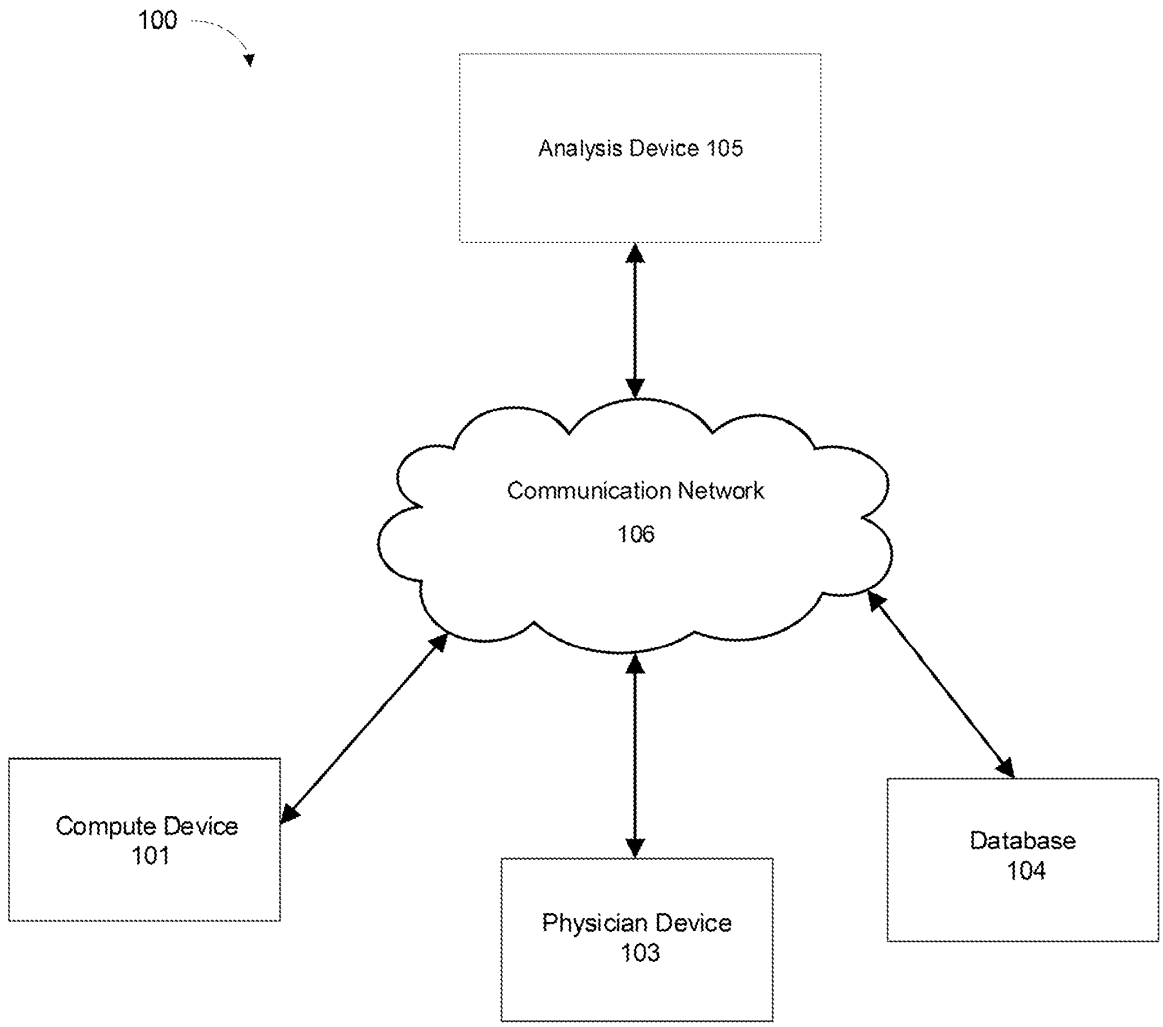

100
Analysis Device 105
Communication Network
106
Compute Device
101
Physician Device
103
Database
104

FIG. 1

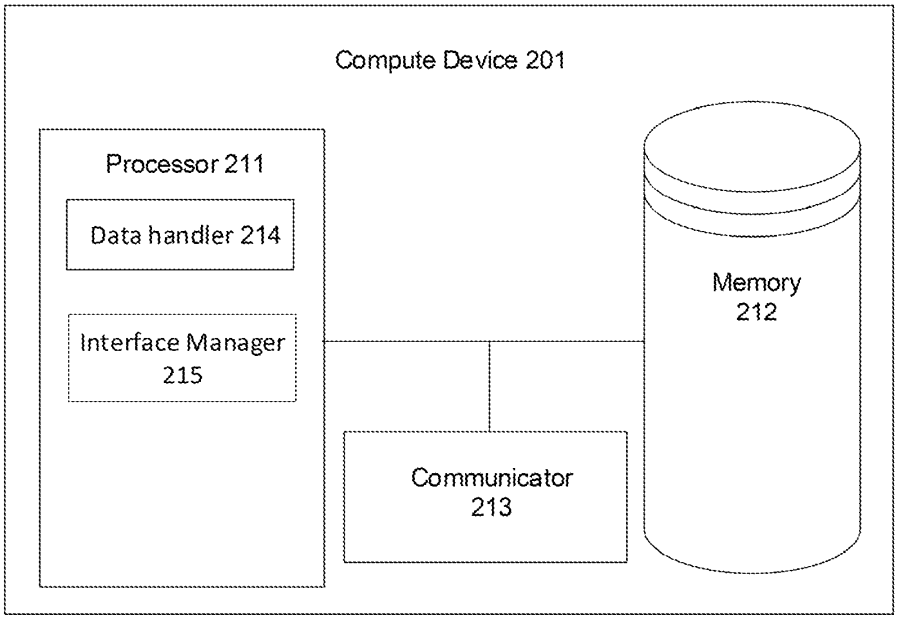

Compute Device 201
Processor 211
Data handler 214
Interface Manager 215
Communicator 213
Memory 212

FIG. 2

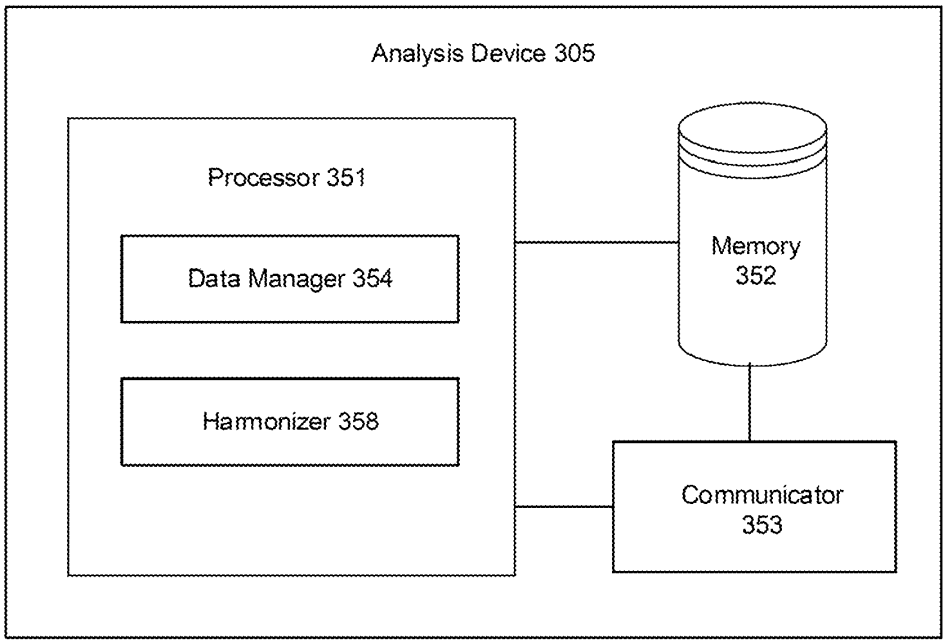

Analysis Device 305
Processor 351
Data Manager 354
Harmonizer 358
Memory
352
Communicator
353

FIG. 3

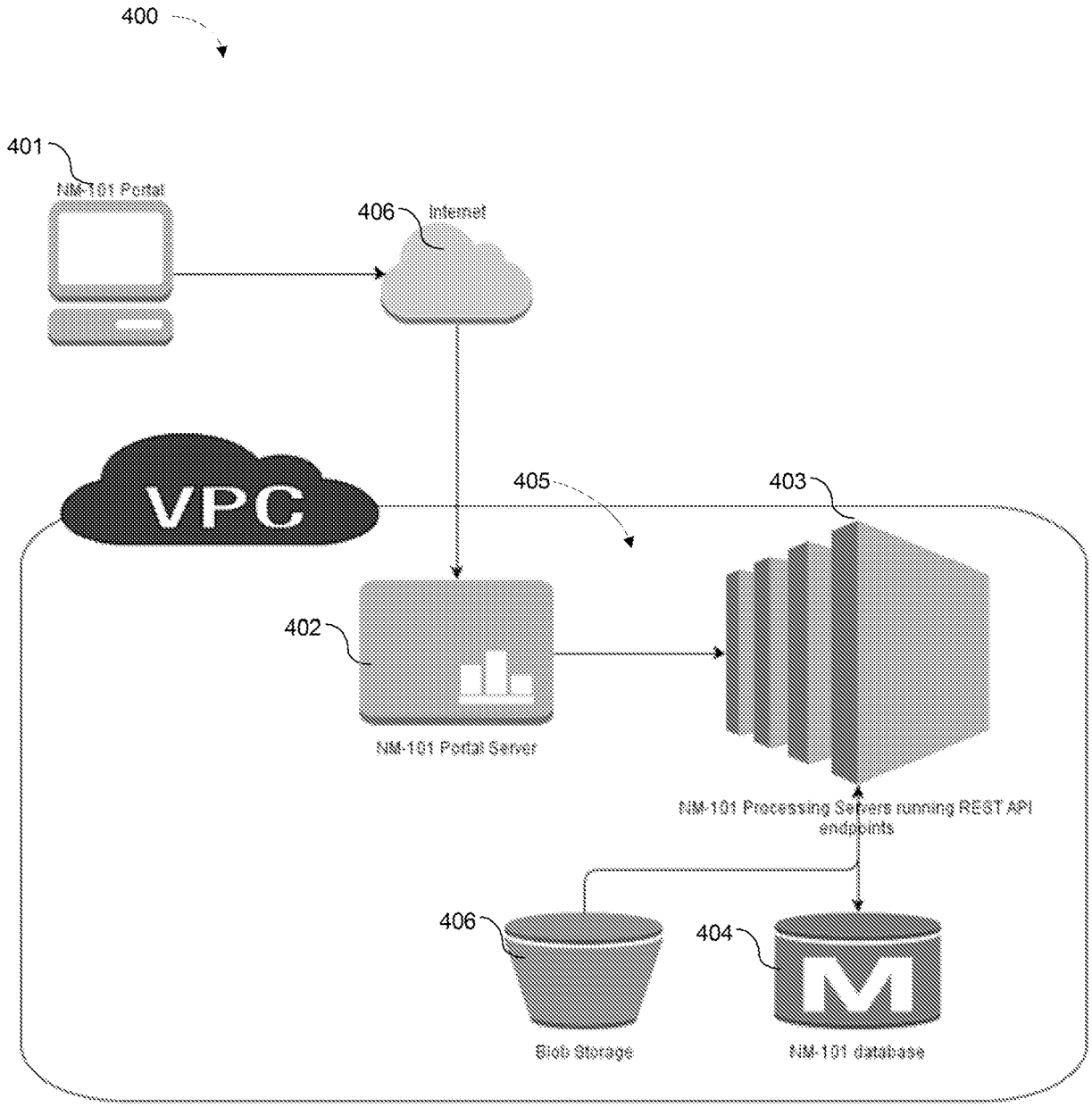

400
401
NM-101 Portal
406
Internet
VPC
405
403
402
NM-101 Portal Server
NM-101 Processing Servers running REST API endpoints
406
Blob Storage
404
NM-101 database

FIG. 4

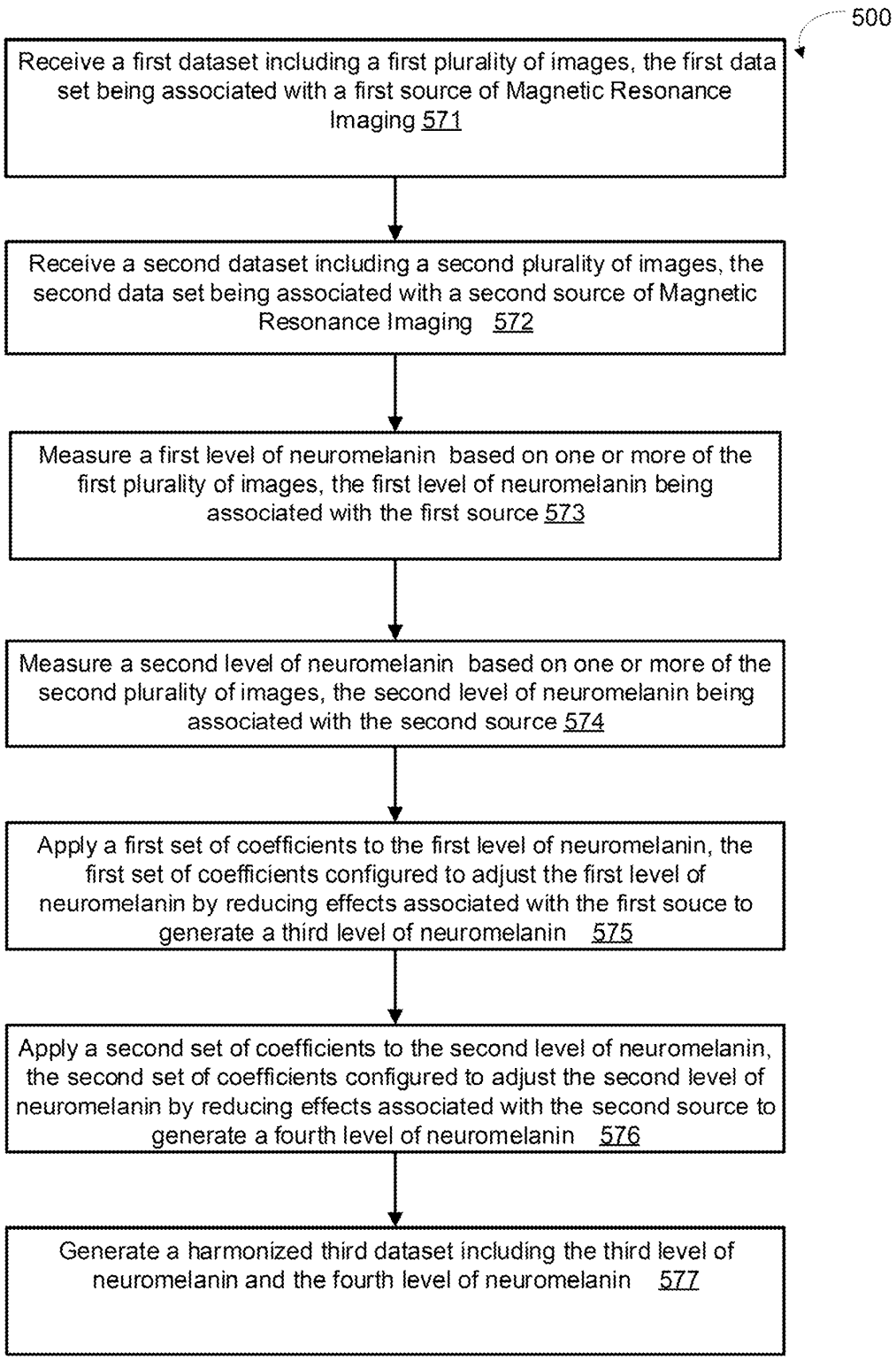

500
Receive a first dataset including a first plurality of images, the first data set being associated with a first source of Magnetic Resonance Imaging 571
Receive a second dataset including a second plurality of images, the second data set being associated with a second source of Magnetic Resonance Imaging 572
Measure a first level of neuromelanin based on one or more of the first plurality of images, the first level of neuromelanin being associated with the first source 573
Measure a second level of neuromelanin based on one or more of the second plurality of images, the second level of neuromelanin being associated with the second source 574
Apply a first set of coefficients to the first level of neuromelanin, the first set of coefficients configured to adjust the first level of neuromelanin by reducing effects associated with the first souce to generate a third level of neuromelanin 575
Apply a second set of coefficients to the second level of neuromelanin, the second set of coefficients configured to adjust the second level of neuromelanin by reducing effects associated with the second source to generate a fourth level of neuromelanin 576
Generate a harmonized third dataset including the third level of neuromelanin and the fourth level of neuromelanin 577

FIG. 5

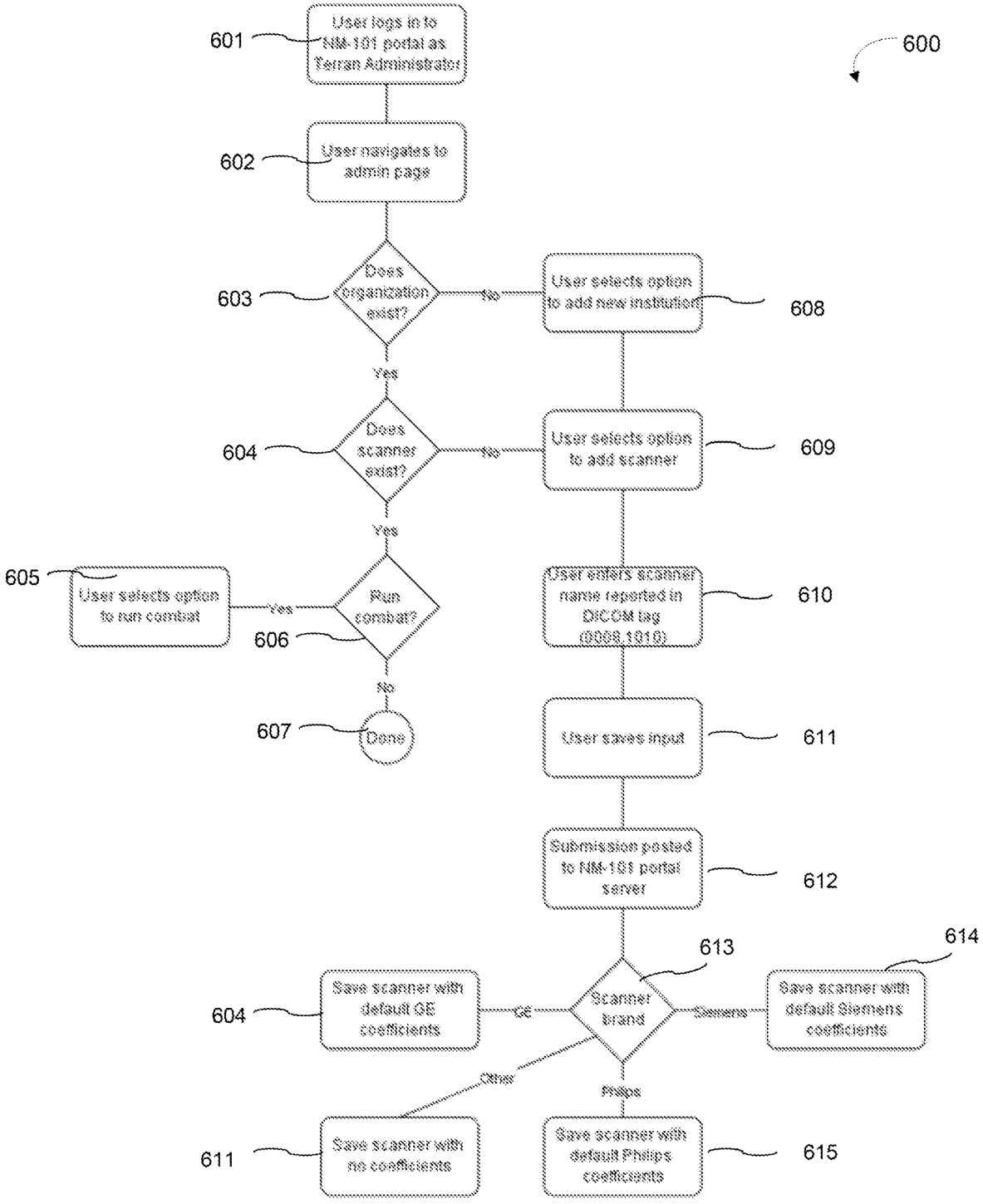

600
601
User logs in to NM-101 portal as Terran Administrator
602
User navigates to admin page
603
Does organization exist?
No
608
User selects option to add new institution
Yes
604
Does scanner exist?
No
609
User selects option to add scanner
Yes
605
User selects option to run combat
Yes
606
Run combat?
No
607
Done
610
User enters scanner name reported in DICOM tag (0008,1010)
611
User saves input
612
Submission posted to NM-101 portal server
613
614
604
Save scanner with default GE coefficients
GE
Scanner Brand
Siemens
Save scanner with default Siemens coefficients
Other
Philips
611
Save scanner with no coefficients
Save scanner with default Philips coefficients
615

FIG. 6

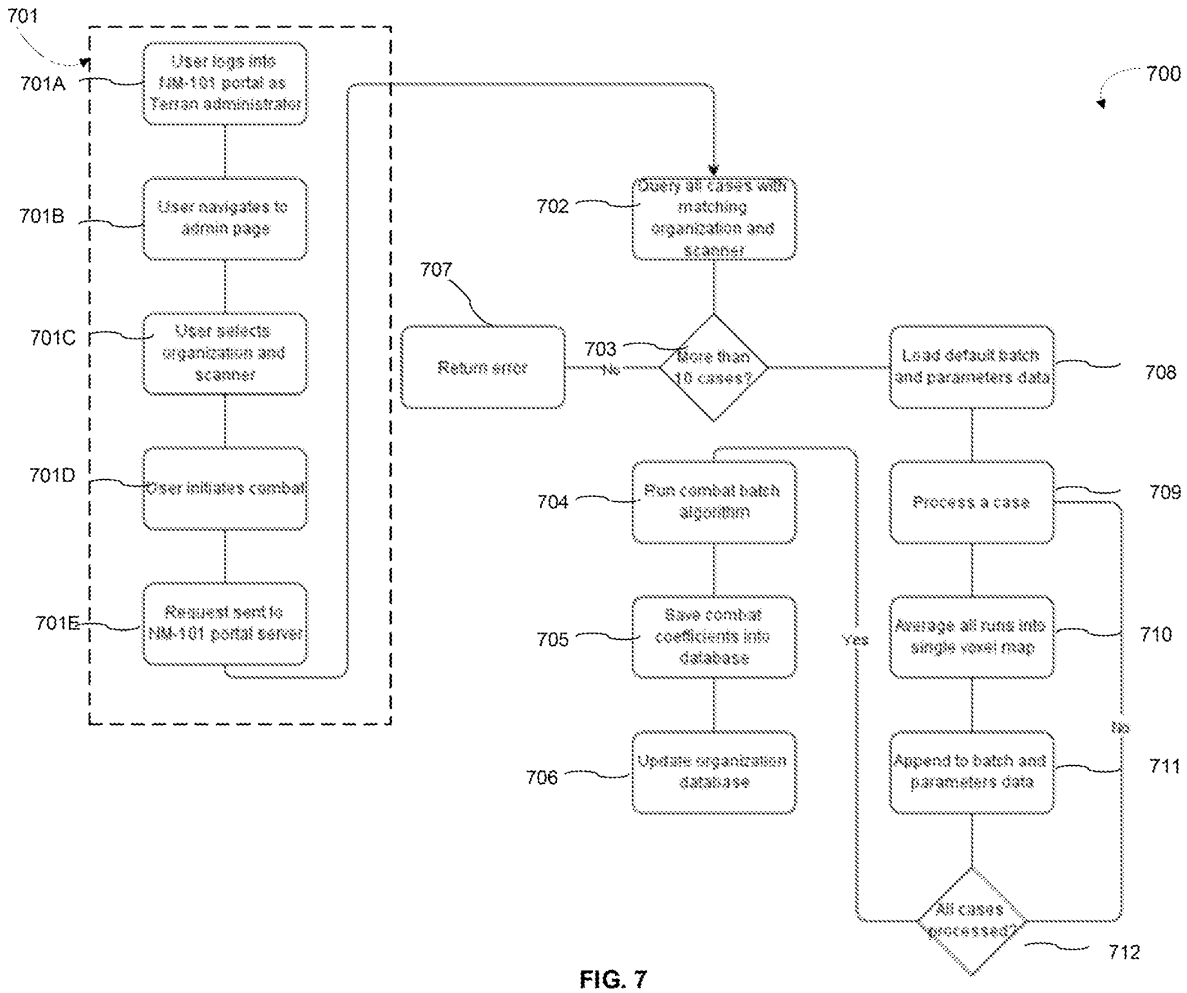

701
701A
User logs into NM-101 portal as Tenant administrator
701B
User navigates to admin page
701C
User selects organization and scanner
701D
User initiates combat
701E
Request sent to NM-101 portal server
700
702
Query all cases with matching organization and scanner
707
Return error
703
No
More than 10 cases?
708
Load default batch and parameters data
704
Run combat batch algorithm
709
Process a case
705
Save combat coefficients into database
Yes
710
Average all runs into single voxel map
706
Update organization database
No
711
Append to batch and parameters data
All cases processed?
712

FIG. 7

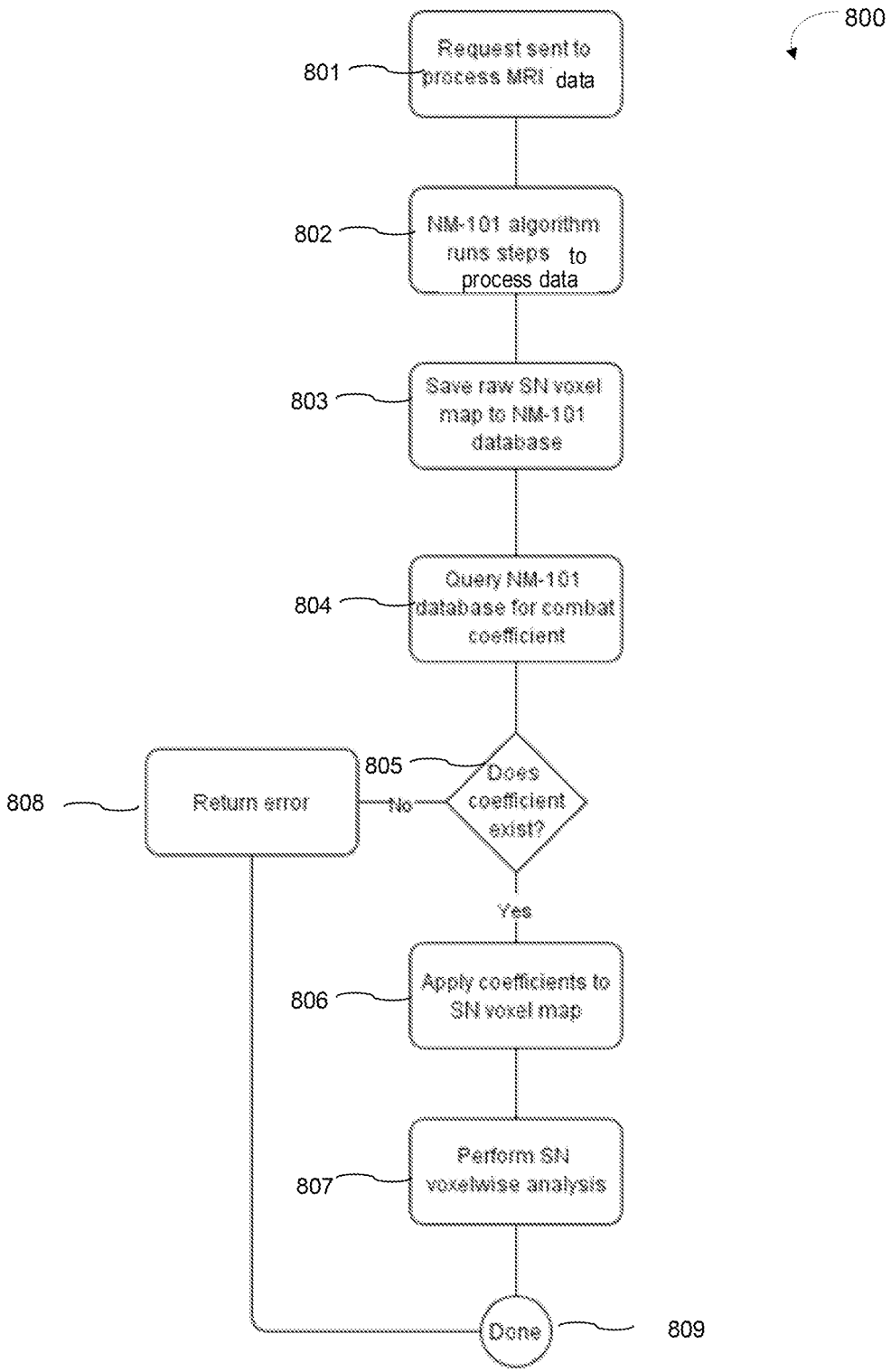

800
801
Request sent to process MRI data
802
NM-101 algorithm runs steps to process data
803
Save raw SN voxel map to NM-101 database
804
Query NM-101 database for combat coefficient
805
Does coefficient exist?
No
808
Return error
Yes
806
Apply coefficients to SN voxel map
807
Perform SN voxelwise analysis
Done
809

FIG. 8

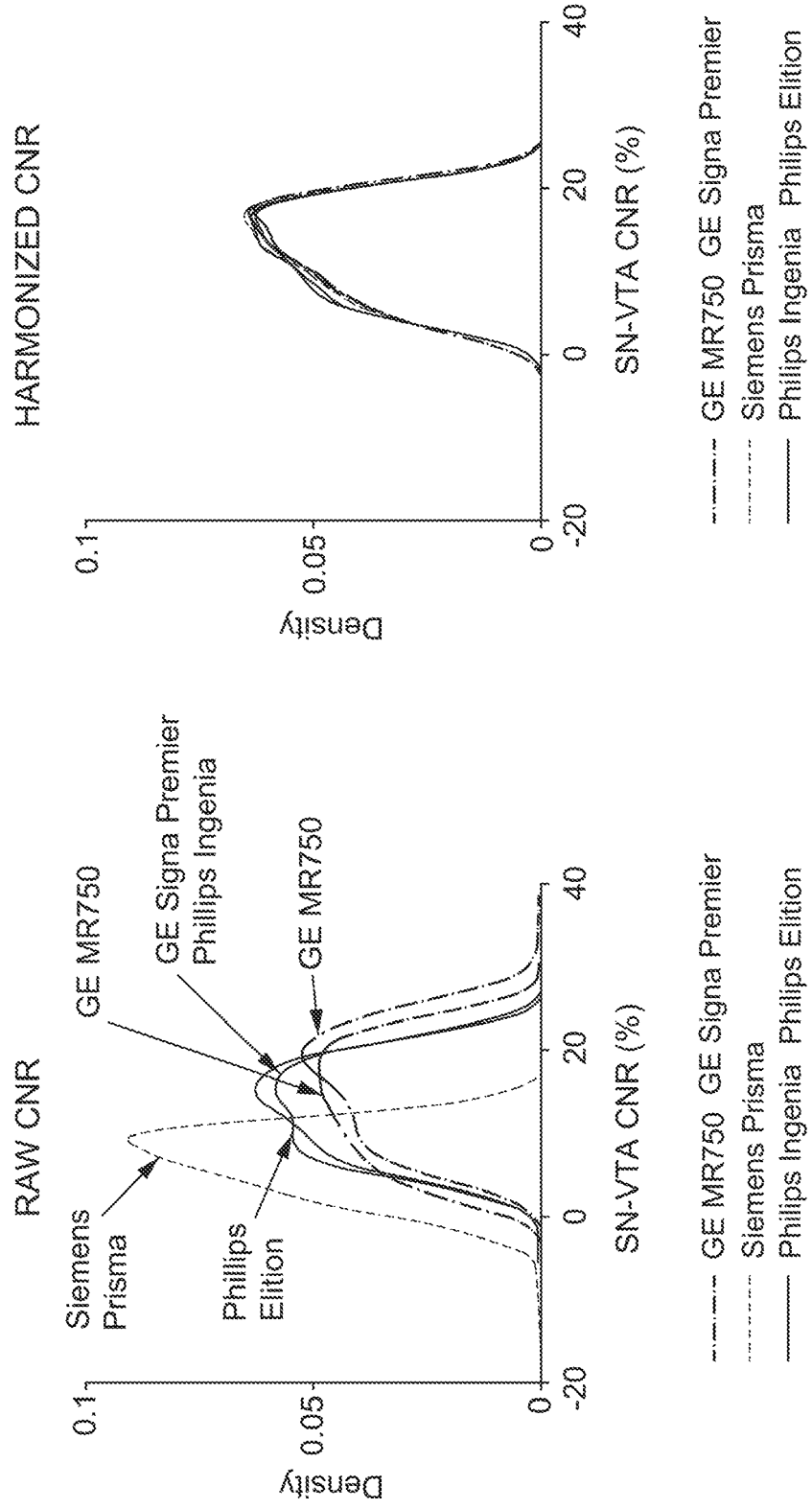

RAW CNR
GE MR750
GE Signa Premier
Phillips Ingenia
GE MR750
Siemens
Prisma
Phillips
Elition
Density
0.1
0.05
0
-20
0
20
40
SN-VTA CNR (%)
GE MR750 GE Signa Premier
Siemens Prisma
Philips Ingenia Philips Elition
HARMONIZED CNR
Density
0.1
0.05
0
-20
0
20
40
SN-VTA CNR (%)
GE MR750 GE Signa Premier
Siemens Prisma
Philips Ingenia Philips Elition

FIG. 9A

FIG. 9B

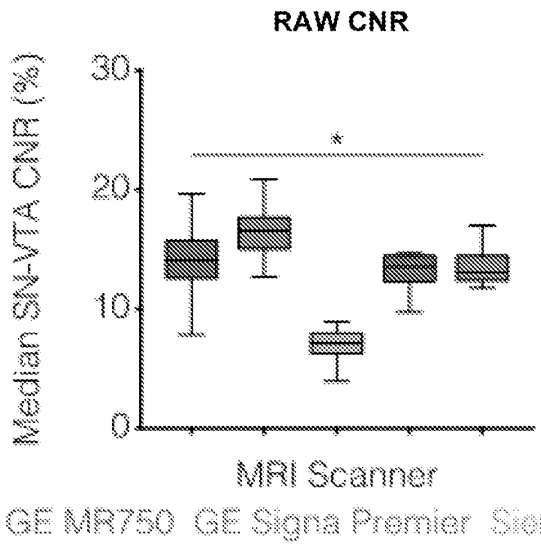



FIG. 10A

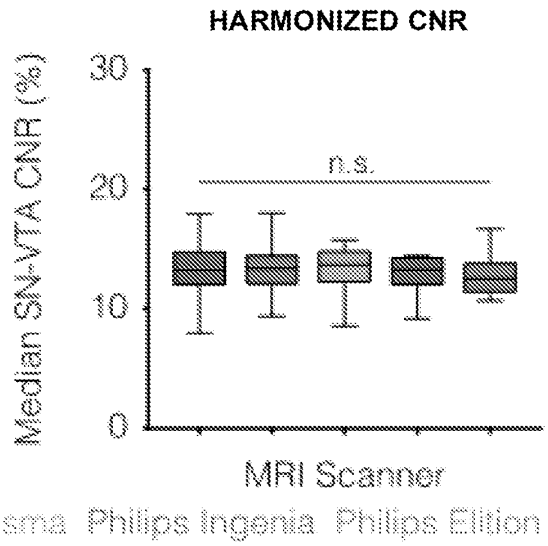



FIG. 10B

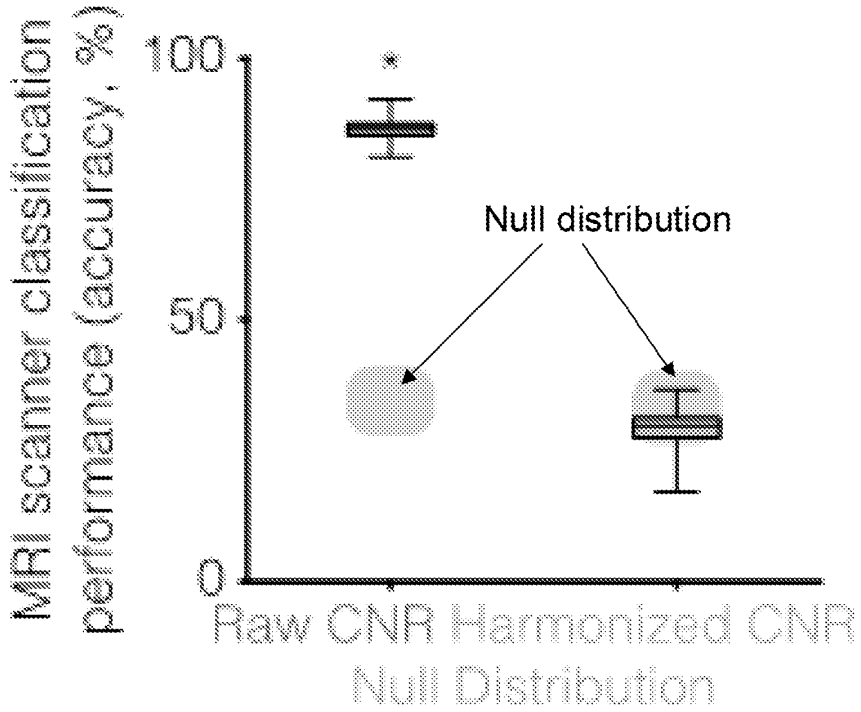

MRI scanner classification performance (accuracy, %)
100
50
0
Null distribution
Raw CNR
Harmonized CNR
Null Distribution

FIG. 11

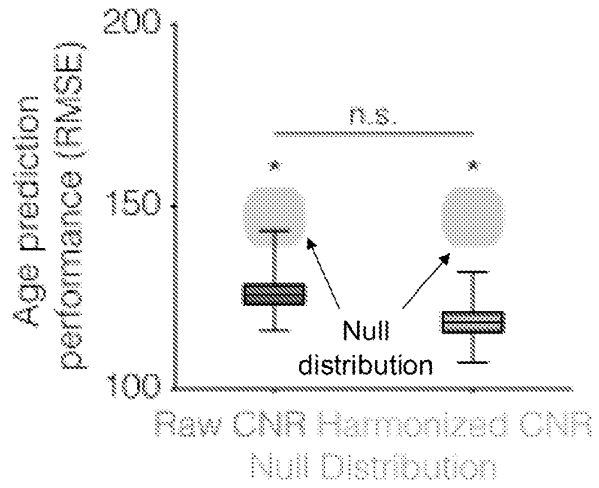



FIG. 12A

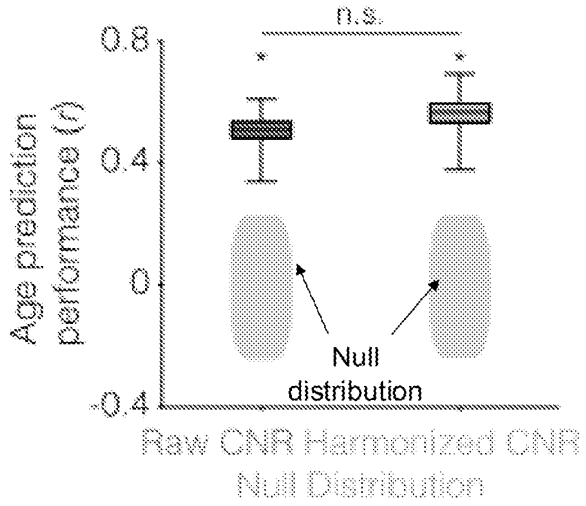
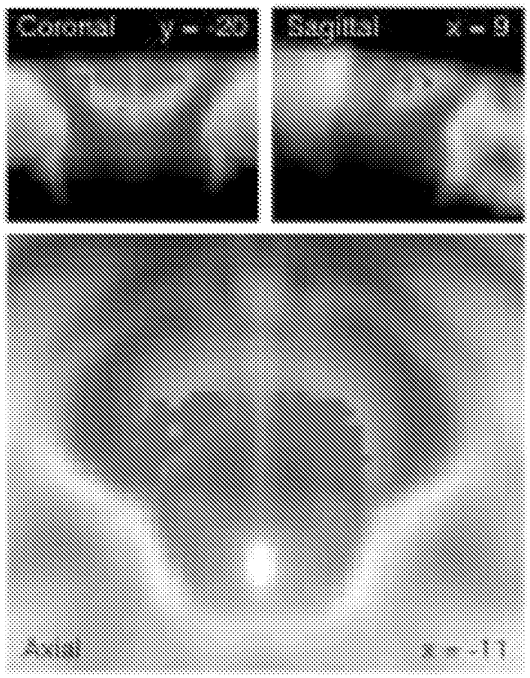



FIG. 12B

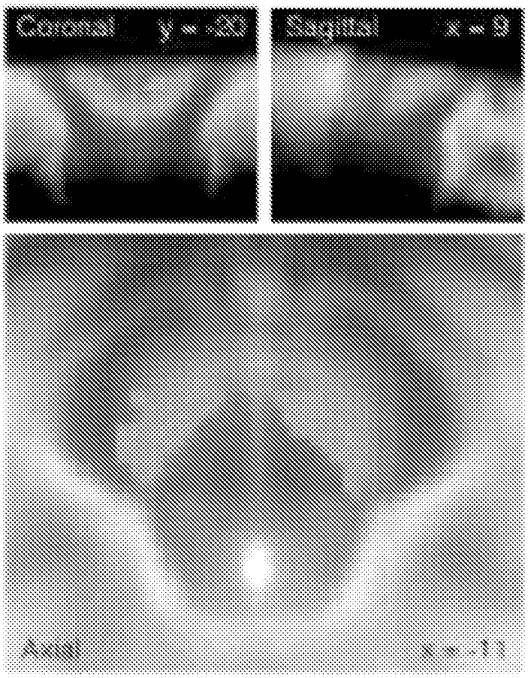
RAW CNR




Age voxels, $p_{corrected}$ = 0.072

FIG. 13A

HARMONIZED CNR




Age voxels, $p_{corrected}$ = 0.042

FIG. 13B

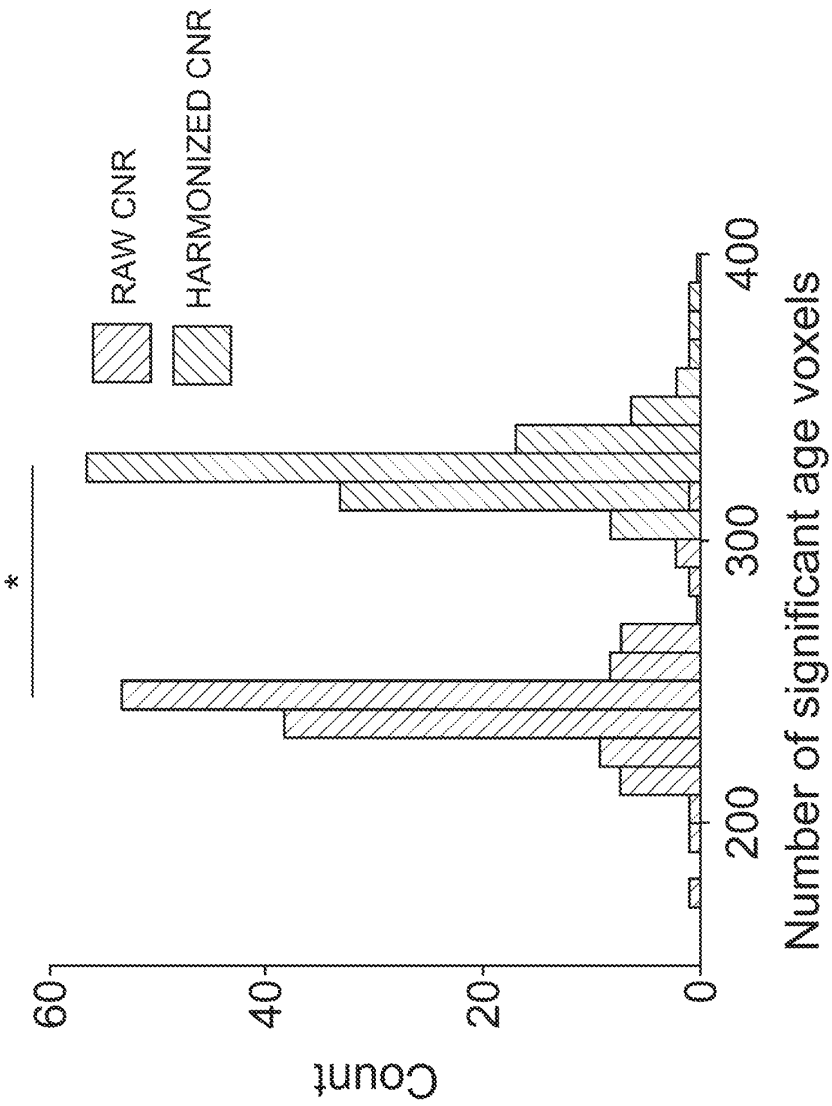

RAW CNR
HARMONIZED CNR
*
Count
0
20
40
60
200
300
400
Number of significant age voxels

FIG. 14

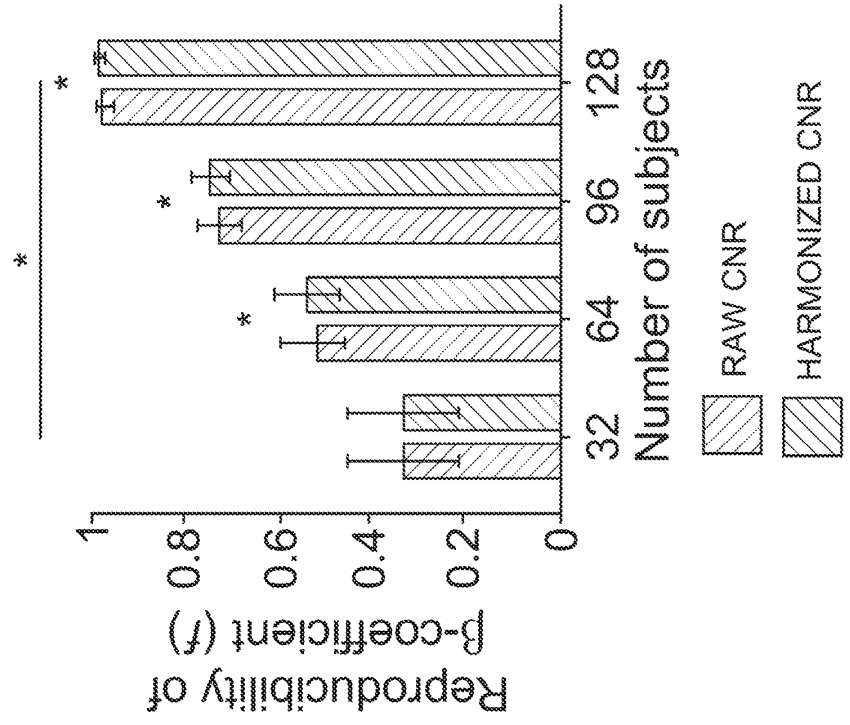



FIG. 15A

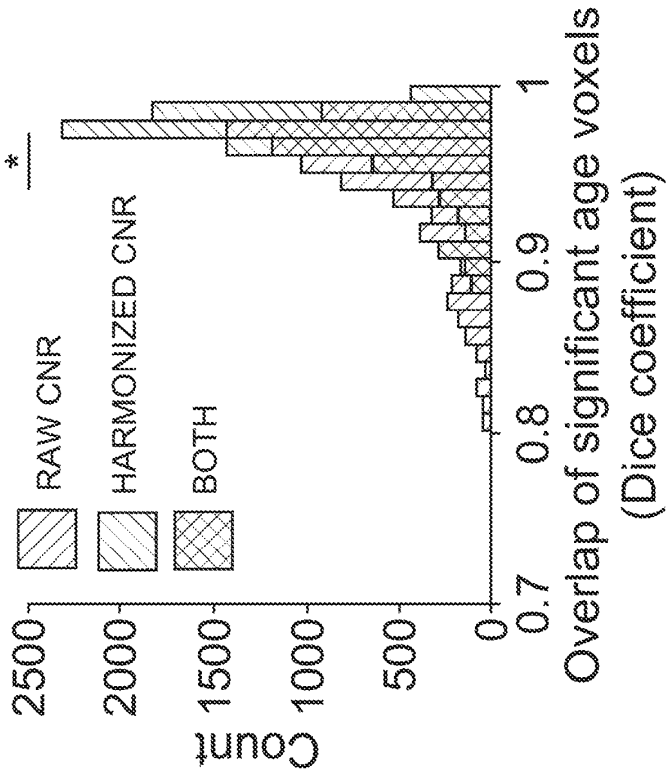



FIG. 15B

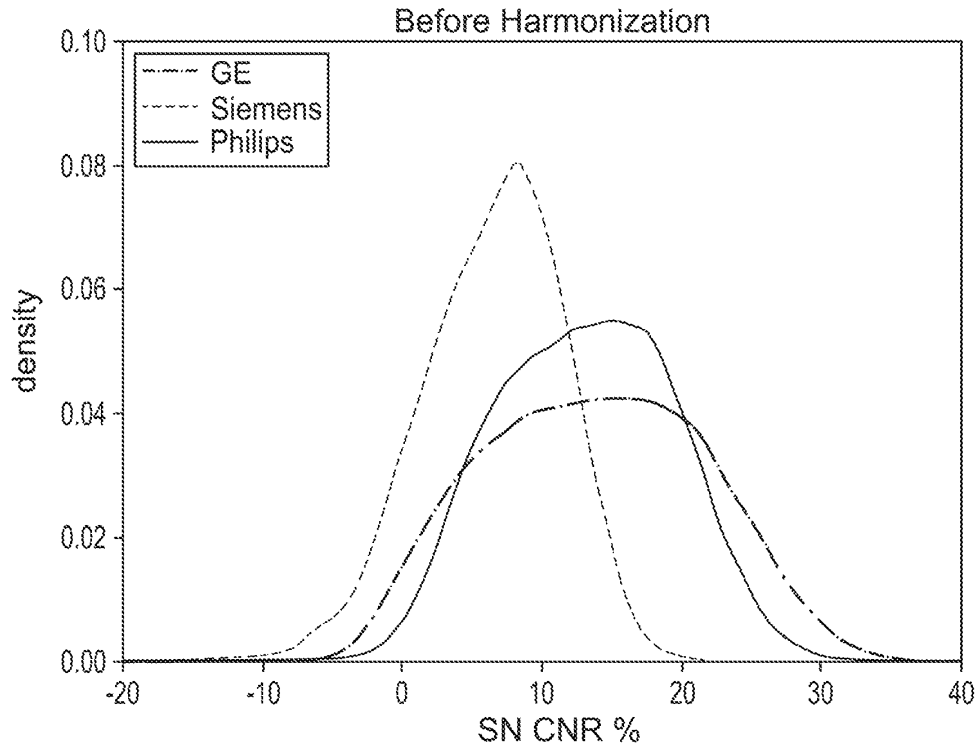



FIG. 16A

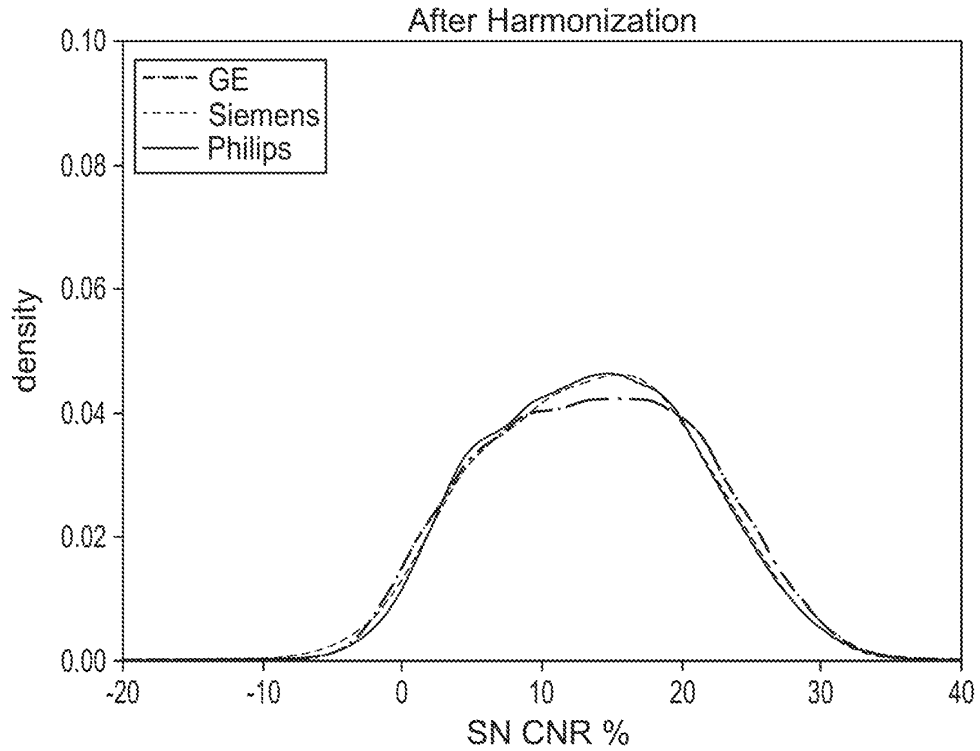



FIG. 16B

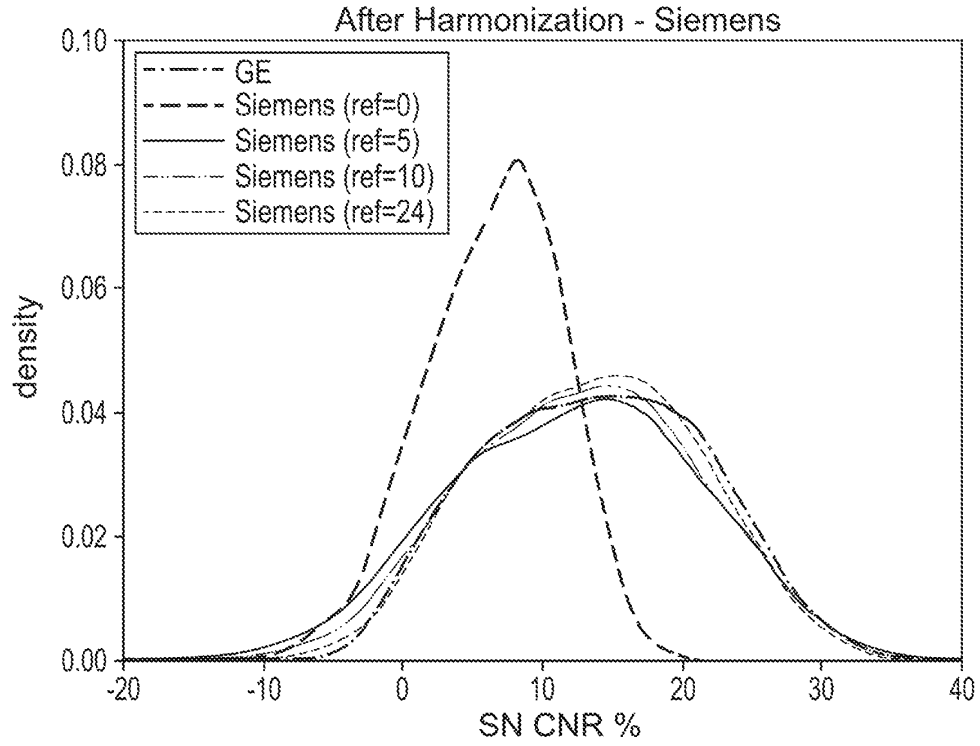



FIG. 17A

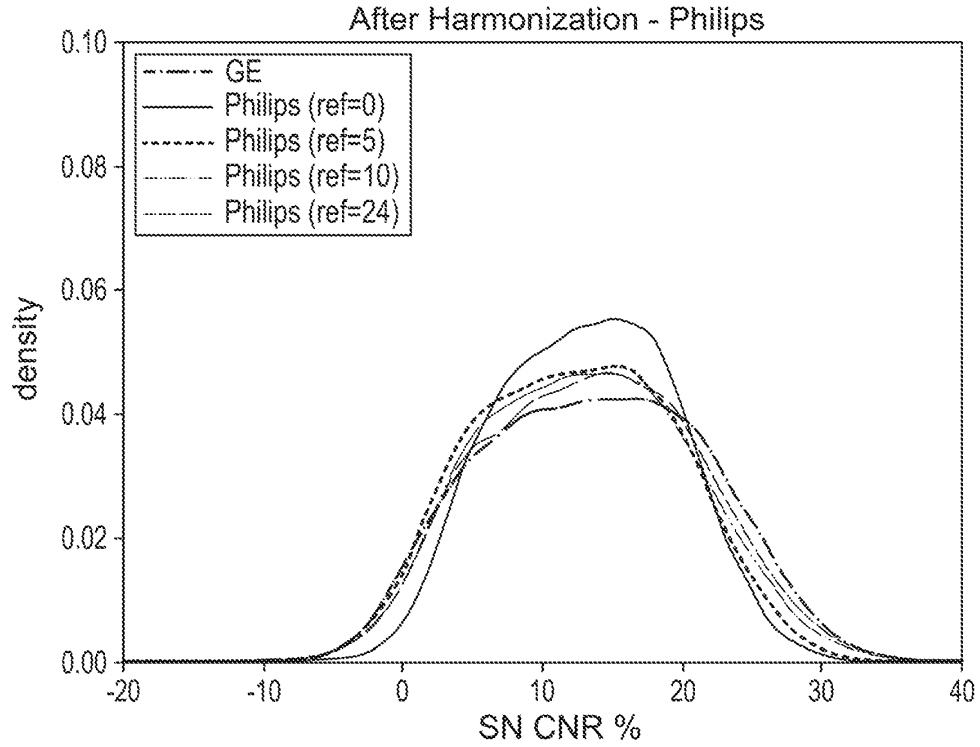



FIG. 17B

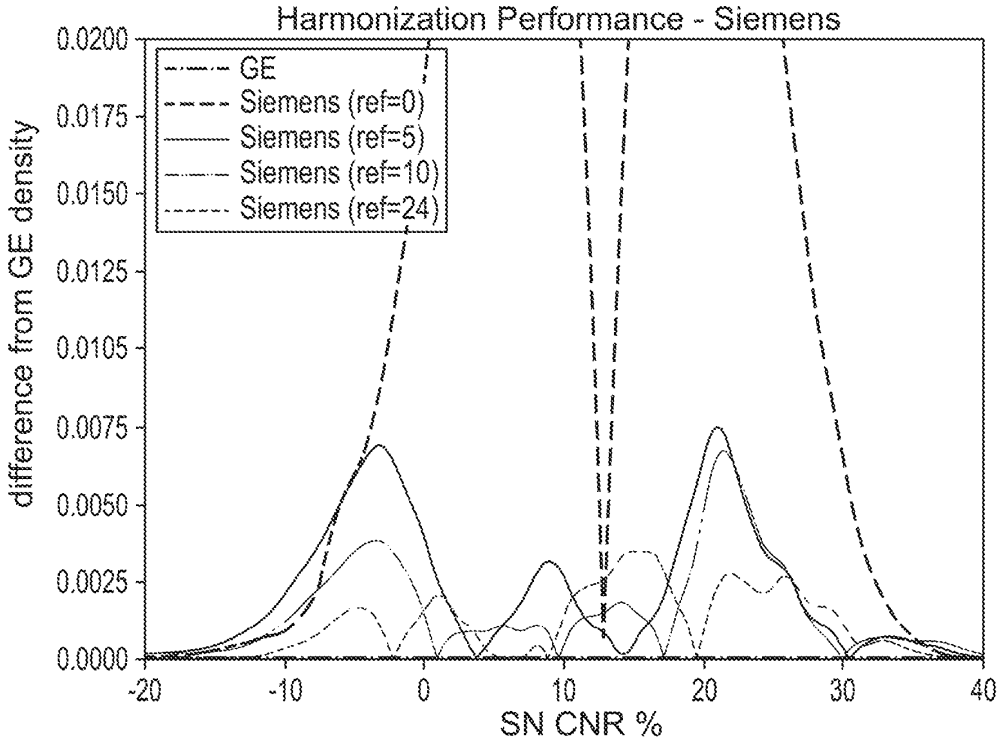



FIG. 18A

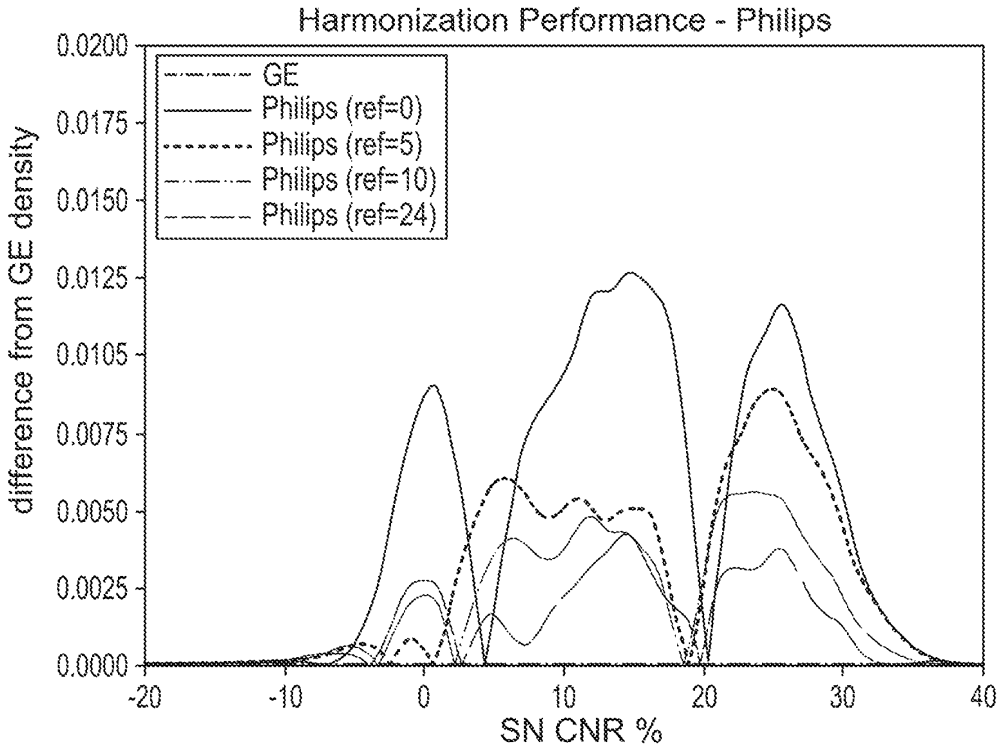



FIG. 18B