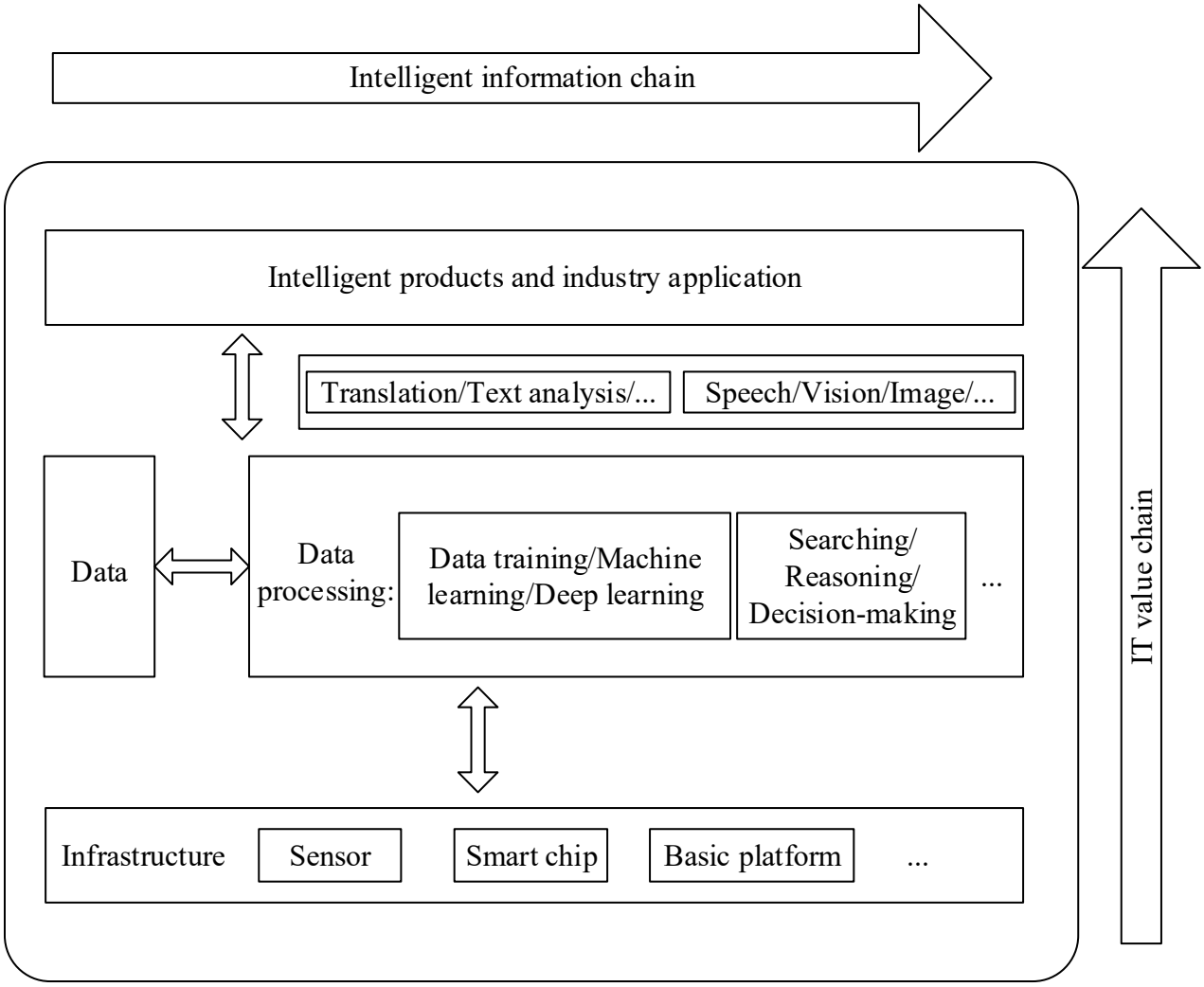
Intelligent information chain
Intelligent products and industry application
Translation/Text analysis/...
Speech/Vision/Image/...
Data
Data processing:
Data training/Machine learning/Deep learning
Searching/ Reasoning/ Decision-making
...
Infrastructure
Sensor
Smart chip
Basic platform
...
IT value chain

FIG. 1

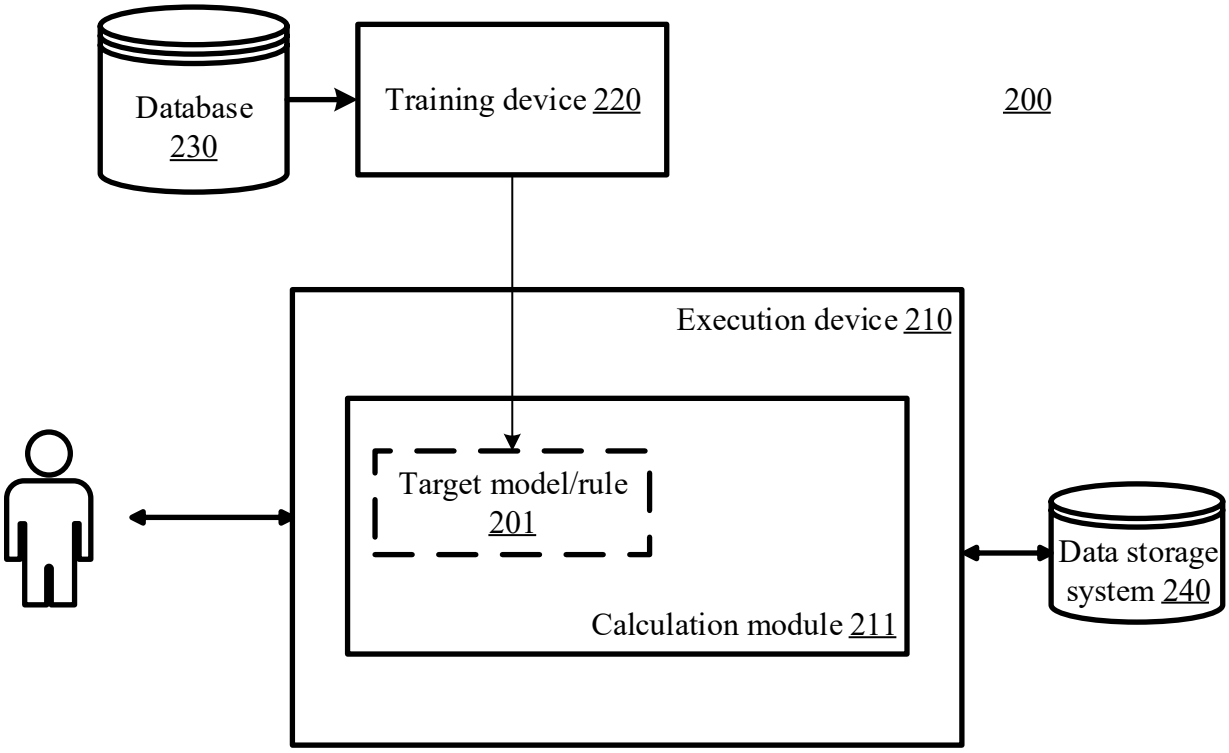
Database
230
Training device 220
200
Execution device 210
Target model/rule
201
Calculation module 211
Data storage
system 240

FIG. 2

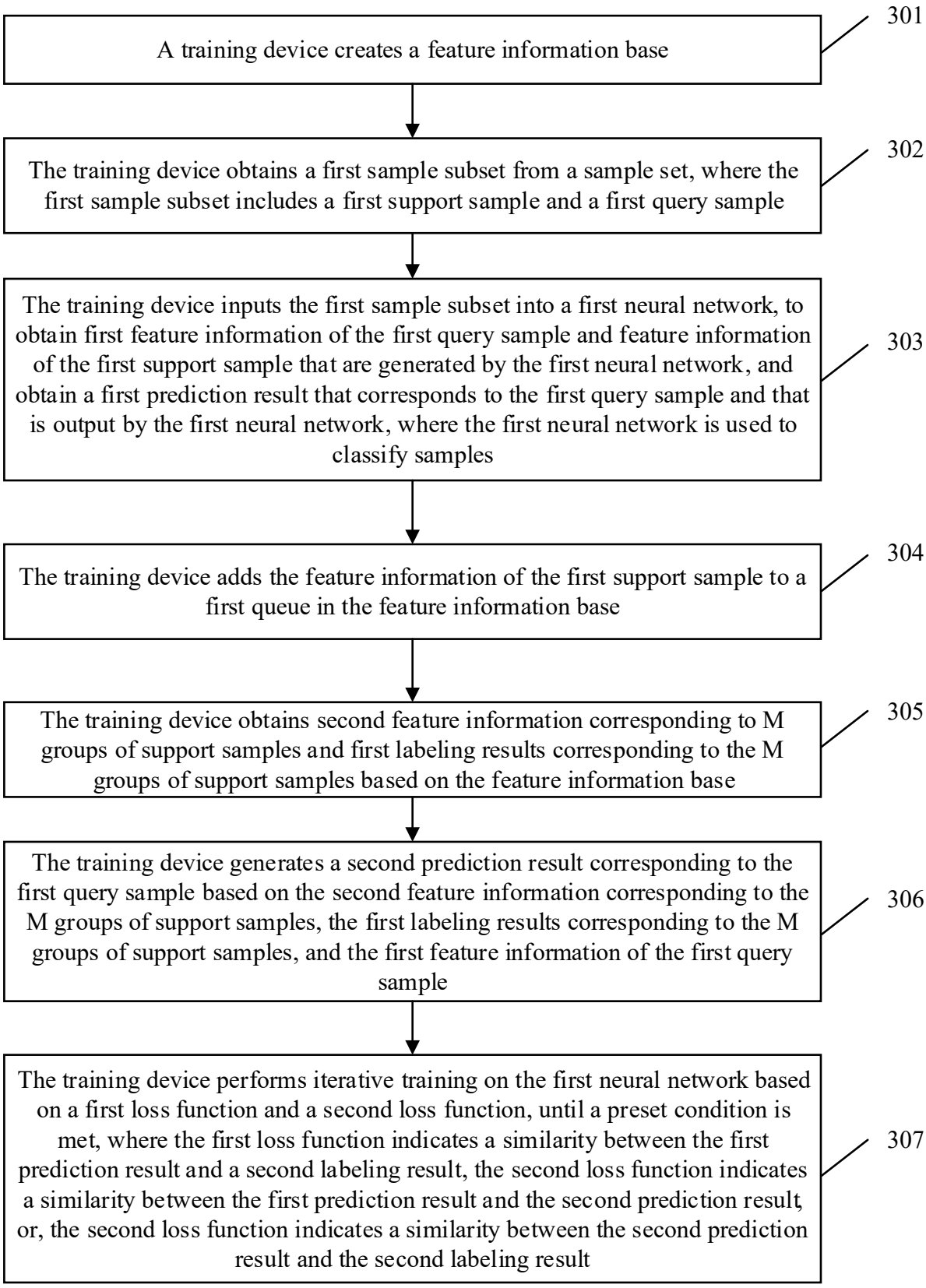
A training device creates a feature information base
301
The training device obtains a first sample subset from a sample set, where the first sample subset includes a first support sample and a first query sample
302
The training device inputs the first sample subset into a first neural network, to obtain first feature information of the first query sample and feature information of the first support sample that are generated by the first neural network, and obtain a first prediction result that corresponds to the first query sample and that is output by the first neural network, where the first neural network is used to classify samples
303
The training device adds the feature information of the first support sample to a first queue in the feature information base
304
The training device obtains second feature information corresponding to M groups of support samples and first labeling results corresponding to the M groups of support samples based on the feature information base
305
The training device generates a second prediction result corresponding to the first query sample based on the second feature information corresponding to the M groups of support samples, the first labeling results corresponding to the M groups of support samples, and the first feature information of the first query sample
306
The training device performs iterative training on the first neural network based on a first loss function and a second loss function, until a preset condition is met, where the first loss function indicates a similarity between the first prediction result and a second labeling result, the second loss function indicates a similarity between the first prediction result and the second prediction result, or, the second loss function indicates a similarity between the second prediction result and the second labeling result
307

FIG. 3

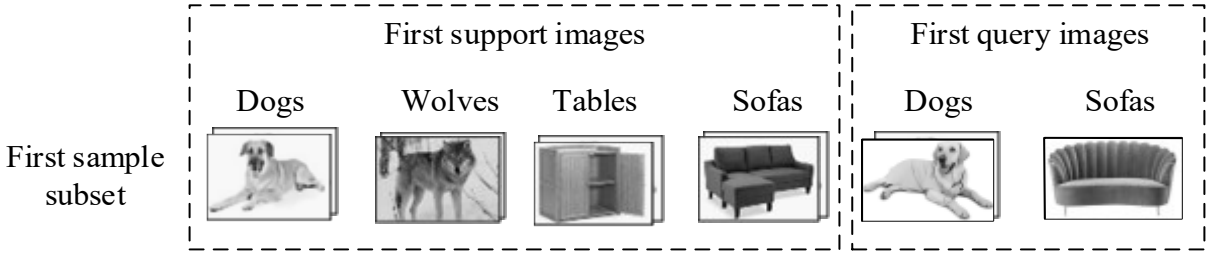

FIG. 4

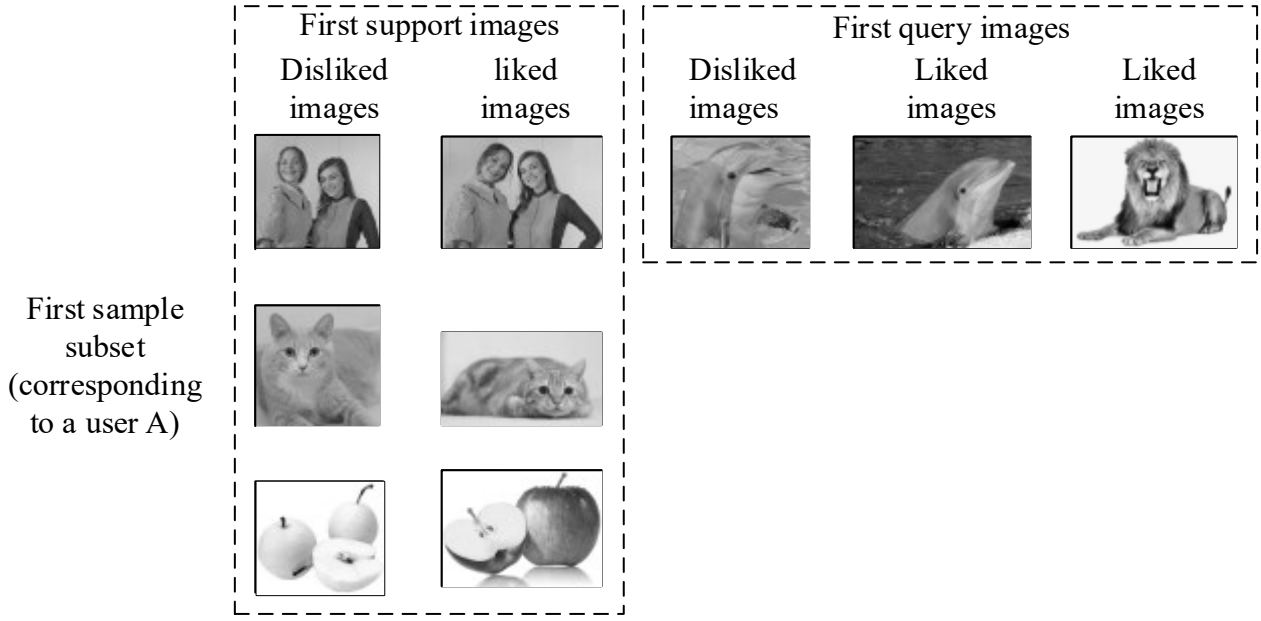

FIG. 5

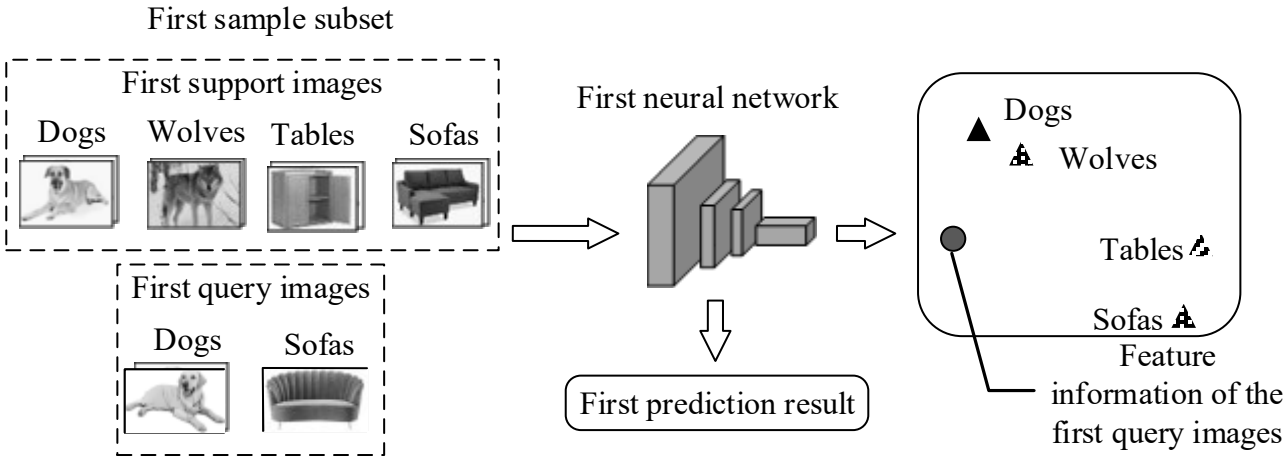

FIG. 6

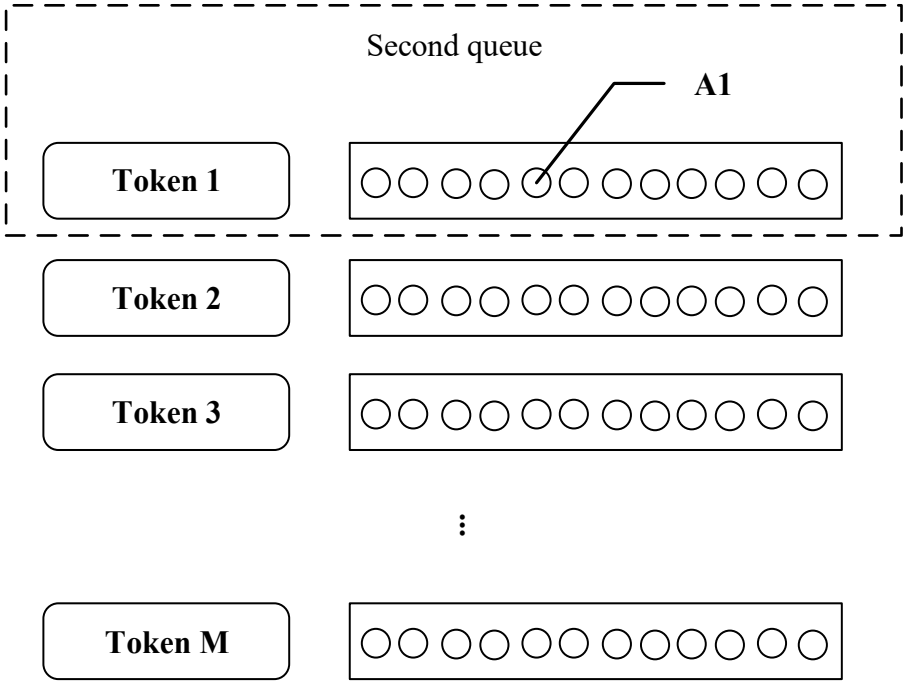

FIG. 7

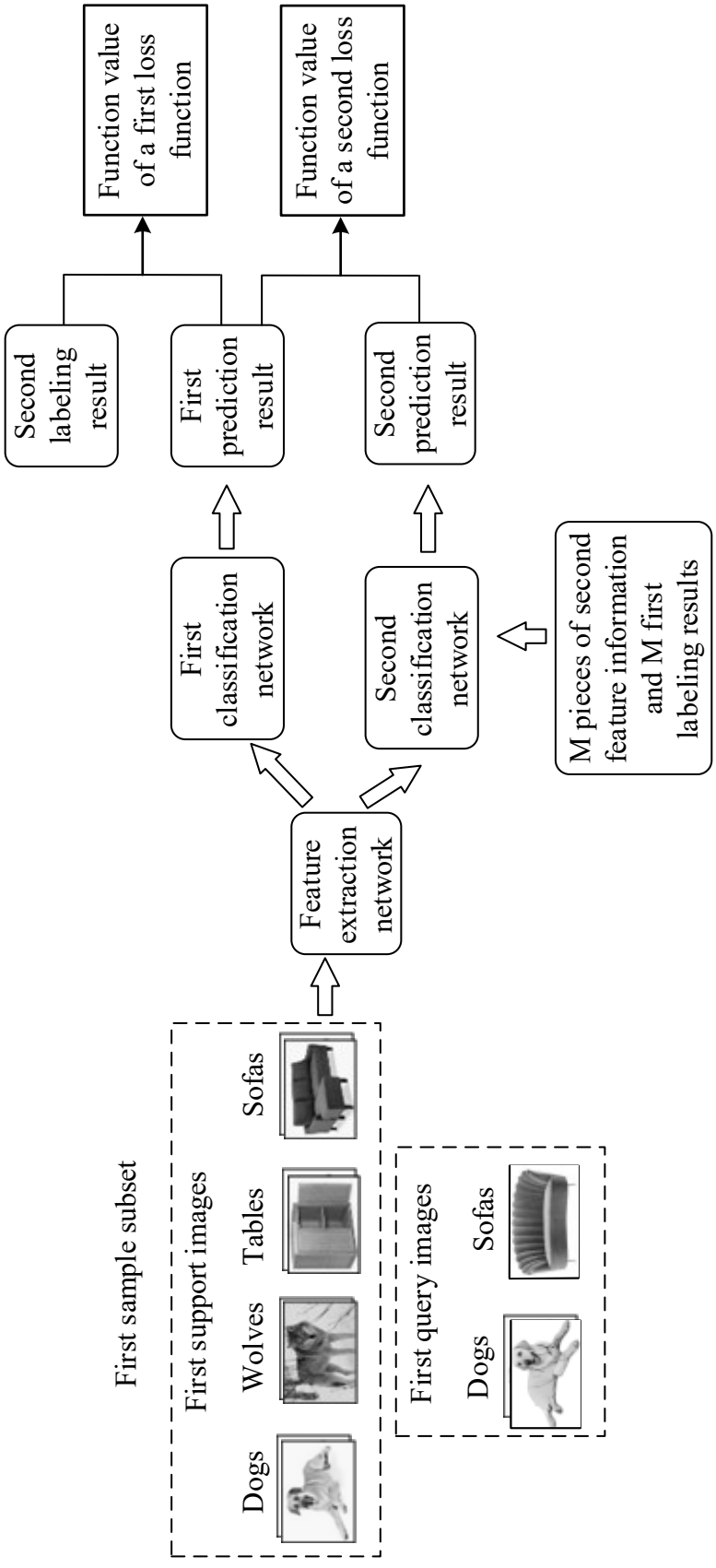
First sample subset
First support images
Dogs
Wolves
Tables
Sofas
First query images
Dogs
Sofas
Feature extraction network
First classification network
Second classification network
M pieces of second feature information and M first labeling results
Second labeling result
First prediction result
Second prediction result
Function value of a first loss function
Function value of a second loss function

FIG. 8

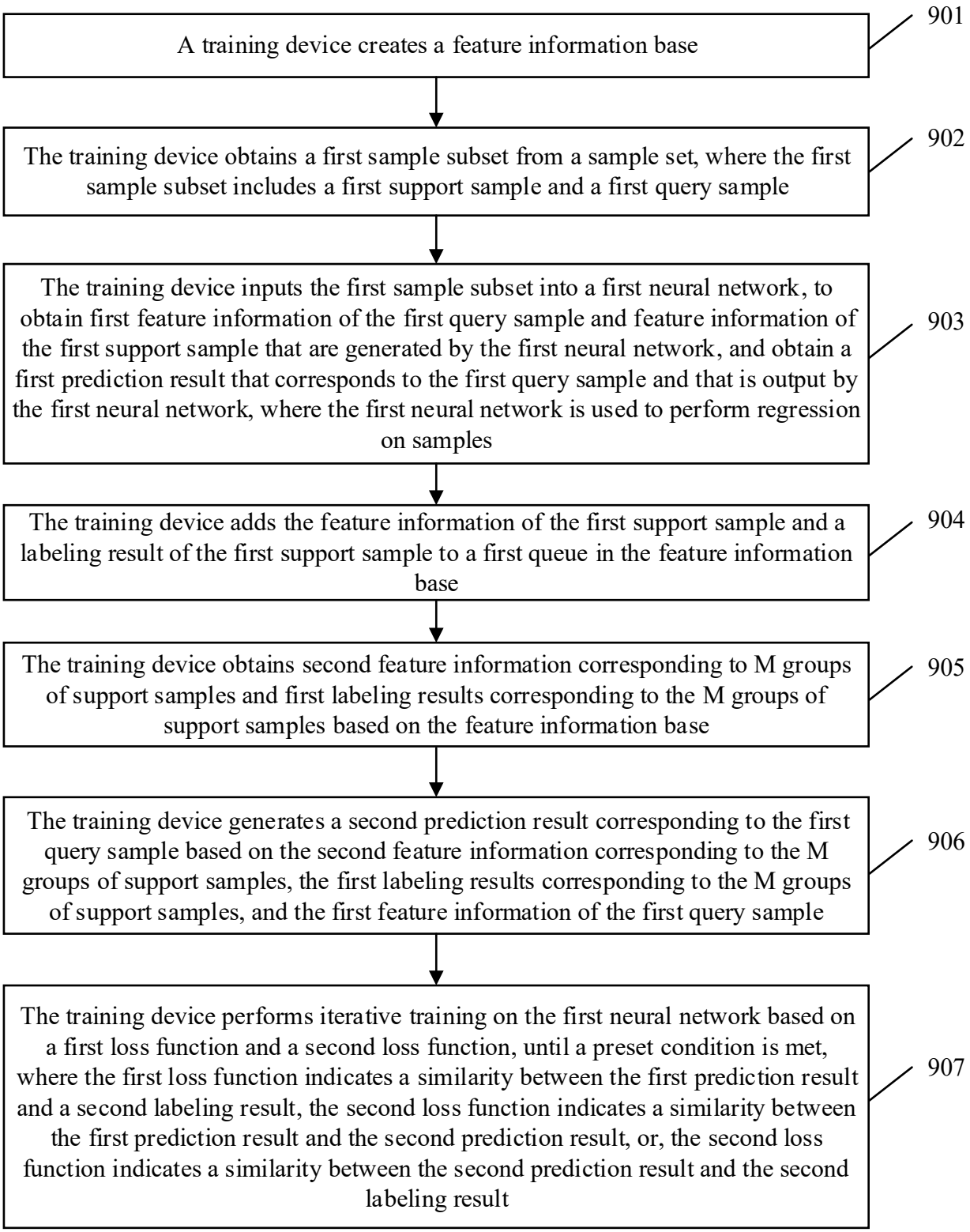
A training device creates a feature information base
901
The training device obtains a first sample subset from a sample set, where the first sample subset includes a first support sample and a first query sample
902
The training device inputs the first sample subset into a first neural network, to obtain first feature information of the first query sample and feature information of the first support sample that are generated by the first neural network, and obtain a first prediction result that corresponds to the first query sample and that is output by the first neural network, where the first neural network is used to perform regression on samples
903
The training device adds the feature information of the first support sample and a labeling result of the first support sample to a first queue in the feature information base
904
The training device obtains second feature information corresponding to M groups of support samples and first labeling results corresponding to the M groups of support samples based on the feature information base
905
The training device generates a second prediction result corresponding to the first query sample based on the second feature information corresponding to the M groups of support samples, the first labeling results corresponding to the M groups of support samples, and the first feature information of the first query sample
906
The training device performs iterative training on the first neural network based on a first loss function and a second loss function, until a preset condition is met, where the first loss function indicates a similarity between the first prediction result and a second labeling result, the second loss function indicates a similarity between the first prediction result and the second prediction result, or, the second loss function indicates a similarity between the second prediction result and the second labeling result
907

FIG. 9

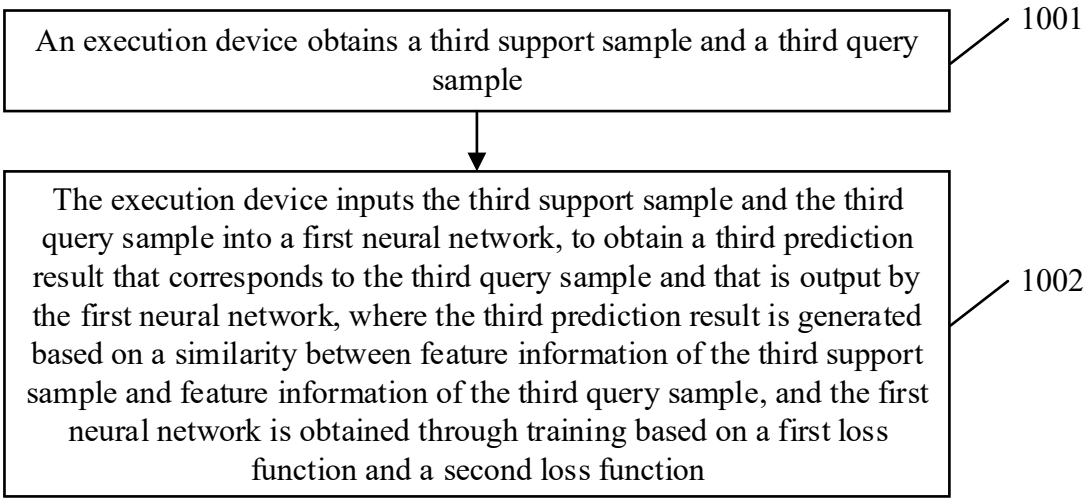

FIG. 10

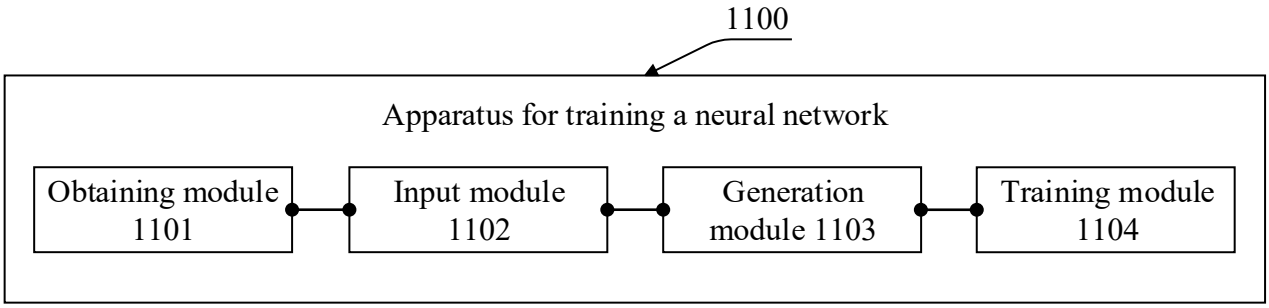

FIG. 11

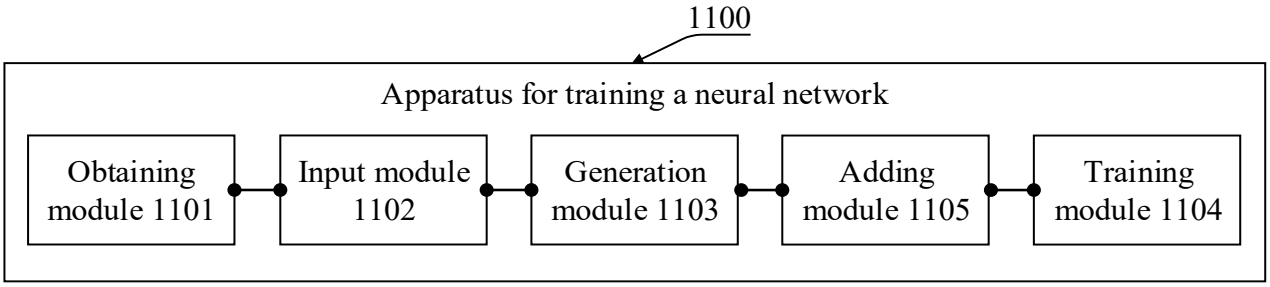

FIG. 12

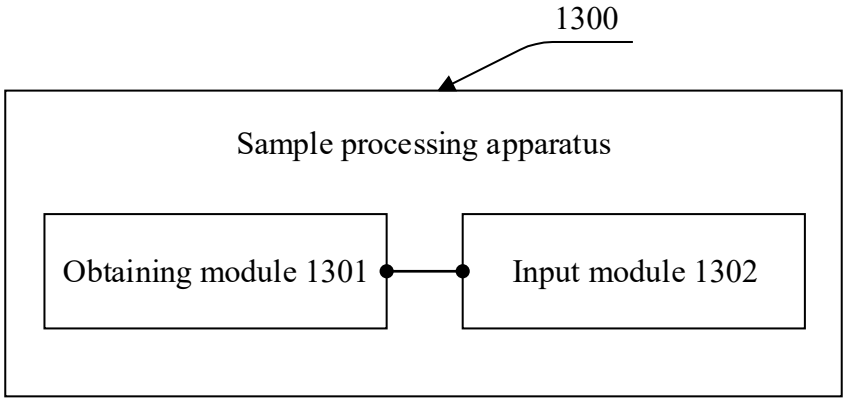
1300
Sample processing apparatus
Obtaining module 1301
Input module 1302

FIG. 13

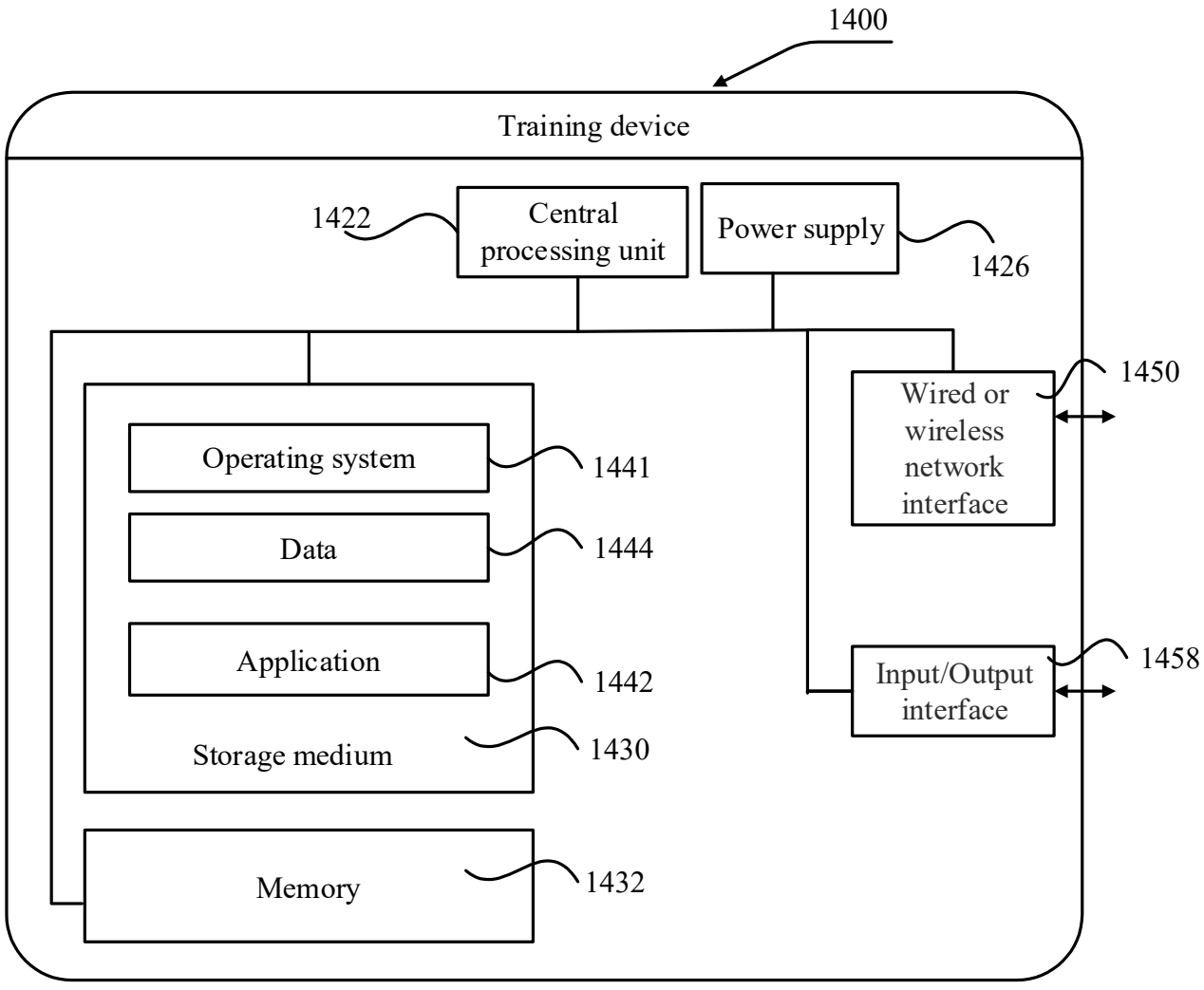
1400
Training device
1422
Central processing unit
Power supply
1426
1450
Wired or wireless network interface
Operating system
1441
Data
1444
Application
1442
Storage medium
1430
Input/Output interface
1458
Memory
1432

FIG. 14

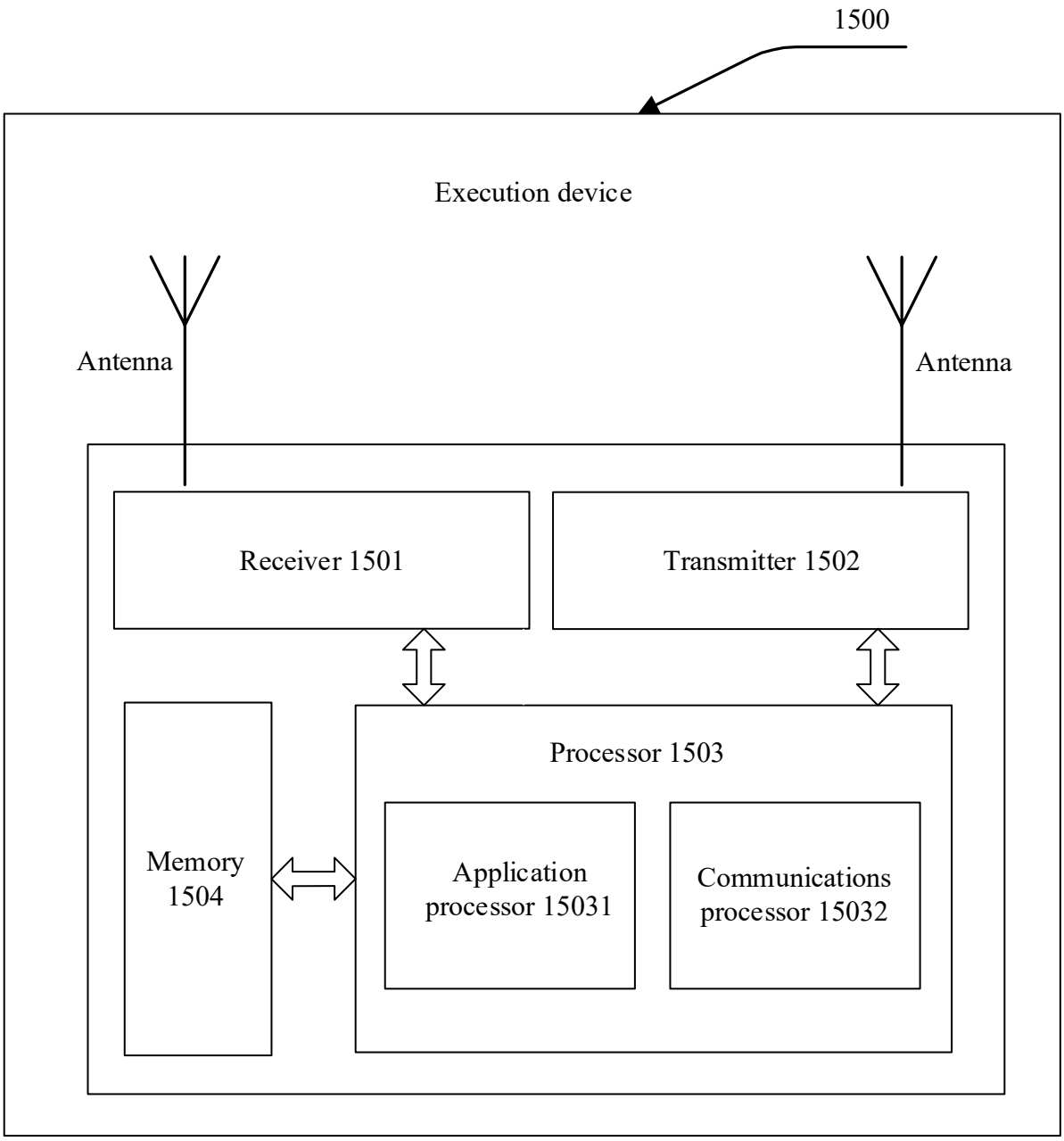
1500
Execution device
Antenna
Antenna
Receiver 1501
Transmitter 1502
Processor 1503
Memory 1504
Application processor 15031
Communications processor 15032

FIG. 15

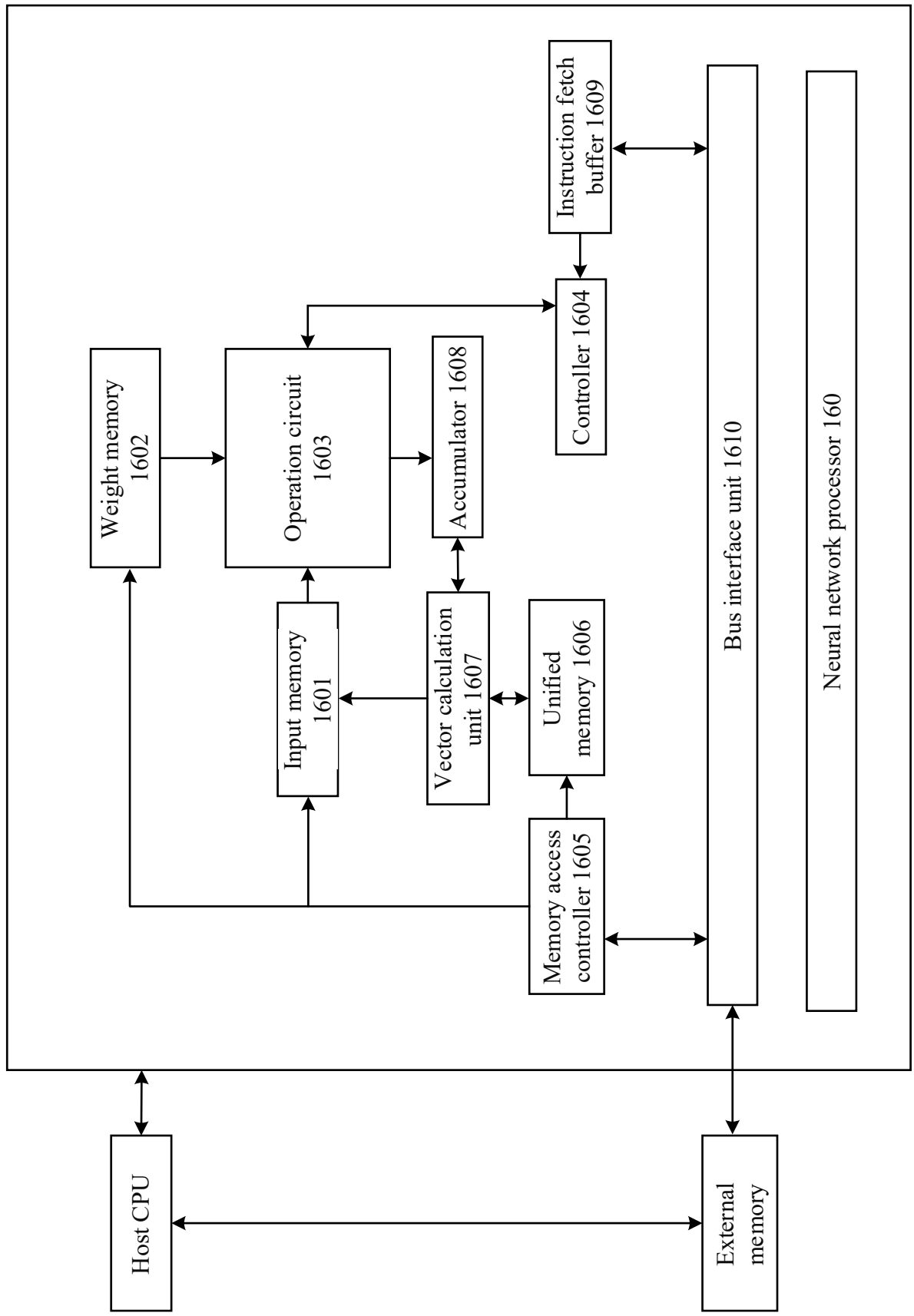
Host CPU
External memory
Weight memory 1602
Operation circuit 1603
Accumulator 1608
Controller 1604
Instruction fetch buffer 1609
Input memory 1601
Vector calculation unit 1607
Unified memory 1606
Memory access controller 1605
Bus interface unit 1610
Neural network processor 160

FIG. 16