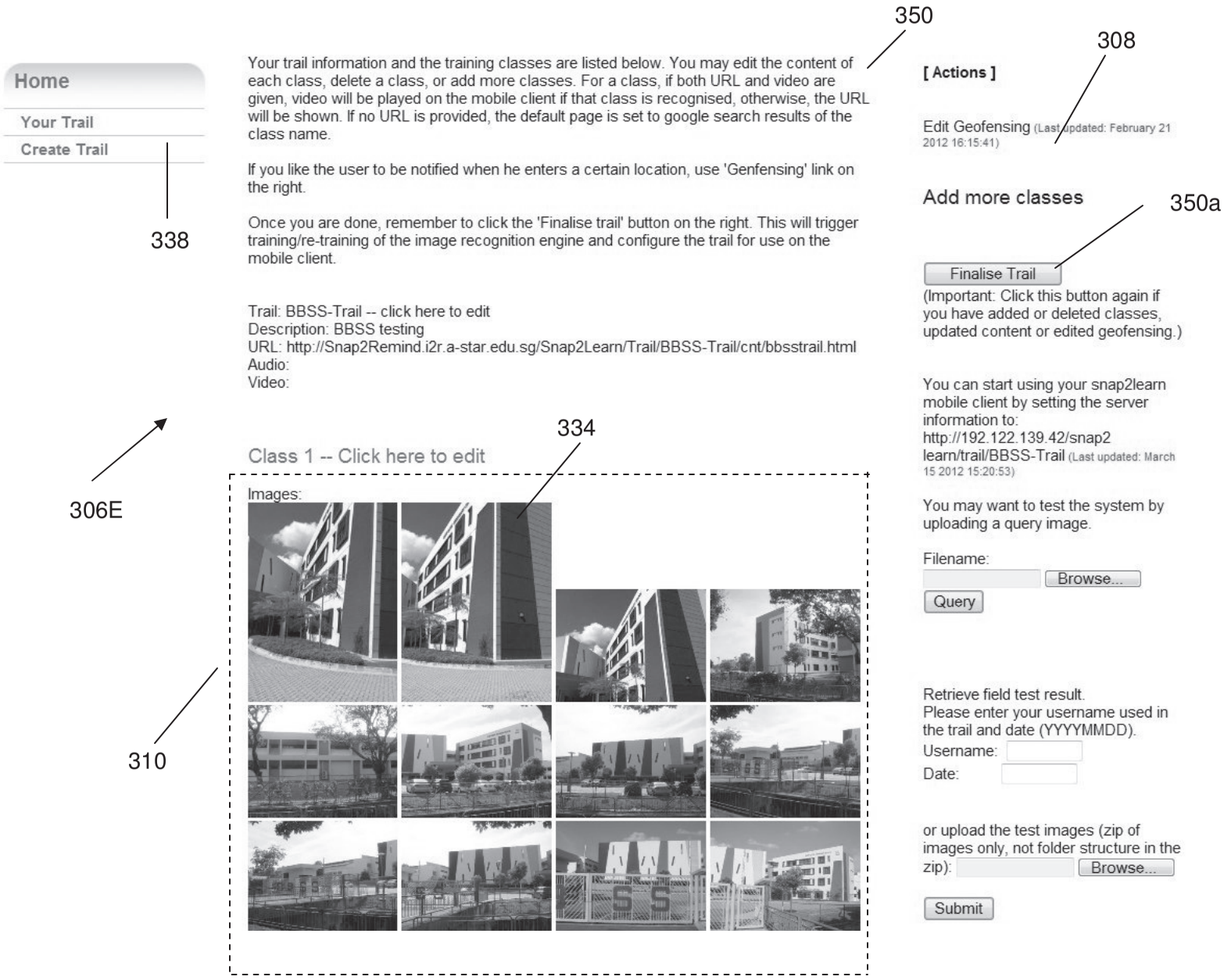

350
308
Home
Your Trail
Create Trail
338
Your trail information and the training classes are listed below. You may edit the content of each class, delete a class, or add more classes. For a class, if both URL and video are given, video will be played on the mobile client if that class is recognised, otherwise, the URL will be shown. If no URL is provided, the default page is set to google search results of the class name.
If you like the user to be notified when he enters a certain location, use 'Genfensing' link on the right.
Once you are done, remember to click the 'Finalise trail' button on the right. This will trigger training/re-training of the image recognition engine and configure the trail for use on the mobile client.
Trail: BBSS-Trail -- click here to edit
Description: BBSS testing
URL: http://Snap2Remind.i2r.a-star.edu.sg/Snap2Learn/Trail/BBSS-Trail/cnt/bbsstrail.html
Audio:
Video:
306E
334
Class 1 -- Click here to edit
Images:
310
[Actions]
Edit Geofensing (Last updated: February 21 2012 16:15:41)
Add more classes
350a
Finalise Trail
(Important: Click this button again if you have added or deleted classes, updated content or edited geofensing.)
You can start using your snap2learn mobile client by setting the server information to: http://192.122.139.42/snap2learn/trail/BBSS-Trail (Last updated: March 15 2012 15:20:53)
You may want to test the system by uploading a query image.
Filename:
Browse...
Query
Retrieve field test result.
Please enter your username used in the trail and date (YYYYMMDD).
Username:
Date:
or upload the test images (zip of images only, not folder structure in the zip):
Browse...
Submit

Figure 3F

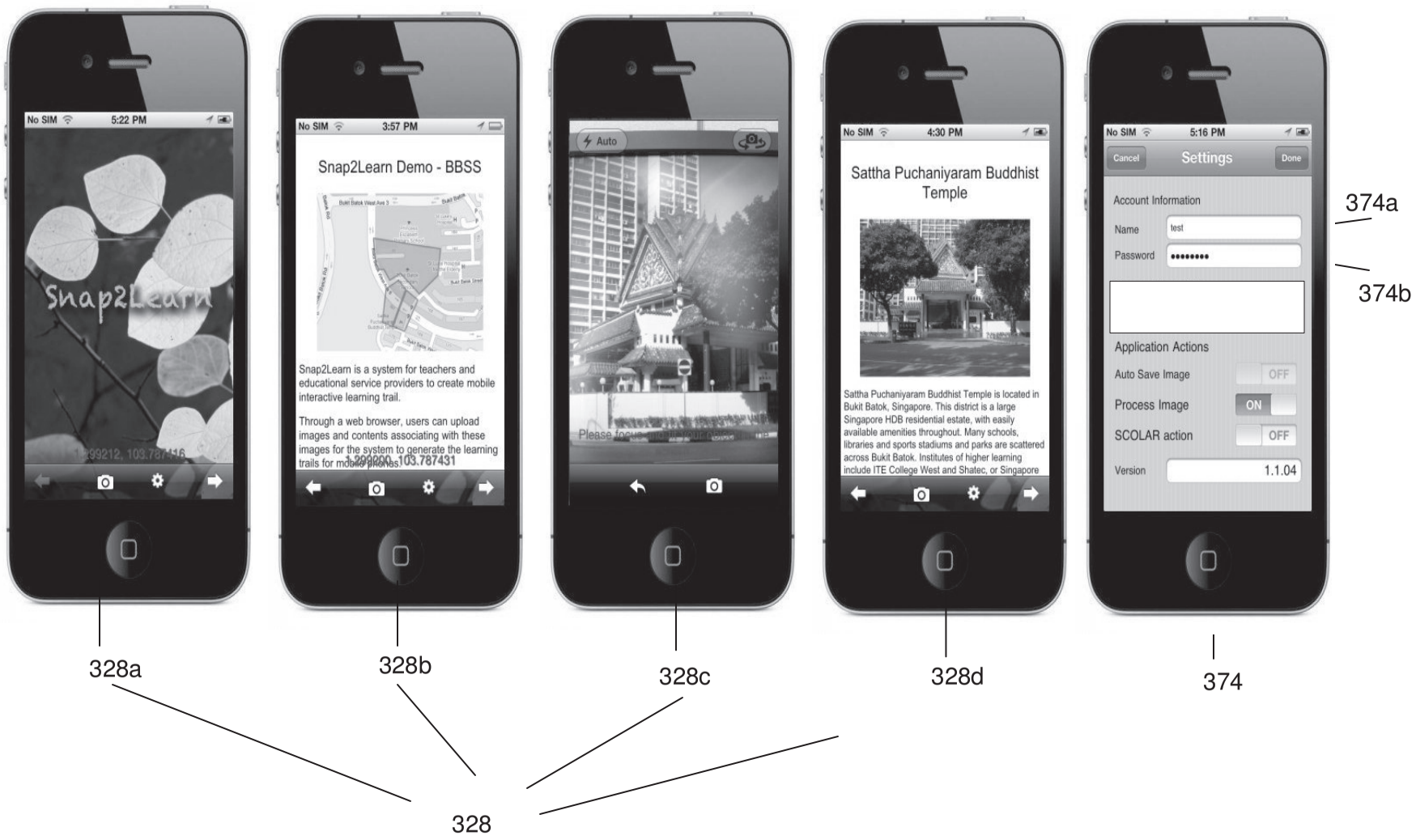

No SIM 5:22 PM
Snap2Learn
No SIM 3:57 PM
Snap2Learn Demo - BBSS
Snap2Learn is a system for teachers and educational service providers to create mobile interactive learning trail.
Through a web browser, users can upload images and contents associating with these images for the system to generate the learning trails for mobile phones.
Auto
No SIM 4:30 PM
Sattha Puchaniyaram Buddhist Temple
Sattha Puchaniyaram Buddhist Temple is located in Bukit Batok, Singapore. This district is a large Singapore HDB residential estate, with easily available amenities throughout. Many schools, libraries and sports stadiums and parks are scattered across Bukit Batok. Institutes of higher learning include ITE College West and Shatec, or Singapore
No SIM 5:16 PM
Cancel
Settings
Done
Account Information
Name
test
Password
Application Actions
Auto Save Image
OFF
Process Image
ON
SCOLAR action
OFF
Version
1.1.04
374a
374b
328a
328b
328c
328d
374
328

Figure 4A

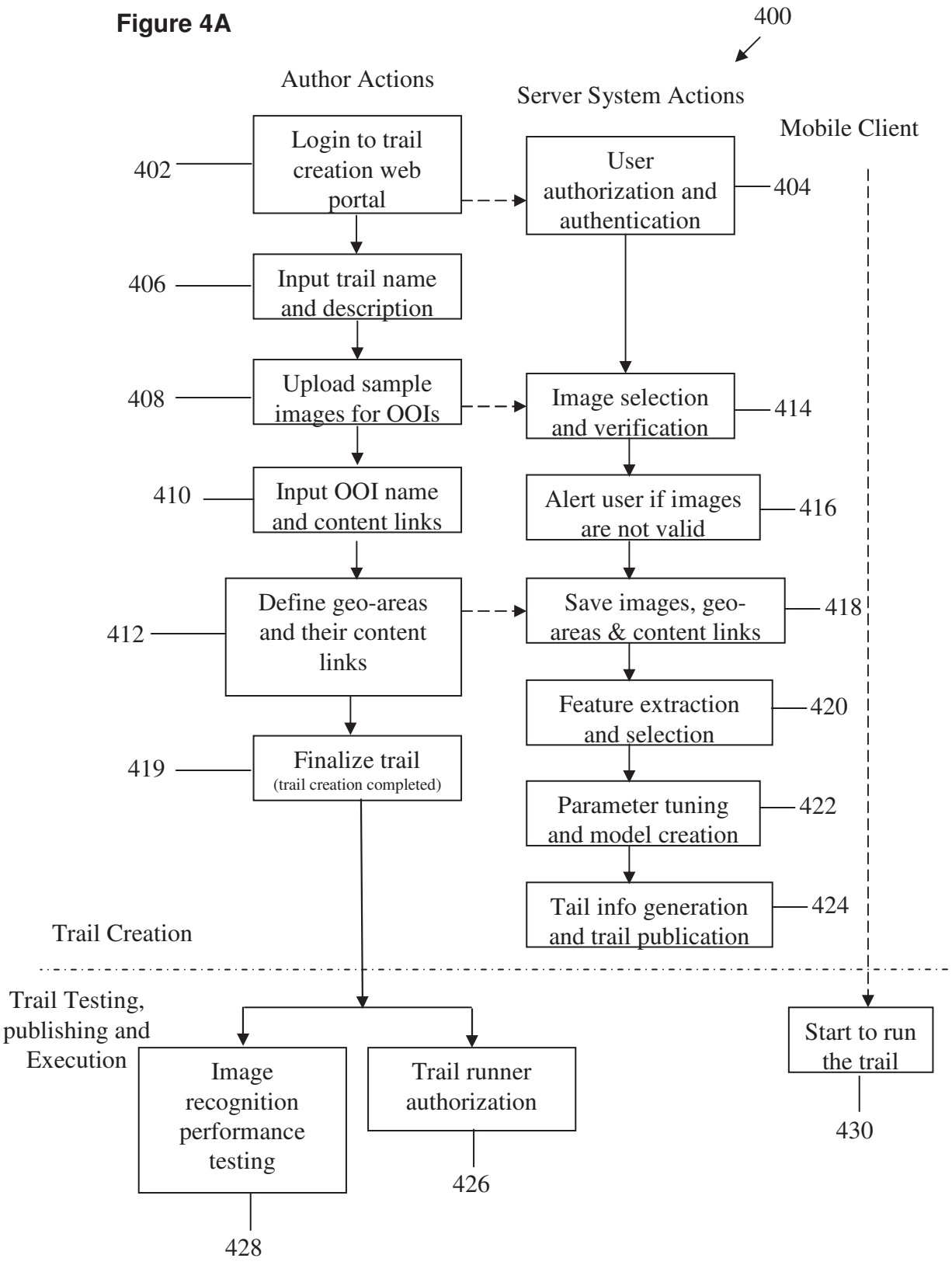

400
Author Actions
Server System Actions
Mobile Client
Login to trail creation web portal
402
User authorization and authentication
404
Input trail name and description
406
Upload sample images for OOIs
408
Image selection and verification
414
Input OOI name and content links
410
Alert user if images are not valid
416
Define geo-areas and their content links
412
Save images, geo-areas & content links
418
Feature extraction and selection
420
Finalize trail
(trail creation completed)
419
Parameter tuning and model creation
422
Tail info generation and trail publication
424
Trail Creation
Trail Testing, publishing and Execution
Image recognition performance testing
428
Trail runner authorization
426
Start to run the trail
430

Figure 4B

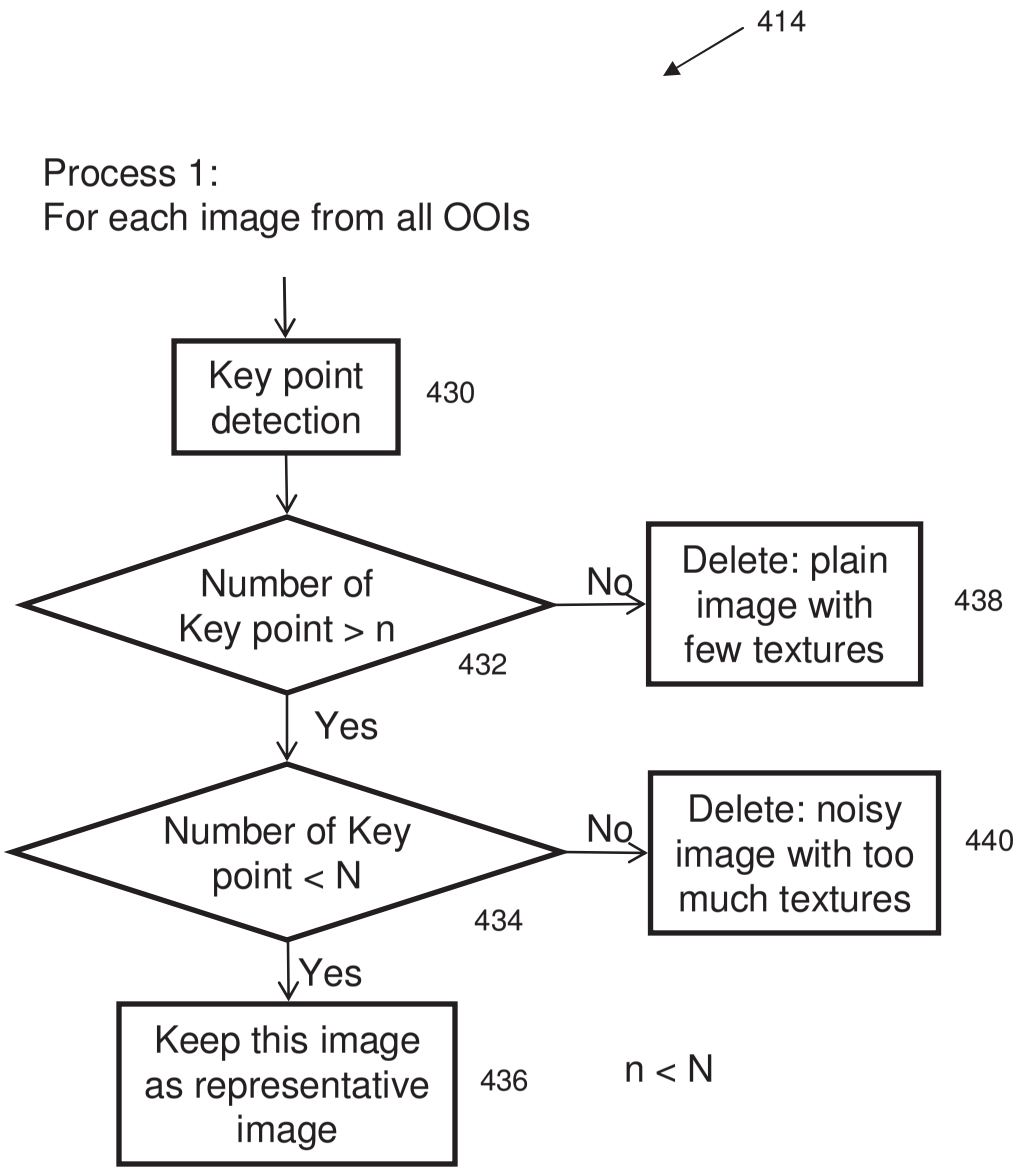

414
Process 1:
For each image from all OOIs
Key point detection
430
Number of Key point > n
432
No
Delete: plain image with few textures
438
Yes
Number of Key point < N
434
No
Delete: noisy image with too much textures
440
Yes
Keep this image as representative image
436
n < N

Figure 4C

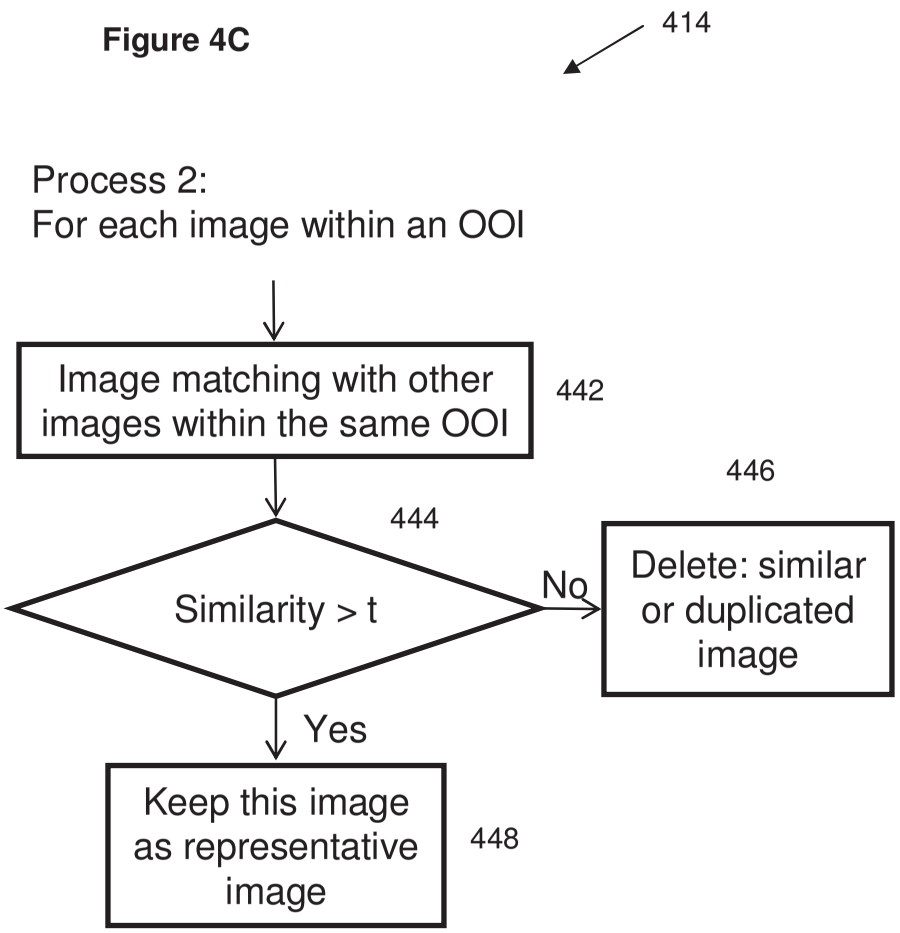
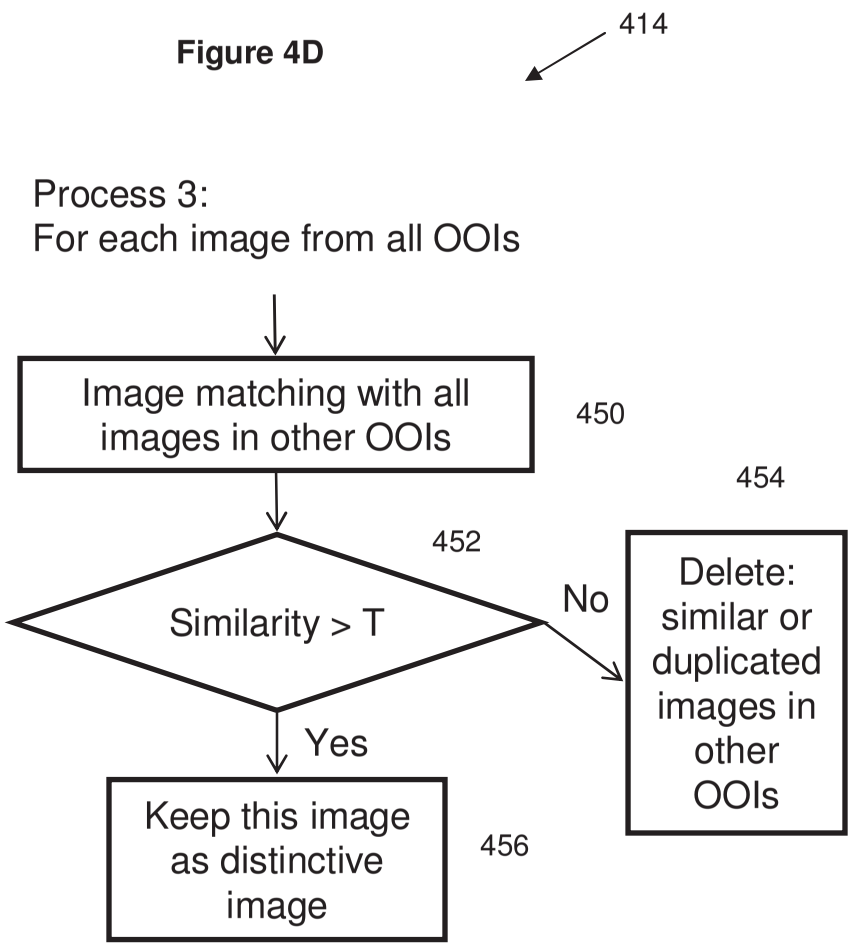


Figure 4D



$t < T$

Figure 4E

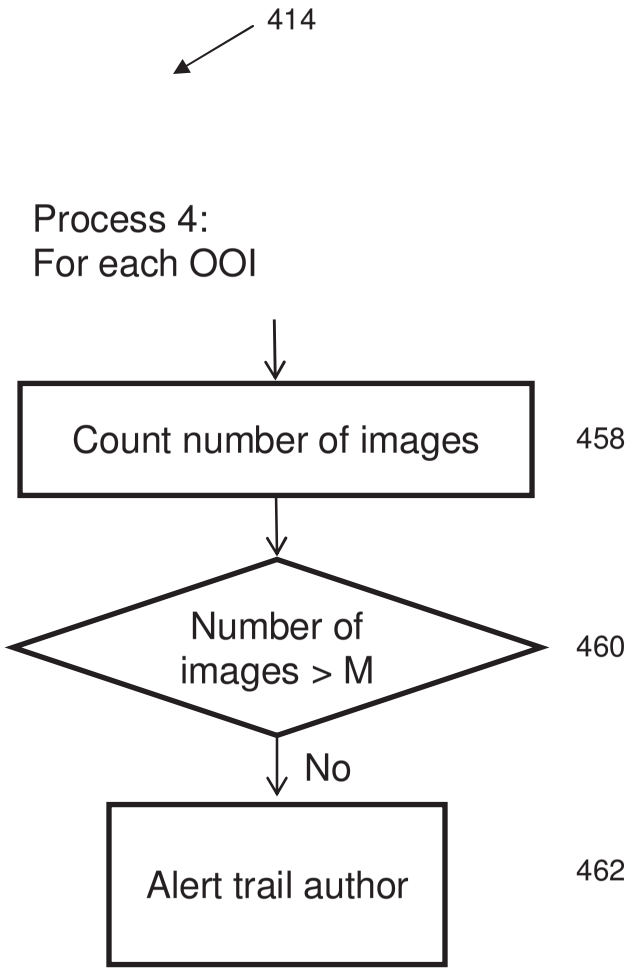

414
Process 4:
For each OOI
Count number of images
458
Number of images > M
460
No
Alert trail author
462

Figure 4F

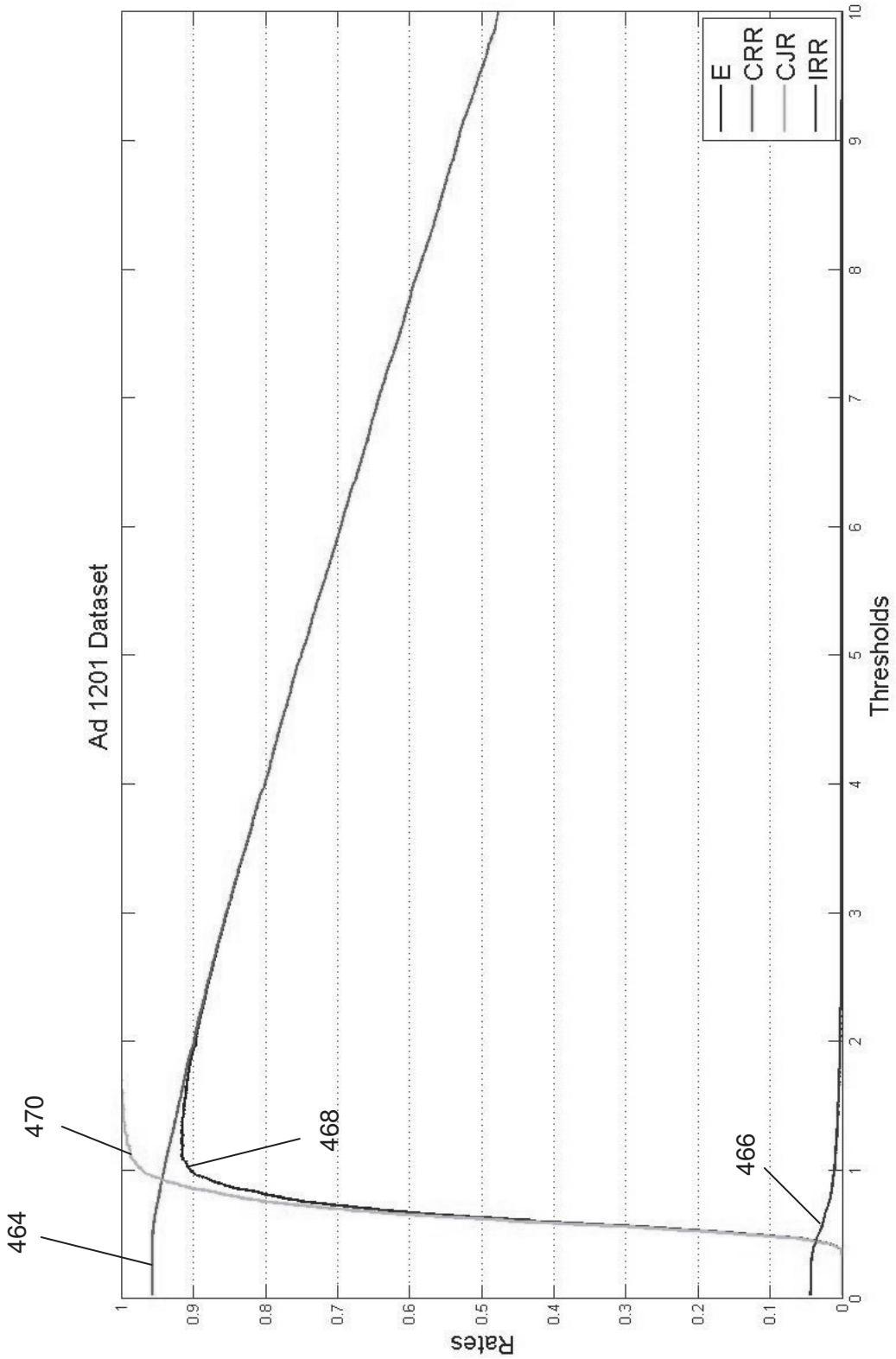

Ad 1201 Dataset
Rates
Thresholds
E
CRR
CJR
IRR
464
470
468
466
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
0
1
2
3
4
5
6
7
8
9
10

Figure 5

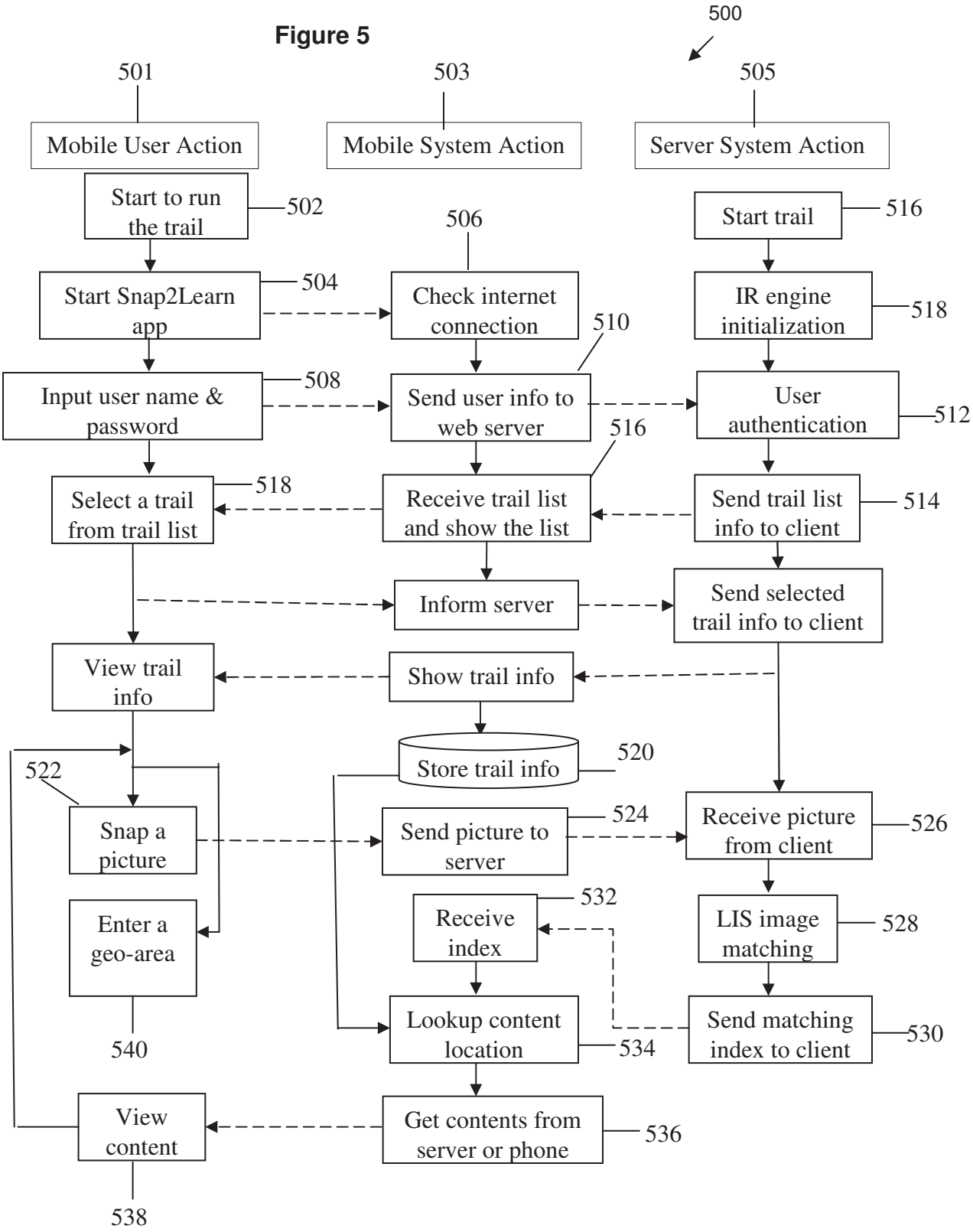

500
501
503
505
Mobile User Action
Mobile System Action
Server System Action
Start to run the trail
502
506
Start trail
516
Start Snap2Learn app
504
Check internet connection
IR engine initialization
518
510
Input user name & password
508
Send user info to web server
User authentication
512
516
Select a trail from trail list
518
Receive trail list and show the list
Send trail list info to client
514
Inform server
Send selected trail info to client
View trail info
Show trail info
Store trail info
520
522
Snap a picture
Send picture to server
524
Receive picture from client
526
Enter a geo-area
532
Receive index
LIS image matching
528
540
Lookup content location
534
Send matching index to client
530
View content
Get contents from server or phone
536
538

Figure 6

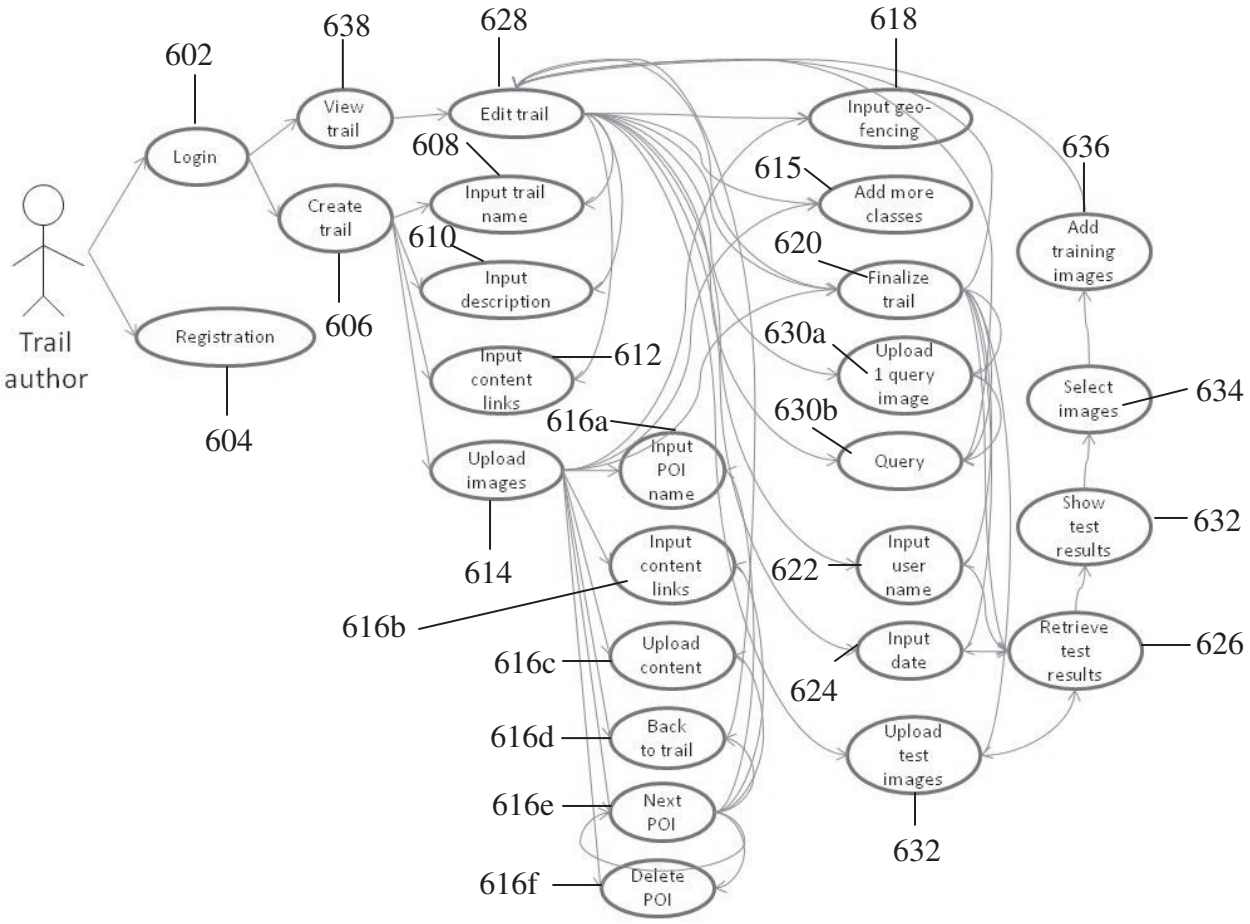

Trail author
Login
Registration
View trail
Create trail
Edit trail
Input trail name
Input description
Input content links
Upload images
Input POI name
Input content links
Upload content
Back to trail
Next POI
Delete POI
Input geo-fencing
Add more classes
Finalize trail
Upload 1 query image
Query
Input user name
Input date
Upload test images
Add training images
Select images
Show test results
Retrieve test results
602
604
606
608
610
612
614
616a
616b
616c
616d
616e
616f
618
620
622
624
626
628
630a
630b
632
634
636
638

Figure 7

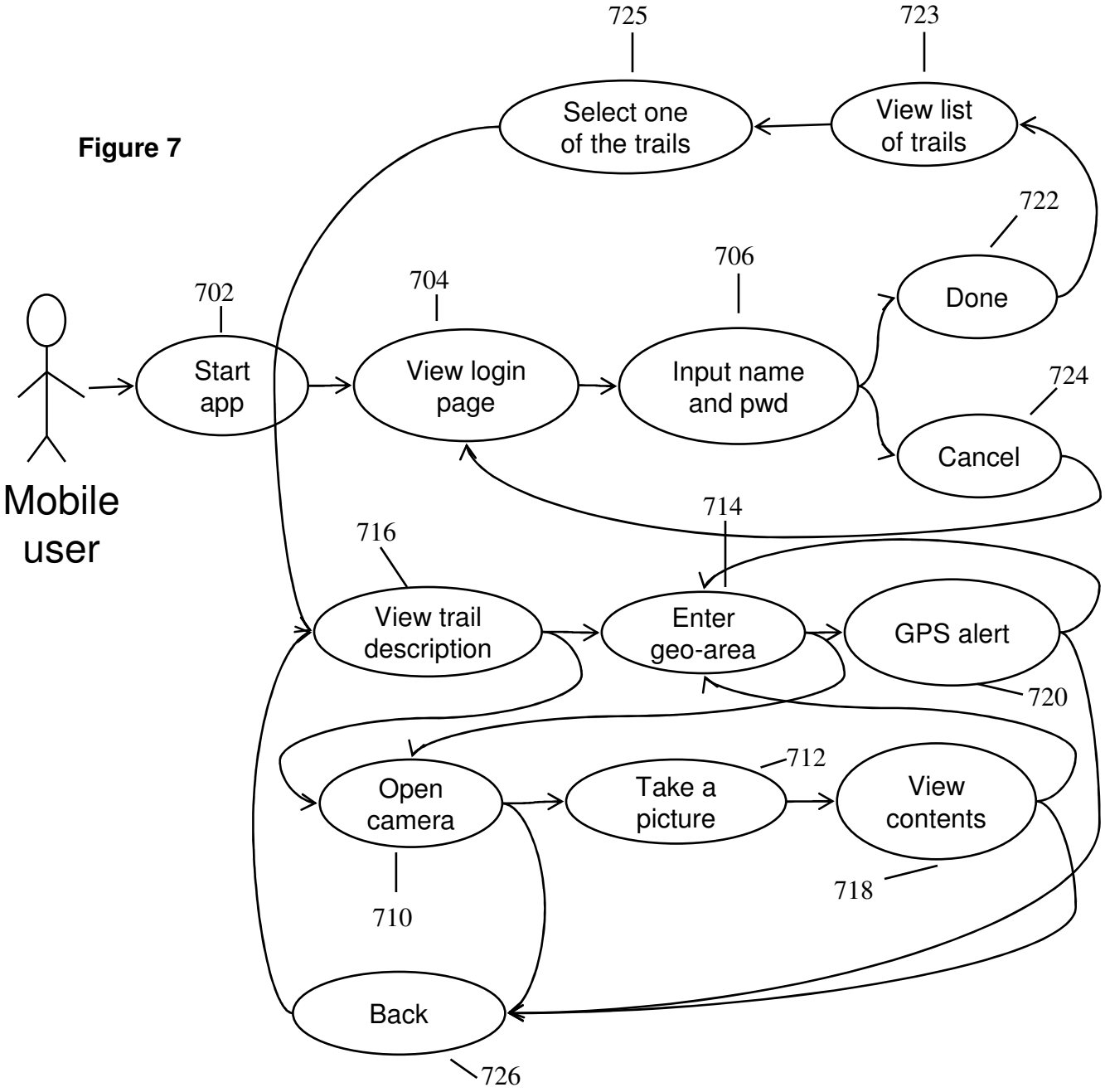

725
723
Select one of the trails
View list of trails
722
706
704
702
Done
Start app
View login page
Input name and pwd
724
Cancel
Mobile user
714
716
View trail description
Enter geo-area
GPS alert
720
712
Open camera
Take a picture
View contents
718
710
Back
726

Figure 8

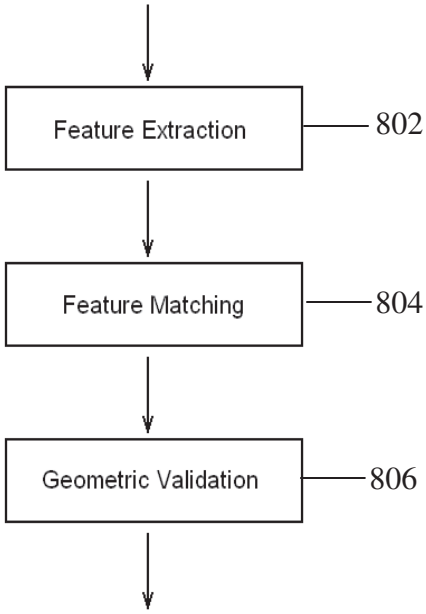

Feature Extraction
802
Feature Matching
804
Geometric Validation
806

Figure 9

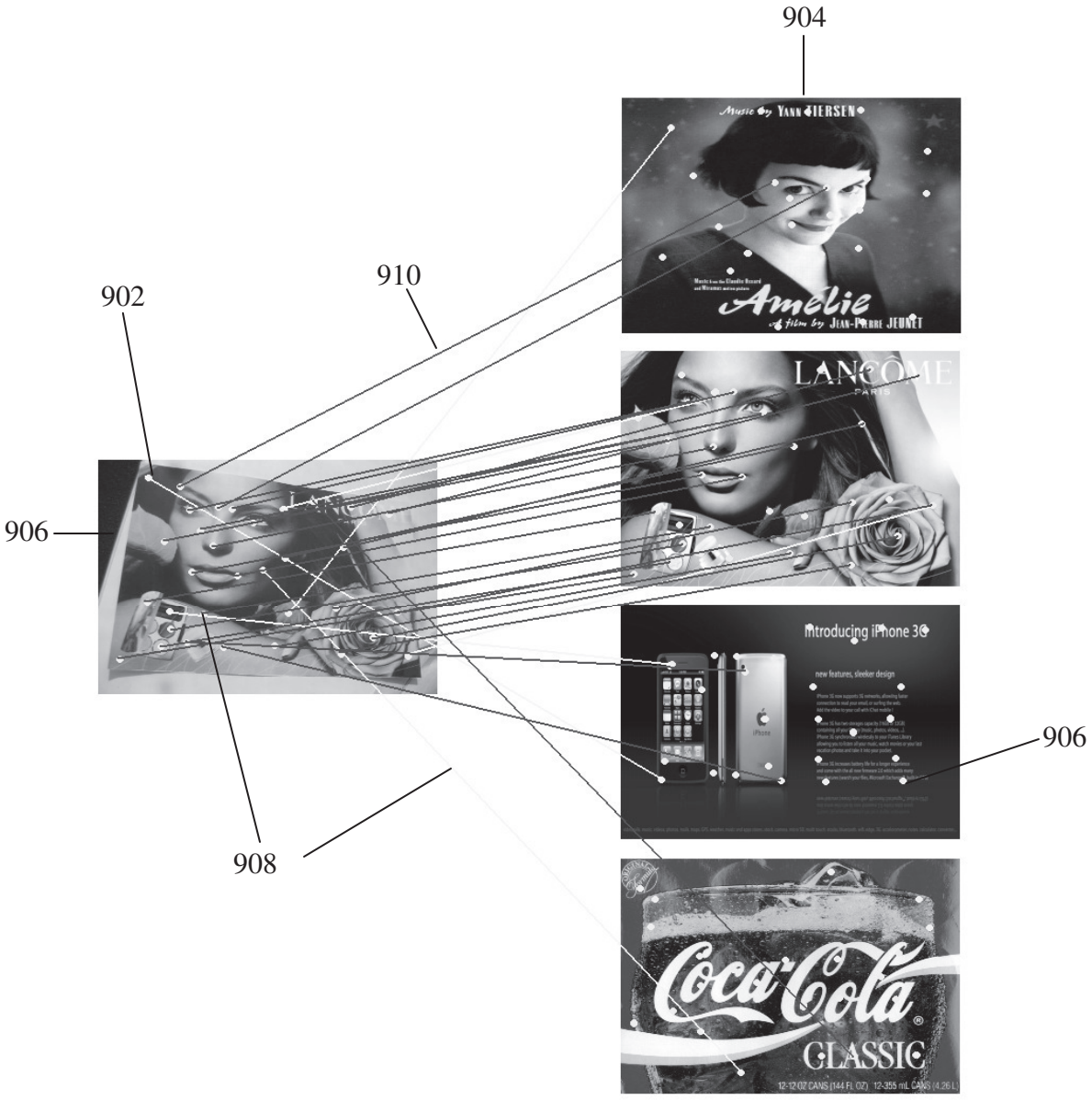

904
902
910
906
908
906
Music by YANN TIERSEN
Amélie
a film by JEAN-PIERRE JEUNET
LANCÔME
PARIS
Introducing iPhone 3G
new features, sleeker design
Coca-Cola
CLASSIC
12-12 OZ CANS (144 FL OZ) 12-355 mL CANS (4.26 L)

Figure 10A

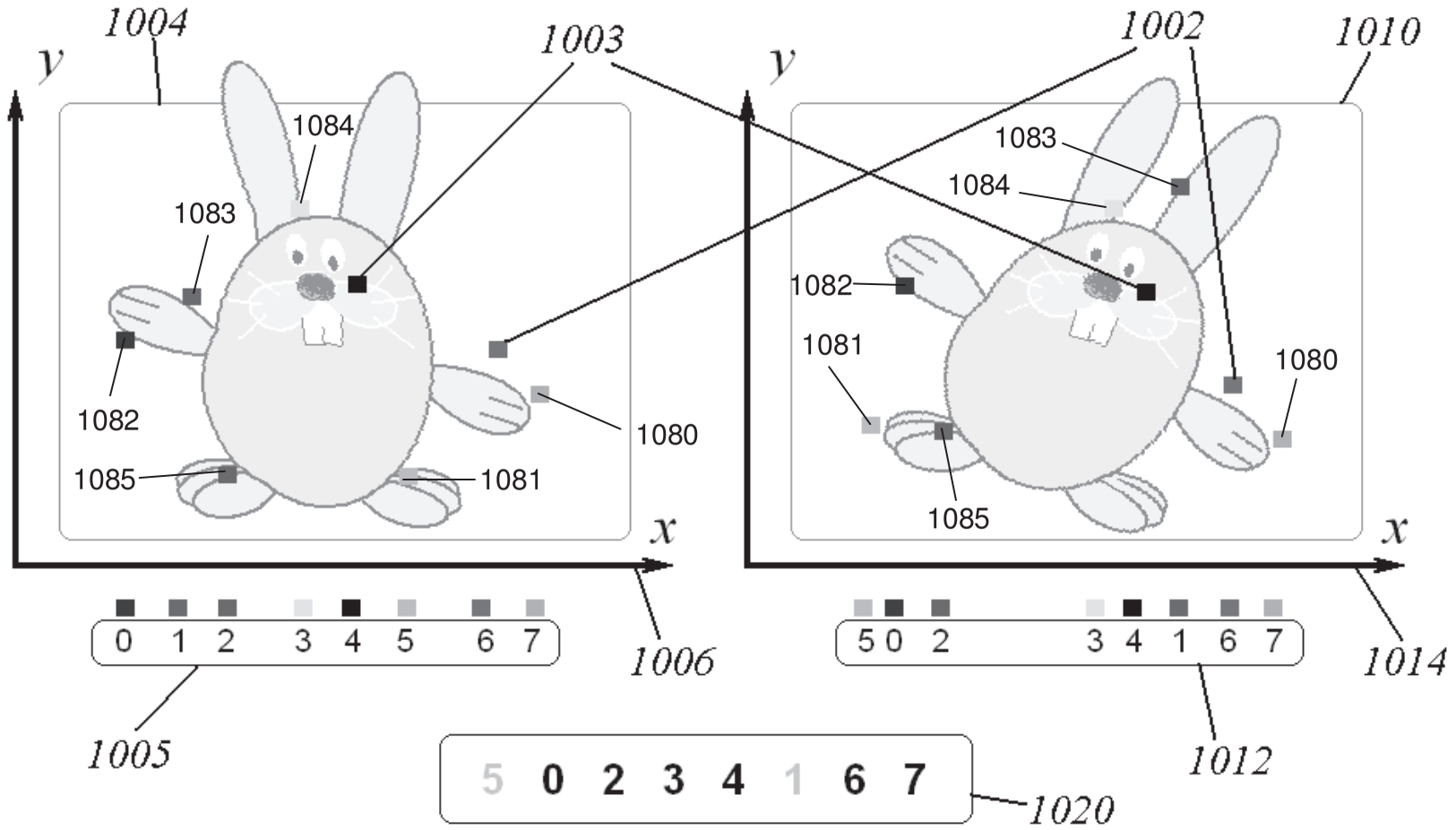

1004
1003
1002
1010
y
x
1084
1083
1082
1085
1081
1080
0 1 2 3 4 5 6 7
1005
1006
5 0 2 3 4 1 6 7
1012
1014
5 0 2 3 4 1 6 7
1020

Figure 10B

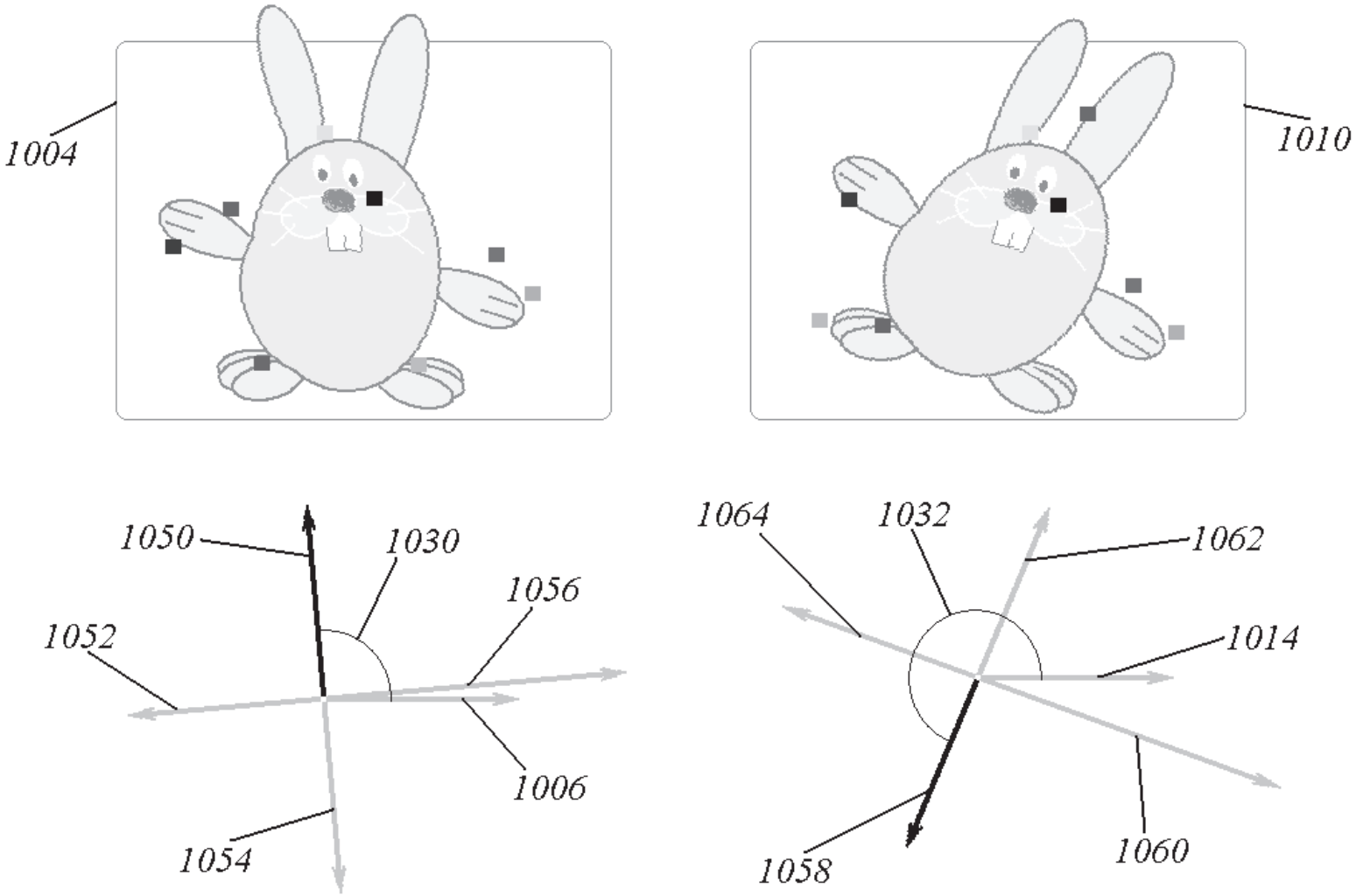

1004
1010
1050
1030
1056
1052
1006
1054
1064
1032
1062
1014
1060
1058

Figure 11

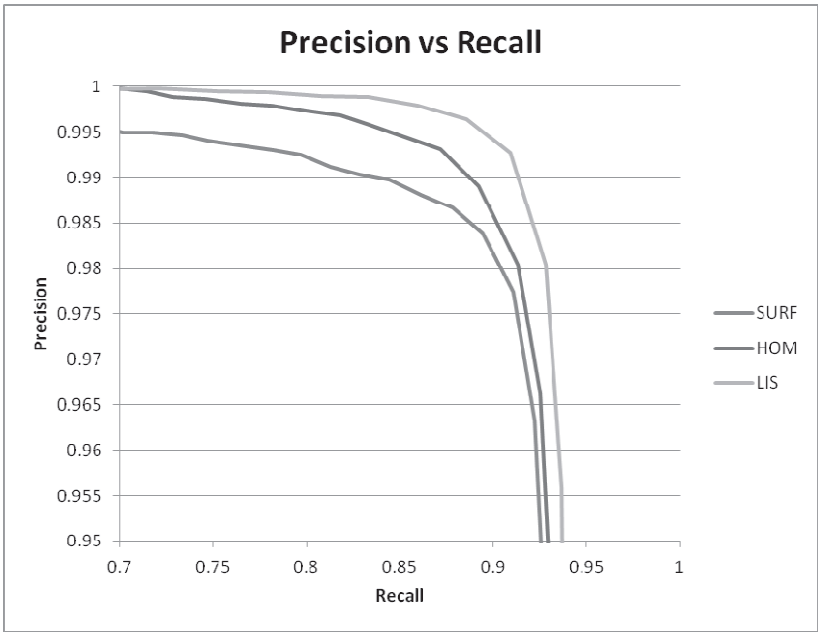


Figure 12

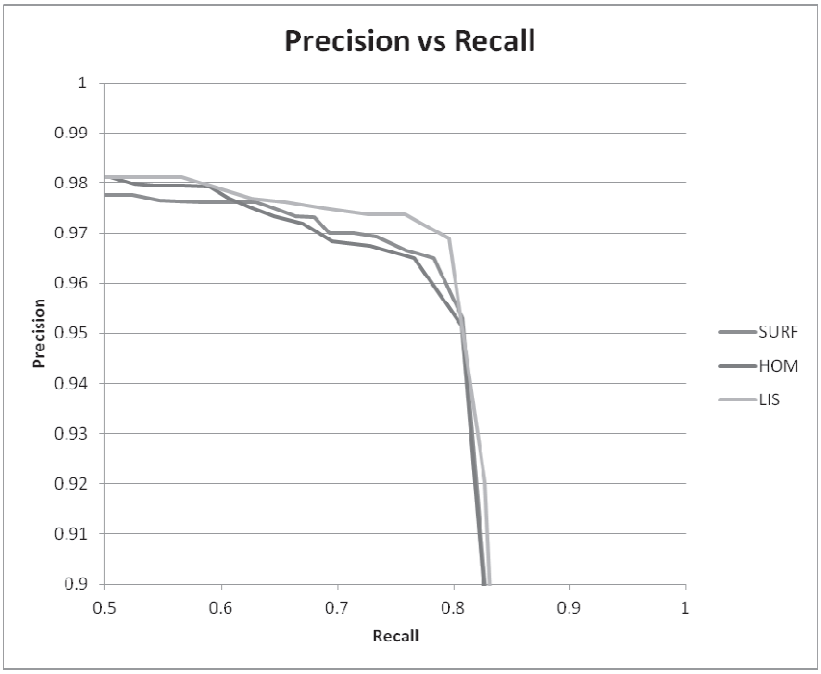


Figure 13

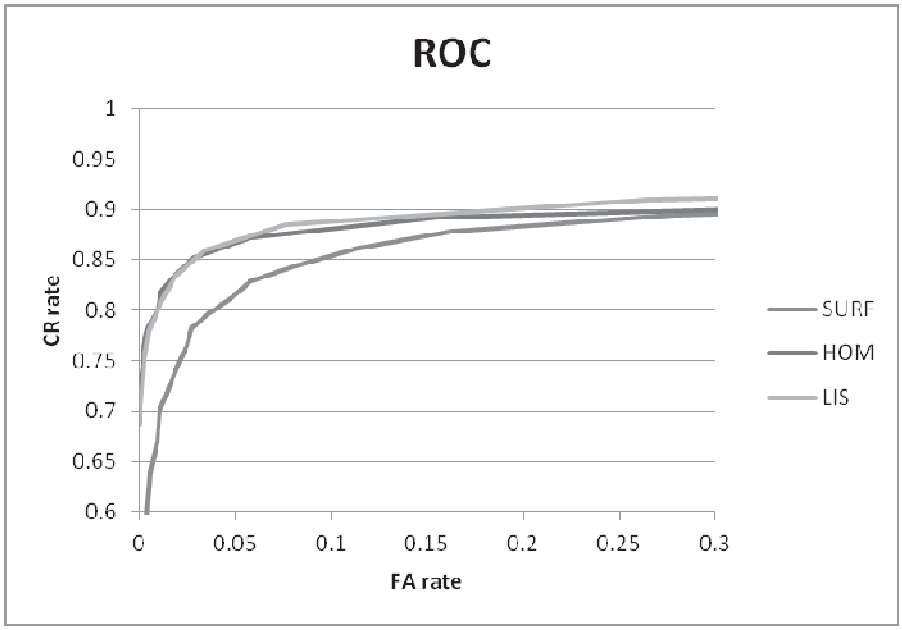


Figure 14

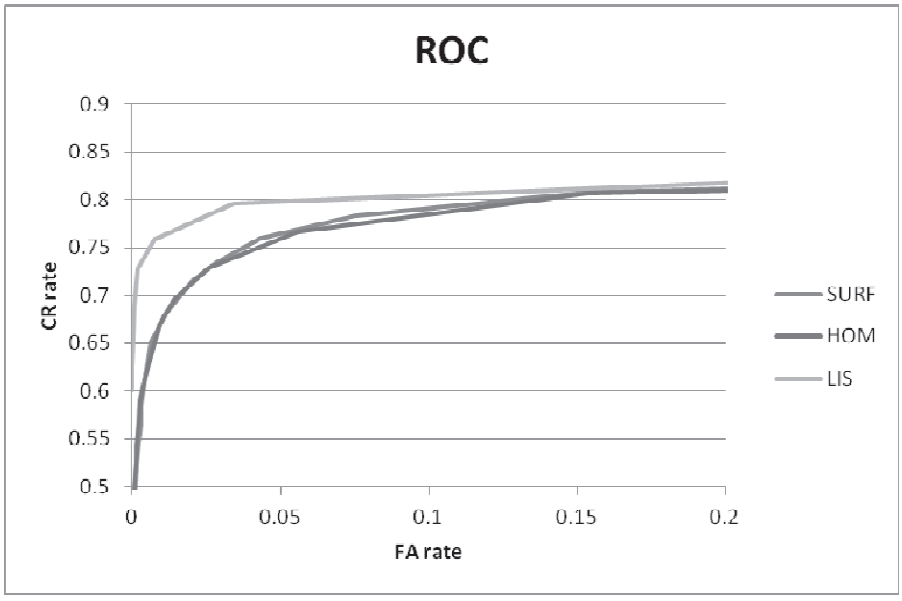
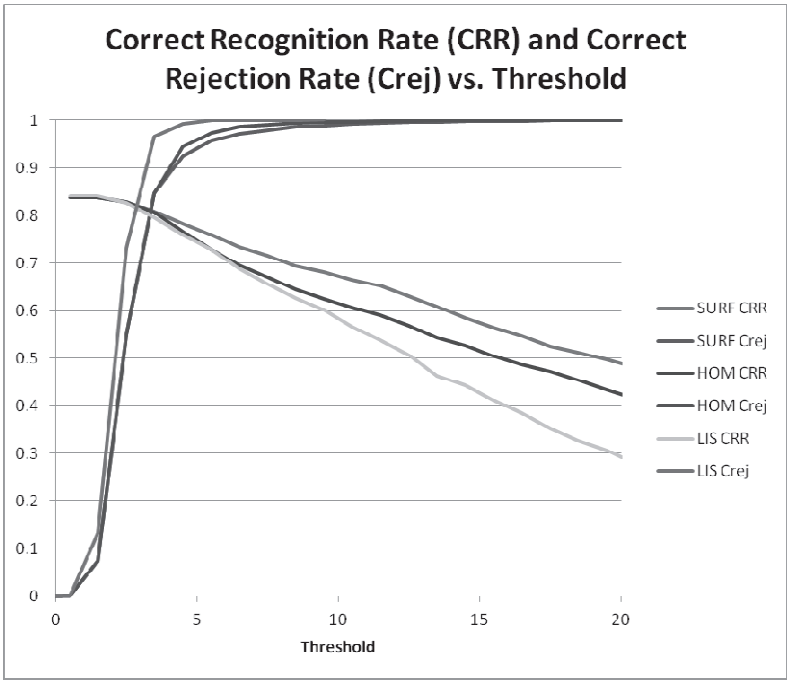


Figure 15


Correct Recognition Rate (CRR) and Correct Rejection Rate (Crej) vs. Threshold
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
5
10
15
20
Threshold
SURF CRR
SURF Crej
HOM CRR
HOM Crej
LIS CRR
LIS Crej