

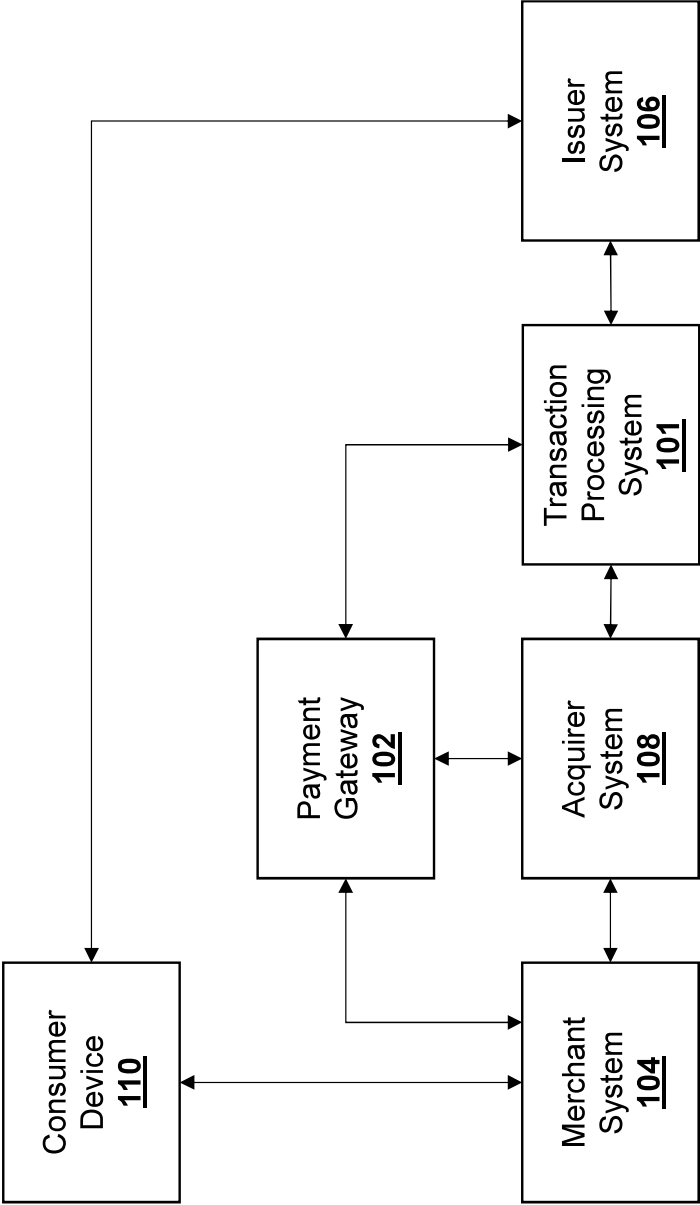


FIG. 1

100

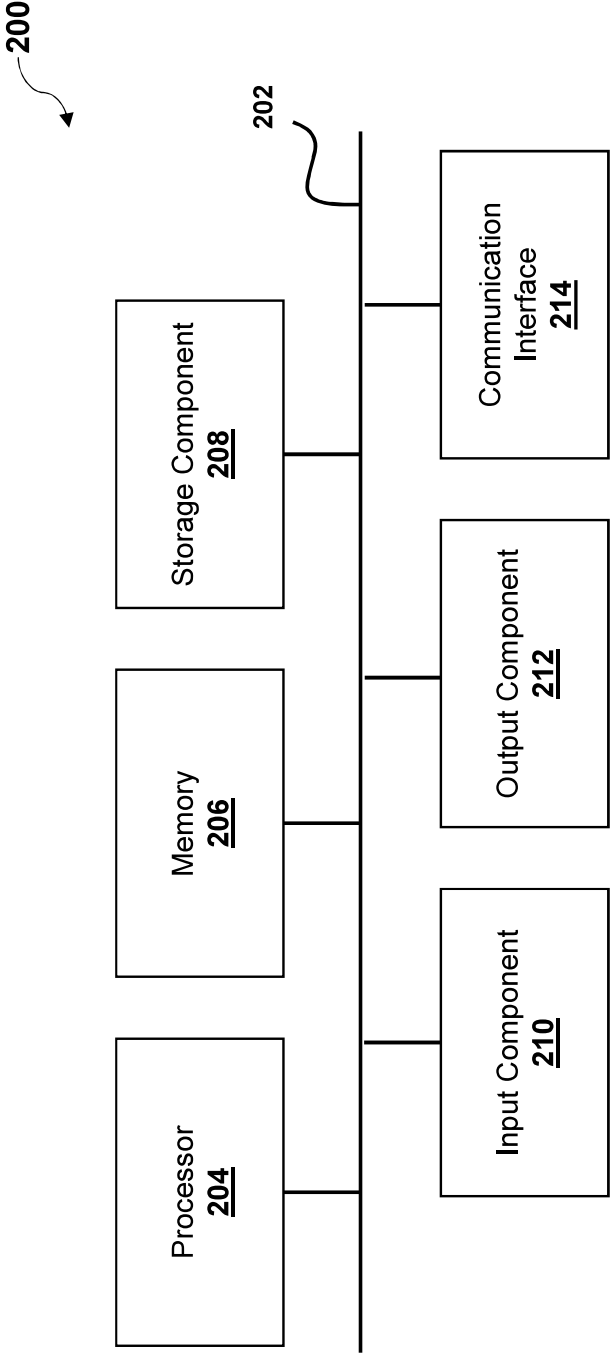


FIG. 2

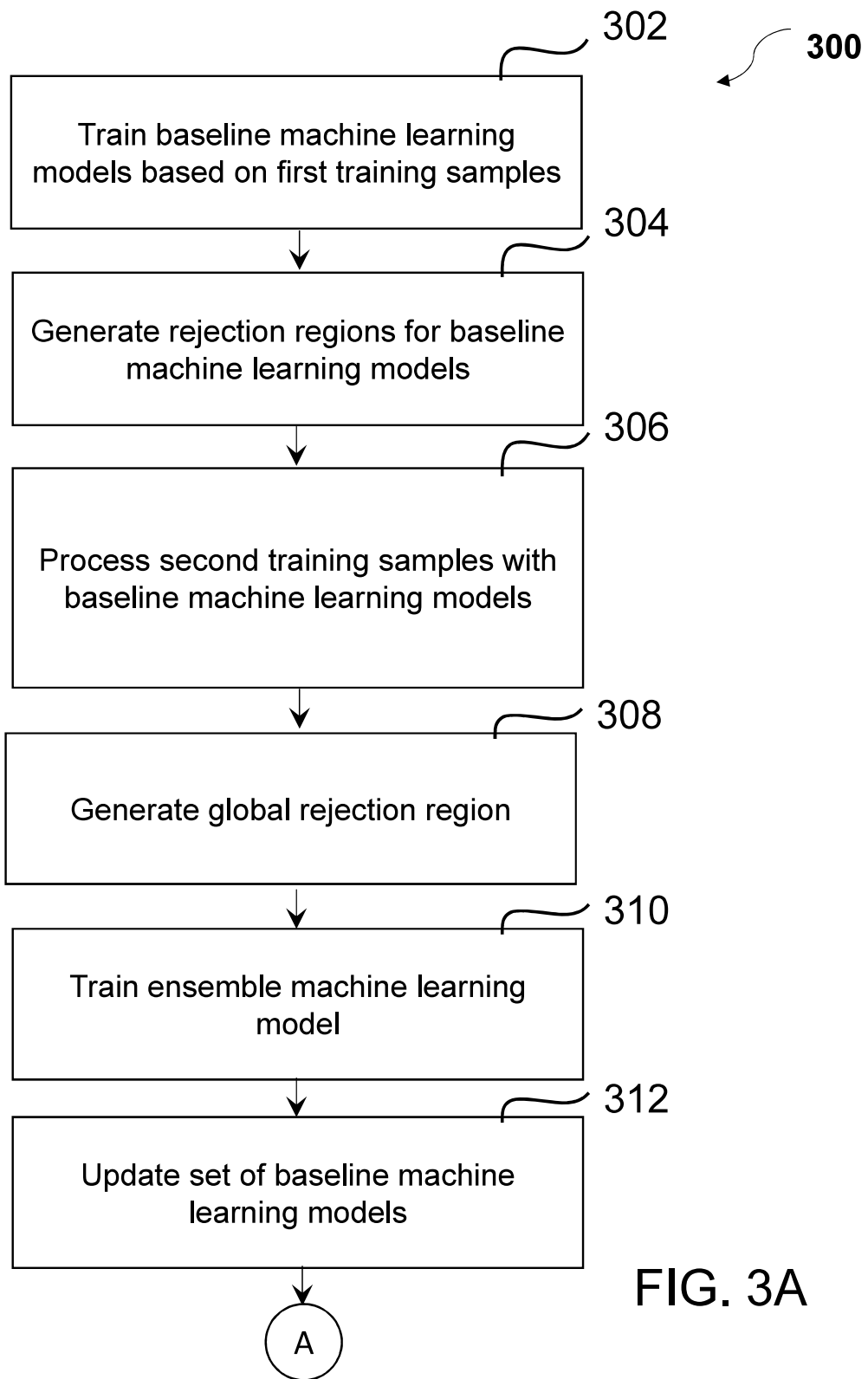


FIG. 3A

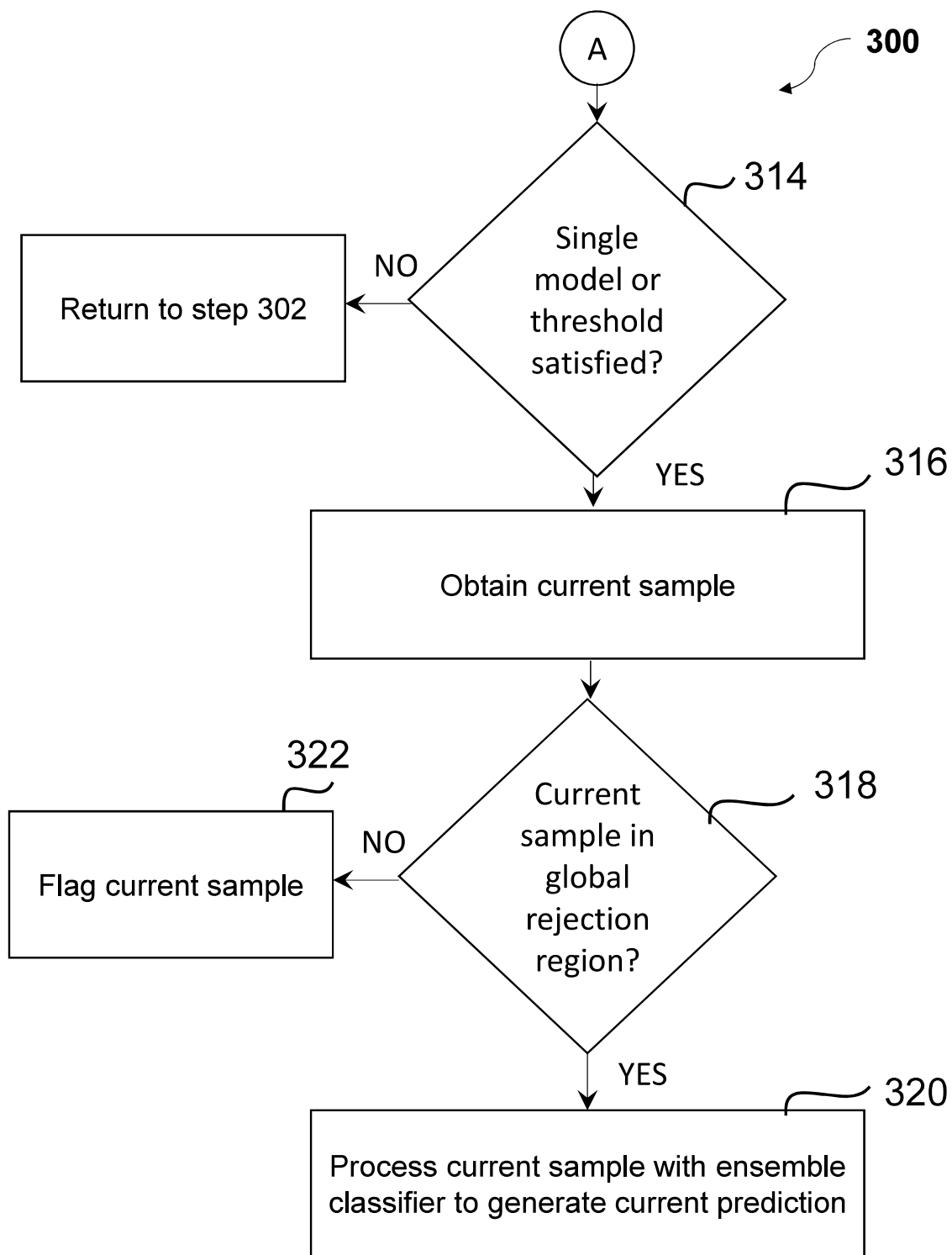


FIG. 3B

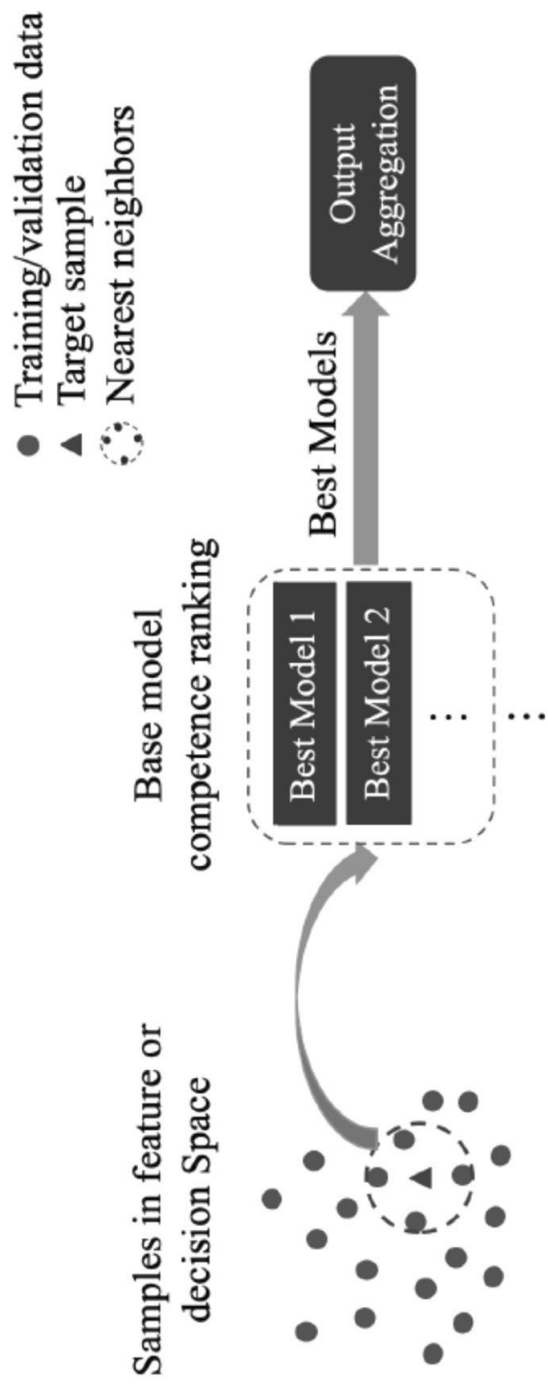
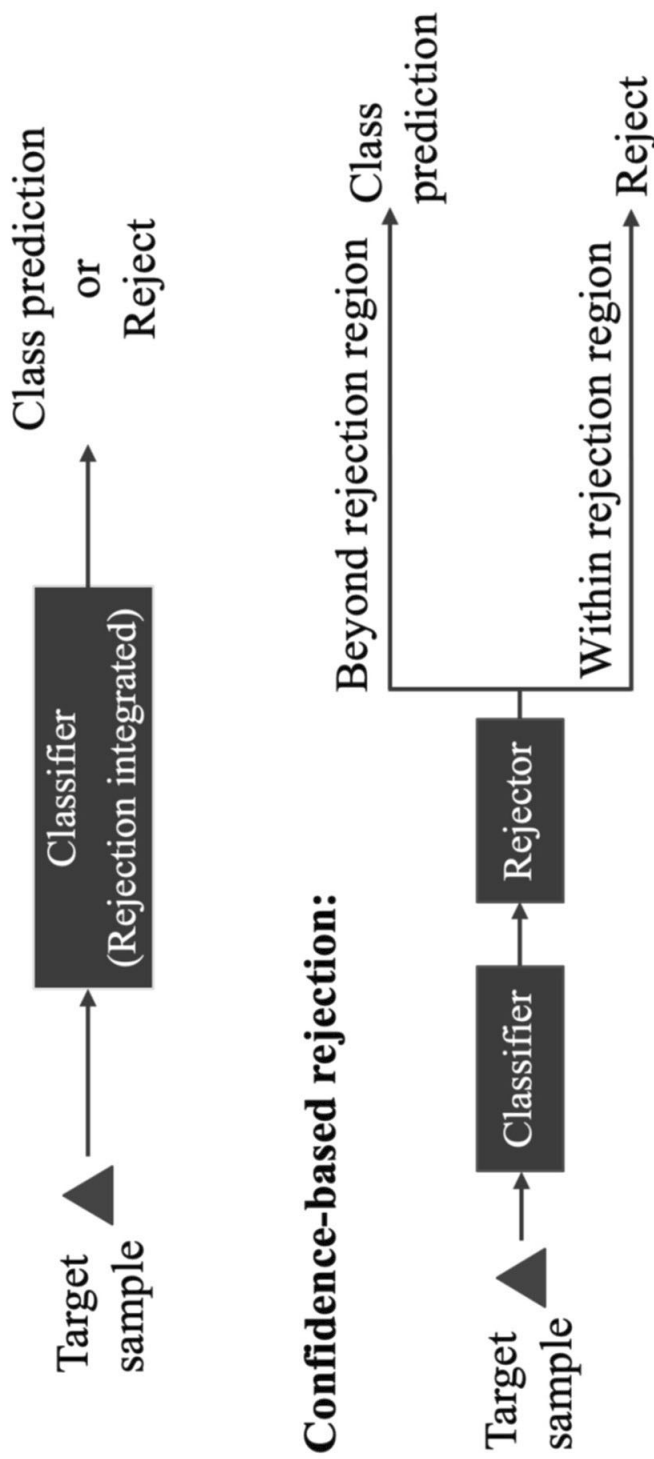


FIG. 4

Classifier-based rejection:



Confidence-based rejection:

FIG. 5

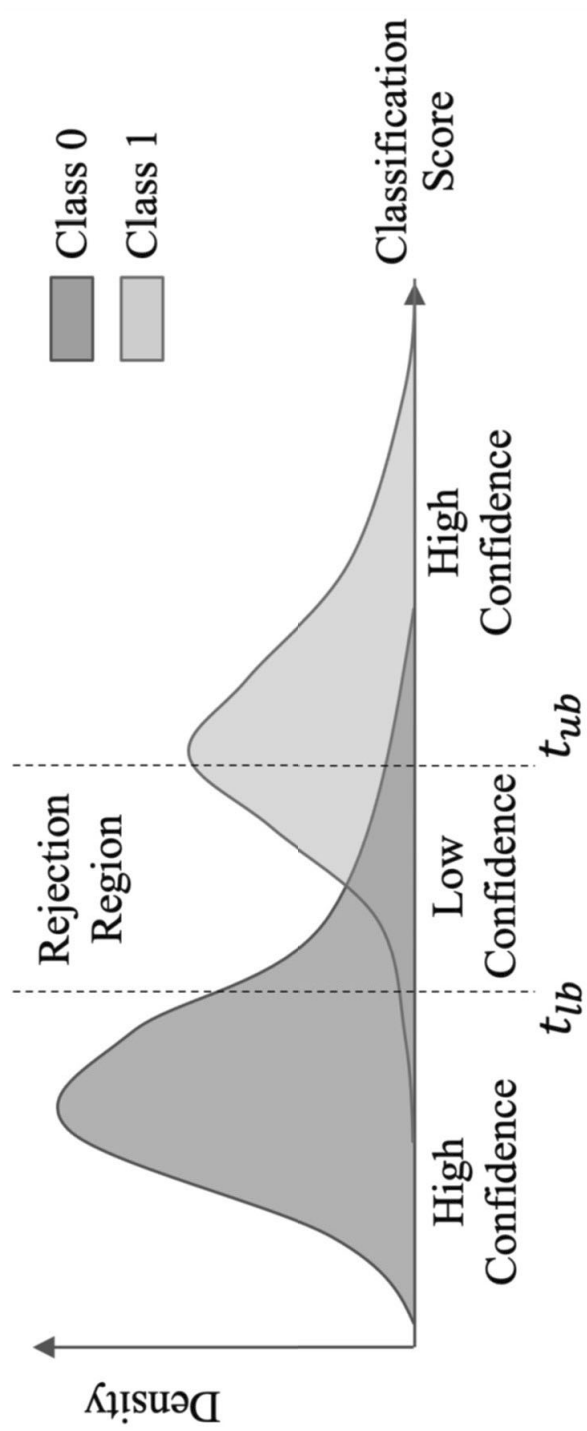


FIG. 6

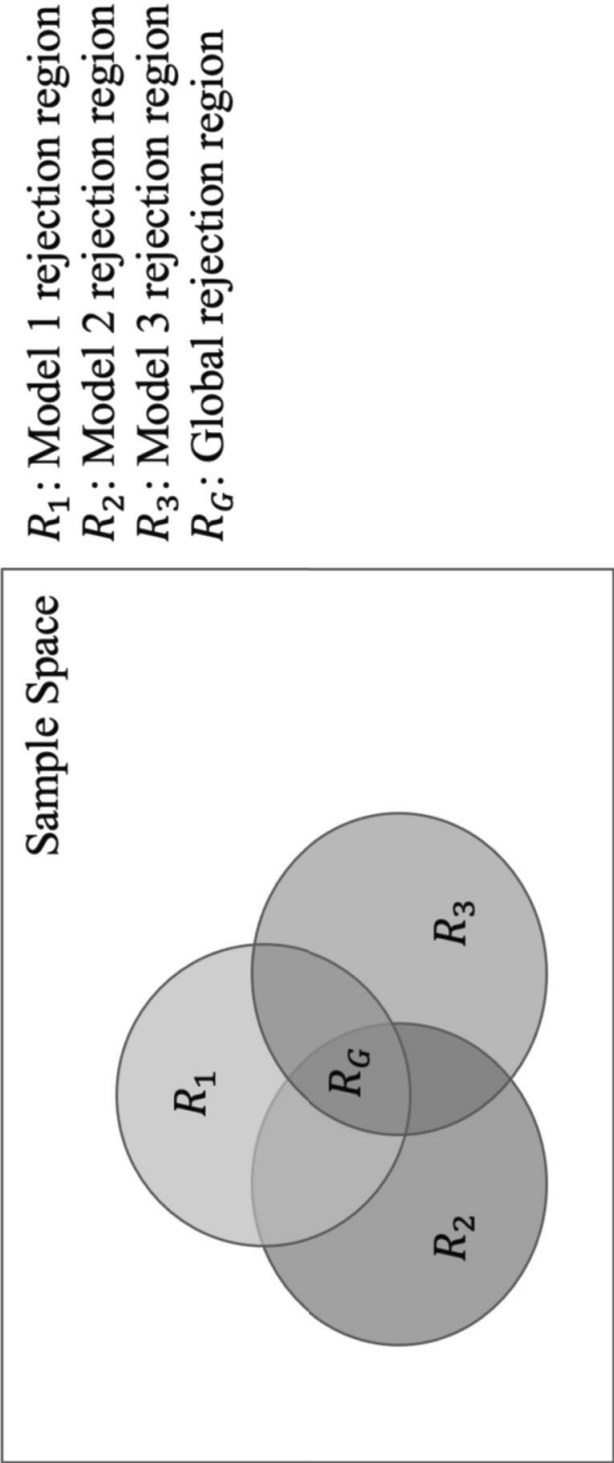


FIG. 7

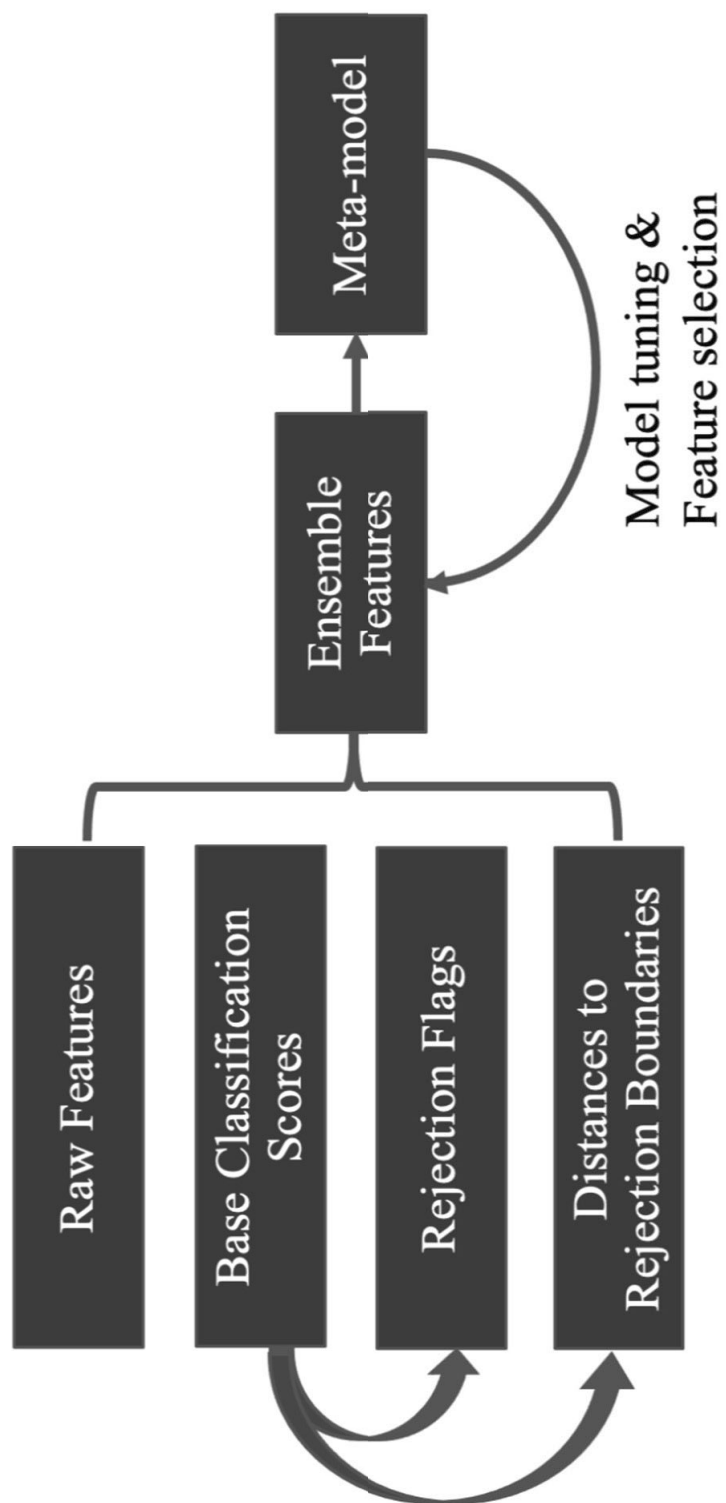


FIG. 8

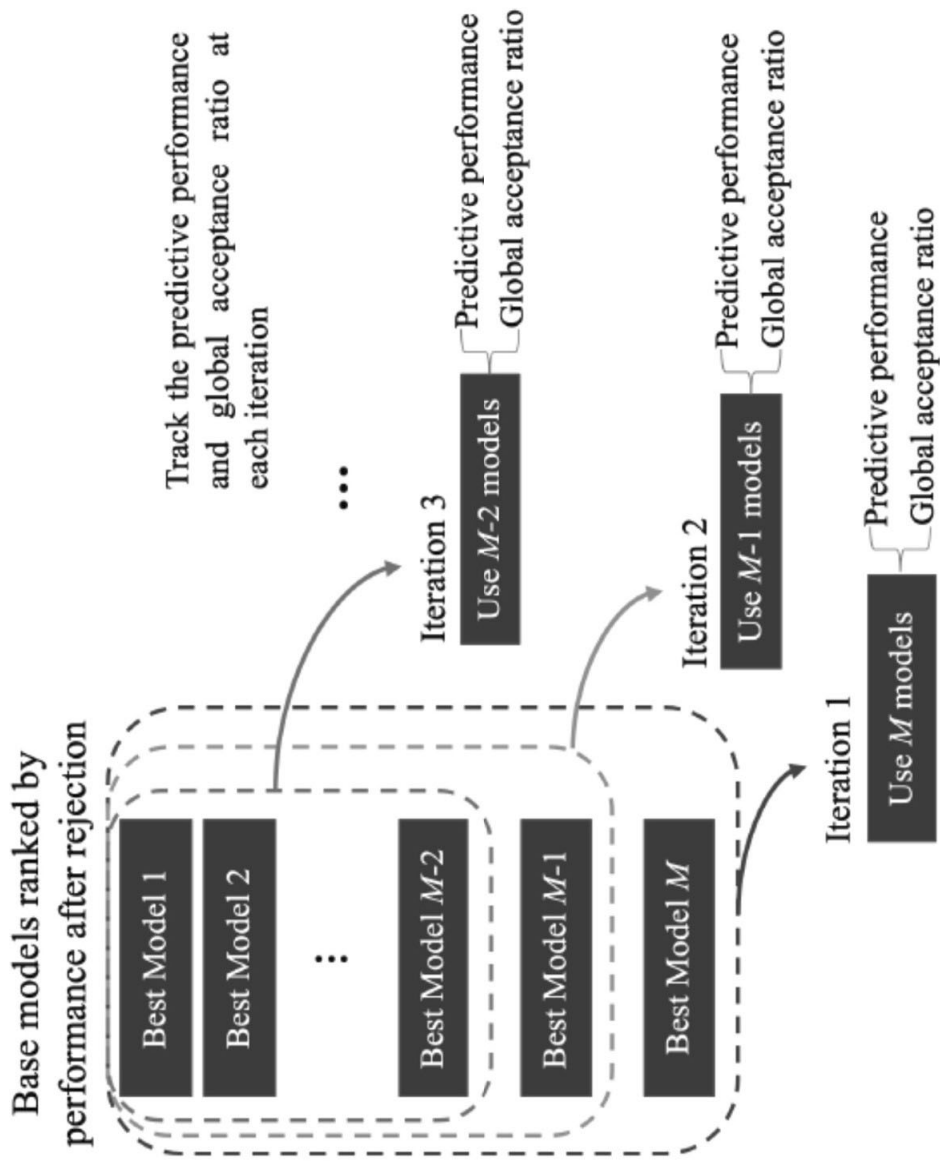


FIG. 9

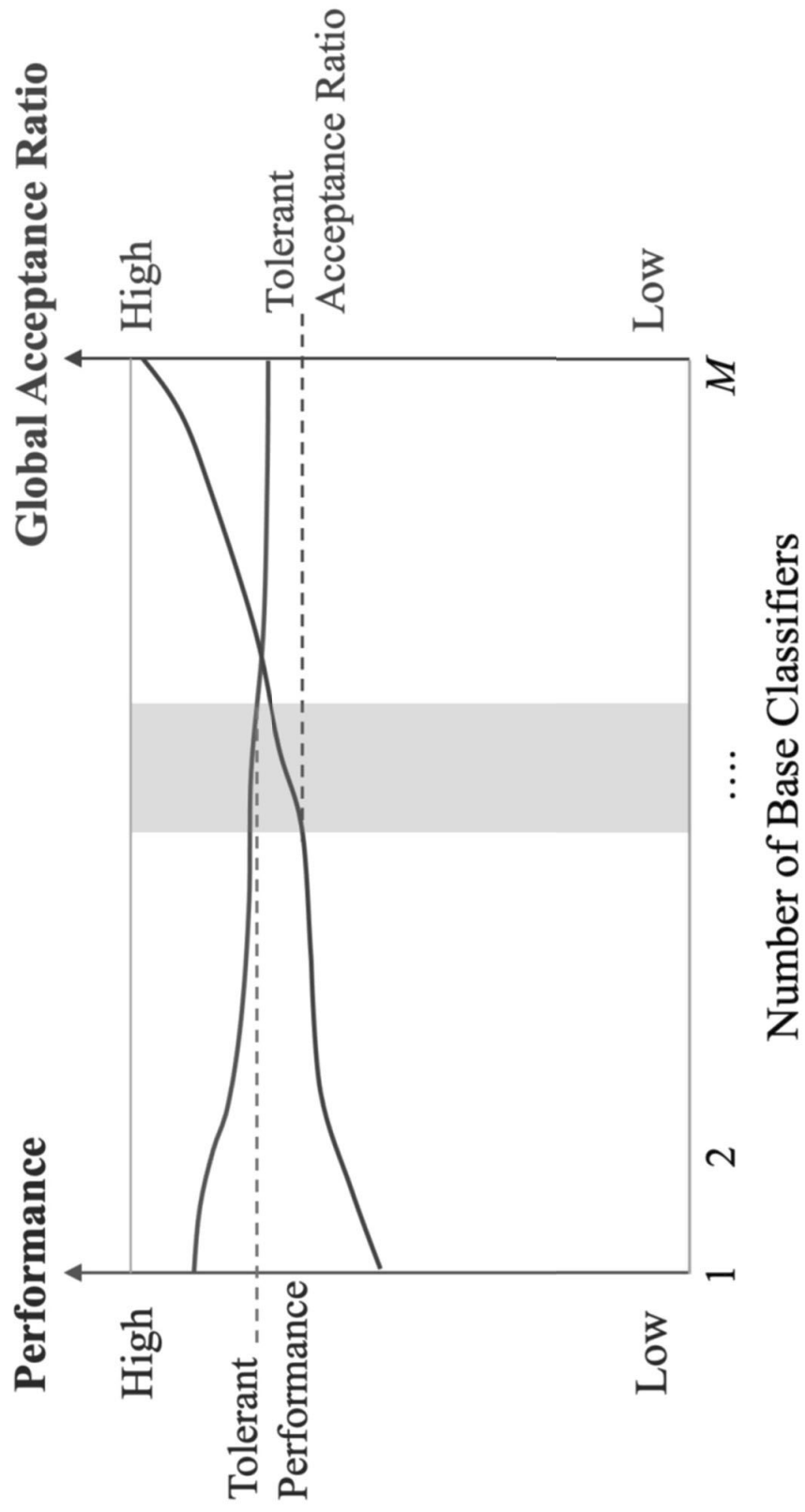


FIG. 10

Description of the experiment datasets

Dataset	Source	Samples (Features)	Min. Ratio	Classes
Payment Risk	OpenML	28,000 (29)	0.002	Normal; Fraud
Water Quality	UCI	139,566 (11)	0.012	Good; Bad
Mammography	OpenML	11,183 (6)	0.023	Negative; Positive
Network Attack	UCI	93,124 (41)	0.057	Normal; Attack
Hypothyroid	OpenML	3,772 (7)	0.061	Negative; Positive
Vowel	OpenML	9,861 (12)	0.087	Player1; Others
Activity Monitor	UCI	10,299 (11 PCA)	0.185	Standing; Others
Credit Default	UCI	30,000 (23)	0.221	Good; Default
Adult Income	OpenML	32,561 (14)	0.241	Low; High
Land Cover	OpenML	581,012 (54)	0.365	Spruce; Others
Breast Cancer	OpenML	569 (30)	0.373	Negative; Positive
MNIST	OpenML	42,000 (42 PCA)	0.490	Odd; Even

FIG. 11

Performance of different models on the class-imbalanced datasets

	Model	Payment Risk	Water Quality	Mammography	Network Attack	Hypothyroid	Vowel
Inference Time [Sec]	Proposed: Acp	0.36 (0.02)	0.13 (0.01)	-0.01 (0.00)	0.05 (0.01)	-0.01 (0.00)	0.01 (0.00)
	Proposed: All	0.37 (0.02)	0.13 (0.01)	<0.01 (0.00)	0.06 (0.01)	<0.01 (0.00)	0.01 (0.00)
	DES-KNN	1.53 (0.10)	0.78 (0.04)	0.16 (0.01)	0.80 (0.08)	0.08 (0.01)	0.25 (0.02)
	KNOP	1.44 (0.07)	0.76 (0.01)	0.17 (0.01)	0.74 (0.11)	0.08 (0.01)	0.20 (0.01)
	DESP	1.46 (0.11)	0.76 (0.01)	0.15 (0.01)	0.68 (0.06)	0.07 (0.01)	0.19 (0.01)
	DESMI	1.44 (0.06)	0.77 (0.01)	0.15 (0.01)	0.68 (0.05)	0.06 (0.01)	0.19 (0.01)
	KNORA-U	1.45 (0.09)	0.75 (0.01)	0.14 (0.00)	0.68 (0.06)	0.06 (0.01)	0.19 (0.01)
	KNORA-E	1.45 (0.05)	0.76 (0.01)	0.15 (0.01)	0.70 (0.10)	0.07 (0.01)	0.20 (0.02)
	META-DES	1.51 (0.13)	0.77 (0.01)	0.16 (0.01)	0.71 (0.04)	0.08 (0.00)	0.23 (0.02)
	RRC	1.45 (0.06)	0.76 (0.01)	0.15 (0.01)	0.69 (0.08)	0.06 (0.02)	0.19 (0.01)
PR-AUC [%]	Proposed: Acp	86.71 (0.48)	97.14 (0.24)	74.43 (1.66)	99.07 (0.04)	89.50 (1.04)	95.93 (0.60)
	Proposed: All	86.06 (0.49)	97.13 (0.24)	68.14 (1.53)	97.19 (0.03)	89.39 (1.05)	94.65 (1.18)
	DES-KNN	82.65 (1.97)	96.08 (0.37)	66.24 (1.81)	96.92 (0.26)	82.61 (2.01)	95.29 (0.96)
	KNOP	84.85 (0.64)	96.03 (0.93)	67.85 (1.12)	97.08 (0.14)	82.47 (0.97)	94.42 (0.62)
	DESP	84.20 (1.33)	96.26 (0.17)	68.19 (1.43)	97.08 (0.17)	84.26 (1.55)	95.26 (0.55)
	DESMI	84.17 (1.23)	96.40 (0.20)	67.69 (1.09)	94.37 (0.84)	81.86 (1.46)	94.42 (0.62)
	KNORA-U	84.36 (0.93)	96.27 (0.28)	68.07 (1.15)	97.11 (0.13)	83.60 (0.89)	95.34 (0.51)
	KNORA-E	83.15 (1.99)	96.29 (0.26)	67.85 (1.53)	96.87 (0.33)	82.98 (1.17)	95.37 (0.54)
	META-DES	85.11 (0.70)	94.97 (1.30)	67.72 (1.21)	97.05 (0.12)	77.05 (4.00)	92.45 (1.66)
	RRC	83.86 (1.50)	96.21 (0.34)	67.61 (1.40)	97.07 (0.19)	82.90 (1.75)	95.44 (0.68)
F1 Score [%]	Proposed: Acp	88.25 (0.36)	96.55 (0.06)	72.93 (1.57)	96.98 (0.05)	84.49 (1.31)	89.67 (0.74)
	Proposed: All	88.20 (0.36)	96.38 (0.06)	66.00 (1.17)	91.59 (0.11)	84.32 (1.27)	88.00 (0.81)
	DES-KNN	83.65 (1.68)	94.41 (1.19)	64.63 (0.82)	92.09 (0.41)	82.39 (0.97)	89.12 (1.60)
	KNOP	85.54 (0.78)	94.78 (0.45)	65.91 (0.97)	92.13 (0.36)	82.31 (1.03)	87.34 (1.51)
	DESP	86.09 (1.13)	94.87 (0.45)	66.77 (0.85)	92.18 (0.37)	82.83 (1.20)	88.67 (1.20)
	DESMI	84.72 (0.75)	95.54 (0.39)	66.69 (1.08)	90.16 (0.53)	82.14 (1.06)	87.84 (1.45)
	KNORA-U	85.86 (1.24)	95.12 (0.32)	65.76 (1.02)	92.10 (0.32)	82.56 (0.93)	89.34 (1.10)
	KNORA-E	84.41 (0.81)	94.71 (0.46)	65.86 (1.53)	92.32 (0.43)	81.35 (0.81)	89.25 (1.38)
	META-DES	85.04 (0.50)	95.36 (0.56)	66.18 (0.99)	91.92 (0.34)	81.78 (1.20)	87.72 (1.44)
	RRC	84.34 (0.69)	94.80 (0.50)	65.84 (0.85)	92.24 (0.39)	82.85 (0.96)	88.99 (1.41)
Rej. Ratio	Proposed: Acp	<0.01	<0.01	0.03	0.04	<0.01	0.02
Rej. PR-AUC [%]	Best base	9.42 (13.2)	N/A	28.85 (5.44)	68.30 (1.28)	N/A	31.34 (6.33)

FIG. 12

Performance of different models on the class-balanced datasets

	Model	Activity Monitor	Credit Default	Adult Income	Land Cover	Breast Cancer	MNIST
Inference Time [Sec]	Proposed: Acp	<0.01 (0.00)	0.06 (0.01)	0.03 (0.00)	1.28 (0.05)	<0.01 (0.00)	0.02 (0.00)
	Proposed: All	<0.01 (0.00)	0.06 (0.01)	0.03 (0.00)	1.29 (0.05)	<0.01 (0.00)	0.02 (0.00)
	DES-KNN	0.25 (0.03)	0.46 (0.05)	0.60 (0.03)	72.06 (3.23)	0.05 (0.01)	1.93 (0.19)
	KNOP	0.15 (0.01)	0.33 (0.02)	0.38 (0.03)	60.55 (3.80)	0.05 (0.00)	1.46 (0.11)
	DESP	0.14 (0.01)	0.32 (0.03)	0.40 (0.04)	61.20 (3.37)	0.04 (0.01)	1.45 (0.16)
	DESMI	0.13 (0.01)	0.32 (0.03)	0.35 (0.03)	61.50 (3.48)	0.04 (0.00)	1.44 (0.12)
	KNORA-U	0.14 (0.01)	0.32 (0.02)	0.36 (0.03)	57.63 (3.38)	0.04 (0.00)	1.42 (0.08)
	KNORA-E	0.14 (0.02)	0.31 (0.02)	0.35 (0.03)	62.98 (2.70)	0.04 (0.01)	1.41 (0.08)
	META-DES	0.16 (0.02)	0.35 (0.02)	0.40 (0.03)	62.33 (3.06)	0.05 (0.01)	1.53 (0.13)
	RRC	0.17 (0.01)	0.30 (0.02)	0.36 (0.02)	63.88 (3.37)	0.04 (0.00)	1.48 (0.14)
AUC [%]	Proposed: Acp	98.08 (0.04)	78.03 (0.04)	92.44 (0.04)	94.07 (0.01)	98.45 (0.21)	99.00 (0.07)
	Proposed: All	97.73 (0.05)	78.03 (0.04)	92.02 (0.04)	92.52 (0.01)	98.45 (0.21)	98.96 (0.08)
	DES-KNN	97.79 (0.08)	77.25 (0.06)	91.42 (0.05)	92.51 (0.33)	97.94 (0.36)	98.34 (0.21)
	KNOP	97.80 (0.07)	77.24 (0.05)	91.52 (0.04)	91.50 (0.31)	97.48 (0.68)	98.12 (0.28)
	DESP	97.82 (0.05)	77.28 (0.05)	91.42 (0.05)	92.38 (0.34)	97.51 (0.45)	98.31 (0.26)
	DESMI	97.75 (0.20)	77.18 (0.10)	91.01 (0.07)	90.56 (0.45)	96.86 (0.73)	96.29 (0.83)
	KNORA-U	97.84 (0.04)	77.22 (0.05)	91.44 (0.04)	92.34 (0.33)	98.07 (0.29)	98.28 (0.26)
	KNORA-E	97.73 (0.10)	77.26 (0.05)	91.44 (0.05)	92.61 (0.34)	96.42 (1.14)	98.35 (0.25)
	META-DES	97.78 (0.04)	77.27 (0.05)	91.40 (0.05)	92.32 (0.34)	98.08 (0.46)	97.97 (0.20)
	RRC	97.66 (0.07)	77.26 (0.05)	91.42 (0.04)	92.29 (0.33)	96.68 (0.37)	98.25 (0.26)
Accuracy [%]	Proposed: Acp	93.98 (0.08)	81.78 (0.04)	87.45 (0.06)	88.22 (0.01)	93.88 (0.72)	95.45 (0.26)
	Proposed: All	93.29 (0.13)	81.78 (0.04)	86.89 (0.06)	85.17 (0.01)	93.88 (0.72)	95.22 (0.27)
	DES-KNN	93.38 (0.22)	81.77 (0.11)	86.06 (0.07)	87.81 (0.35)	93.67 (0.47)	94.34 (0.42)
	KNOP	93.40 (0.12)	81.77 (0.08)	86.18 (0.10)	84.62 (0.32)	93.35 (0.38)	93.49 (0.69)
	DESP	93.55 (0.14)	81.89 (0.11)	86.05 (0.07)	87.67 (0.34)	94.20 (0.39)	94.16 (0.57)
	DESMI	93.32 (0.20)	81.73 (0.14)	85.32 (0.18)	83.50 (0.45)	92.23 (0.51)	91.80 (1.30)
	KNORA-U	93.56 (0.15)	81.76 (0.06)	86.07 (0.07)	87.81 (0.34)	93.56 (0.39)	94.12 (0.58)
	KNORA-E	93.32 (0.20)	81.83 (0.08)	86.12 (0.08)	88.20 (0.35)	94.36 (0.62)	94.46 (0.55)
	META-DES	93.41 (0.18)	81.81 (0.11)	85.98 (0.07)	87.73 (0.35)	93.88 (0.28)	93.20 (0.67)
	RRC	93.13 (0.20)	81.81 (0.09)	86.01 (0.06)	87.43 (0.34)	93.56 (0.17)	93.88 (0.57)
Rej. Ratio	Proposed: Acp	0.02	0.00	0.02	<0.01	0.00	<0.01
Rej. AUC [%]	Best base	66.09 (2.34)	N/A	55.90 (2.46)	63.34 (6.51)	N/A	61.79 (0.01)

FIG. 13

Performance with different number of base models
(Payment Risk data)

# Base	Rej. Ratio	Time [Sec]	PR-AUC [%]	F1 Score [%]
1	0.105	0.31 (0.06)	90.63 (0.65)	92.97 (0.48)
2	0.053	0.32 (0.03)	88.77 (0.50)	91.88 (0.21)
3	0.013	0.35 (0.03)	87.51 (0.30)	90.24 (0.26)
4	0.009	0.36 (0.03)	87.16 (0.18)	90.05 (0.36)
5	0.009	0.36 (0.02)	87.00 (0.23)	89.64 (0.52)
6	0.001	0.36 (0.02)	86.71 (0.48)	88.25 (0.36)
Best DES	N/A	1.44 (0.06)	85.11 (0.70)	86.09 (1.13)

FIG. 14

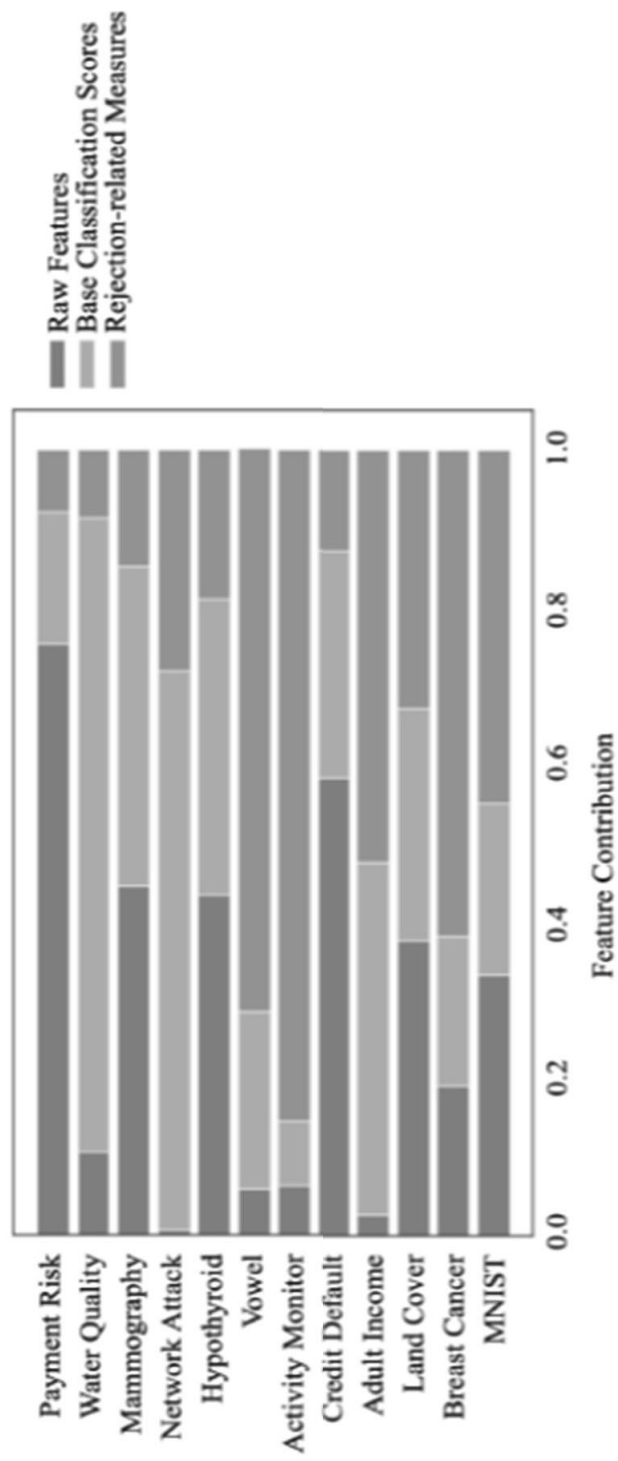


FIG. 15