Glaucus Automated supervised learning module experimental data results

I. Test plan

Balanced Accuracy(BOC) was used for calculation and evaluation. Compared with 500-scale random forest for the automated forecasting model, a random forest algorithm of 500-tree comparison was performed on 166 data sets (supervised learning data set) , Algorithm base scikit-learn basic algorithm package, the other parameters are used algorithm default

II. Test result

Among them, the fully automated prediction model on 17 datasets performed better than 500 traditional RF algorithms. The 145 datasets did not differ much from the RF algorithm, and the 4 datasets are worse than the RF algorithm.

III. Result in detail

A. The BOC and the selected pipeline

Dataset	Glaucus	500-tree RF	Pipeline
GAMETES_Epistasis_2-Way_1000atts_0.4H_EDM-1_EDM-1_1	53.3%	53.0%	KNeighborsClassifier(n_neighbors=62, p=1, weights="uniform")
GAMETES_Epistasis_2-Way_20atts_0.1H_EDM-1_1	60.6%	60.4%	make_pipeline(FastICA(tol=0.1), Normalizer(norm="l1"), DecisionTreeClassifier(criterion="gini", max_depth=9, min_samples_leaf=3, min_samples_split=13))
GAMETES_Epistasis_2-Way_20atts_0.4H_EDM-1_1	67.6%	67.3%	make_pipeline(StackingEstimator(estimator=RandomForestClassifier(bootstrap=True, criterion="gini", max_features=0.5, min_samples_leaf=6, min_samples_split=10, n_estimators=100)), GaussianNB())
GAMETES_Epistasis_3-Way_20atts_0.2H_EDM-1_1	56.7%	50.3%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), GradientBoostingClassifier(learning_rate=0.01, max_depth=8, max_features=0.4, min_samples_leaf=14, min_samples_split=4, n_estimators=100, subsample=0.9000000000000001))

Dataset	Glaucus	500-tree RF	Pipeline
GAMETES_Heterogeneity_20atts_1600_Het_0.4_0.2_50_EDM-2_001	71.9%	67.3%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), RandomForestClassifier(bootstrap=True, criterion="entropy", max_features=0.25, min_samples_leaf=18, min_samples_split=12, n_estimators=100))
GAMETES_Heterogeneity_20atts_1600_Het_0.4_0.2_75_EDM-2_001	72.6%	66.5%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), DecisionTreeClassifier(criterion="entropy", max_depth=8, min_samples_leaf=19, min_samples_split=9))
Hill_Valley_with_noise	99.8%	57.1%	make_pipeline(Normalizer(norm="max"), KNeighborsClassifier(n_neighbors=12, p=2, weights="distance"))
Hill_Valley_without_noise	96.6%	61.0%	LogisticRegression(C=10.0, dual=False, penalty="l2")
adult	86.5%	86.1%	GradientBoostingClassifier(learning_rate=1.0, max_depth=1, max_features=0.55, min_samples_leaf=18, min_samples_split=18, n_estimators=100, subsample=0.9000000000000001)
agaricus-lepiota	100%	99.7%	ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.7500000000000001, min_samples_leaf=10, min_samples_split=8, n_estimators=100)
allbp	97.6%	97.1%	GradientBoostingClassifier(learning_rate=0.5, max_depth=8, max_features=0.25, min_samples_leaf=14, min_samples_split=14, n_estimators=100, subsample=0.8500000000000001)
allhyper	98.3%	98.8%	make_pipeline(StackingEstimator(estimator=ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=1.0, min_samples_leaf=10, min_samples_split=17, n_estimators=100)), ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.7000000000000001, min_samples_leaf=11, min_samples_split=17, n_estimators=100))

Dataset	Glaucus	500-tree RF	Pipeline
allhypo	96.9%	81.6%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), StackingEstimator(estimator=ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.6500000000000001, min_samples_leaf=3, min_samples_split=15, n_estimators=100)), LinearSVC(C=5.0, dual=False, loss="squared_hinge", penalty="l1", tol=0.1))
allrep	98.6%	98.0%	GradientBoostingClassifier(learning_rate=0.5, max_depth=4, max_features=0.8, min_samples_leaf=19, min_samples_split=16, n_estimators=100, subsample=0.55)
analcatdata_aids	74.5%	75.0%	LogisticRegression(C=0.1, dual=False, penalty="l1")
analcatdata_asbestos	86.5%	87.0%	GaussianNB()
analcatdata_authorship	99.8%	99.2%	make_pipeline(StackingEstimator(estimator=ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.35000000000000003, min_samples_leaf=4, min_samples_split=11, n_estimators=100)), LinearSVC(C=0.001, dual=False, loss="squared_hinge", penalty="l2", tol=0.0001))
analcatdata_bankruptcy	94.3%	94.1%	make_pipeline(RFE(estimator=ExtraTreesClassifier(criterion="gini", max_features=0.4, n_estimators=100), step=0.8), LinearSVC(C=0.01, dual=False, loss="squared_hinge", penalty="l1", tol=0.0001))
analcatdata_boxing1	75.4%	75.1%	make_pipeline(StackingEstimator(estimator=DecisionTreeClassifier(criterion="gini", max_depth=6, min_samples_leaf=7, min_samples_split=10)), GaussianNB())
analcatdata_boxing2	72.1%	72.6%	DecisionTreeClassifier(criterion="gini", max_depth=1, min_samples_leaf=11, min_samples_split=10)
analcatdata_creditscore	100%	100%	DecisionTreeClassifier(criterion="gini", max_depth=8, min_samples_leaf=5, min_samples_split=13)
analcatdata_cyyoung8092	92.5%	92.7%	LogisticRegression(C=1.0, dual=False, penalty="l1")

Dataset	Glaucus	500-tree RF	Pipeline
analcatdata_cyyoung9302	88.9%	88.5%	make_pipeline(StackingEstimator(estimator=RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.2, min_samples_leaf=5, min_samples_split=4, n_estimators=100)), RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.5, min_samples_leaf=8, min_samples_split=10, n_estimators=100))
analcatdata_dmft	24.2%	24.7%	GradientBoostingClassifier(learning_rate=0.1, max_depth=7, max_features=0.1, min_samples_leaf=16, min_samples_split=5, n_estimators=100, subsample=0.6500000000000001)
analcatdata_fraud	92.6%	92.4%	make_pipeline(make_union(FunctionTransformer(copy), FunctionTransformer(copy)), RandomForestClassifier(bootstrap=True, criterion="entropy", max_features=0.35000000000000003, min_samples_leaf=4, min_samples_split=3, n_estimators=100))
analcatdata_germangss	41.5%	35.1%	DecisionTreeClassifier(criterion="gini", max_depth=9, min_samples_leaf=15, min_samples_split=16)
analcatdata_happiness	63.9%	45.1%	make_pipeline(RobustScaler(), GradientBoostingClassifier(learning_rate=0.5, max_depth=9, max_features=0.1, min_samples_leaf=4, min_samples_split=13, n_estimators=100, subsample=0.5))
analcatdata_japansolvent	88.9%	88.9%	RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.2, min_samples_leaf=14, min_samples_split=19, n_estimators=100)
analcatdata_lawsuit	98.4%	97.9%	make_pipeline(FeatureAgglomeration(affinity="precomputed", linkage="average"), GaussianNB())
ann-thyroid	99.5%	99.1%	RandomForestClassifier(bootstrap=False, criterion="entropy", max_features=0.6500000000000001, min_samples_leaf=5, min_samples_split=20, n_estimators=100)
appendicitis	87.9%	87.9%	RandomForestClassifier(bootstrap=False, criterion="entropy", max_features=0.05, min_samples_leaf=5, min_samples_split=19, n_estimators=100)
australian	87.3%	87.7%	GradientBoostingClassifier(learning_rate=0.1, max_depth=4, max_features=0.15000000000000002, min_samples_leaf=11, min_samples_split=6, n_estimators=100, subsample=0.6500000000000001)

Dataset	Glaucus	500-tree RF	Pipeline
auto	72.9%	72.7%	GradientBoostingClassifier(learning_rate=0.1, max_depth=1, max_features=0.6000000000000001, min_samples_leaf=1, min_samples_split=7, n_estimators=100, subsample=0.9000000000000001)
backache	84.8%	84.5%	KNeighborsClassifier(n_neighbors=58, p=1, weights="distance")
balance-scale	90.9%	67.2%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), LogisticRegression(C=0.01, dual=False, penalty="l1"))
banana	90.2%	89.2%	make_pipeline(ZeroCount(), ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.9000000000000001, min_samples_leaf=2, min_samples_split=5, n_estimators=100))
biomed	93.1%	92.9%	make_pipeline(StackingEstimator(estimator=KNeighborsClassifier(n_neighbors=1, p=1, weights="uniform")), RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.9500000000000001, min_samples_leaf=8, min_samples_split=12, n_estimators=100))
breast-cancer-wisconsin	97.0%	96.7%	make_pipeline(MaxAbsScaler(), LogisticRegression(C=10.0, dual=False, penalty="l2"))
breast-cancer	75.0%	80.2%	make_pipeline(StackingEstimator(estimator=LinearSVC(C=10.0, dual=False, loss="squared_hinge", penalty="l1", tol=0.0001)), FastICA(tol=0.5), RandomForestClassifier(bootstrap=True, criterion="entropy", max_features=0.7500000000000001, min_samples_leaf=9, min_samples_split=4, n_estimators=100))
breast-w	97.1%	96.8%	make_pipeline(StackingEstimator(estimator=GaussianNB()), KNeighborsClassifier(n_neighbors=24, p=1, weights="distance"))
breast	97.3%	97.8%	GradientBoostingClassifier(learning_rate=0.1, max_depth=9, max_features=1.0, min_samples_leaf=5, min_samples_split=18, n_estimators=100, subsample=0.6500000000000001)

Dataset	Glaucus	500-tree RF	Pipeline
buggyCrx	88.0%	88.1%	GradientBoostingClassifier(learning_rate=0.01, max_depth=10, max_features=0.3, min_samples_leaf=2, min_samples_split=6, n_estimators=100, subsample=0.6500000000000001)
bupa	69.7%	69.4%	ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.55, min_samples_leaf=4, min_samples_split=6, n_estimators=100)
calendarDOW	61.7%	62.1%	make_pipeline(VarianceThreshold(threshold=0.25), MaxAbsScaler(), KNeighborsClassifier(n_neighbors=9, p=2, weights="distance"))
car-evaluation	97.8%	92.9%	GradientBoostingClassifier(learning_rate=0.5, max_depth=6, max_features=0.6500000000000001, min_samples_leaf=5, min_samples_split=3, n_estimators=100, subsample=0.9000000000000001)
car	98.7%	98.2%	make_pipeline(StackingEstimator(estimator=GradientBoostingClassifier(learning_rate=0.5, max_depth=4, max_features=0.7500000000000001, min_samples_leaf=1, min_samples_split=8, n_estimators=100, subsample=0.7000000000000001)), GaussianNB())
cars	90.9%	90.9%	RandomForestClassifier(bootstrap=True, criterion="gini", max_features=1.0, min_samples_leaf=3, min_samples_split=6, n_estimators=100)
cars1	83.2%	83.3%	RandomForestClassifier(bootstrap=False, criterion="entropy", max_features=0.7500000000000001, min_samples_leaf=4, min_samples_split=8, n_estimators=100)
chess	99.2%	99.7%	ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.4, min_samples_leaf=2, min_samples_split=3, n_estimators=100)
churn	95.7%	95.2%	ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.6500000000000001, min_samples_leaf=1, min_samples_split=2, n_estimators=100)
clean1	100%	100%	LogisticRegression(C=0.01, dual=False, penalty="l1")
clean2	100%	100%	LogisticRegression(C=0.5, dual=False, penalty="l2")

Dataset	Glaucus	500-tree RF	Pipeline
cleve	83.5%	83.1%	make_pipeline(ZeroCount(), OneHotEncoder(minimum_fraction=0.2, sparse=False), BernoulliNB(alpha=10.0, fit_prior=False))
cleveland-nominal	59.1%	59.5%	KNeighborsClassifier(n_neighbors=27, p=2, weights="distance")
cleveland	61.3%	61.8%	make_pipeline(StackingEstimator(estimator=GaussianNB()), DecisionTreeClassifier(criterion="gini", max_depth=2, min_samples_leaf=13, min_samples_split=2))
cloud	63.8%	49.5%	KNeighborsClassifier(n_neighbors=53, p=2, weights="distance")
cmc	55.8%	55.5%	ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.9000000000000001, min_samples_leaf=18, min_samples_split=18, n_estimators=100)
coil2000	94.0%	93.6%	DecisionTreeClassifier(criterion="entropy", max_depth=3, min_samples_leaf=14, min_samples_split=5)
colic	86.8%	86.9%	DecisionTreeClassifier(criterion="gini", max_depth=4, min_samples_leaf=18, min_samples_split=18)
collins	100%	97%	GaussianNB()
confidence	81.9%	81.7%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), KNeighborsClassifier(n_neighbors=2, p=2, weights="distance"))
connect-4	83.6%	83.4%	GradientBoostingClassifier(learning_rate=0.5, max_depth=10, max_features=0.35000000000000003, min_samples_leaf=16, min_samples_split=12, n_estimators=100, subsample=0.7500000000000001)
contraceptive	56.8%	56.5%	make_pipeline(OneHotEncoder(minimum_fraction=0.05, sparse=False), GradientBoostingClassifier(learning_rate=0.1, max_depth=2, max_features=0.7000000000000001, min_samples_leaf=10, min_samples_split=20, n_estimators=100, subsample=0.6000000000000001))
corral	100%	100%	GradientBoostingClassifier(learning_rate=0.1, max_depth=9, max_features=0.6500000000000001, min_samples_leaf=13, min_samples_split=15, n_estimators=100, subsample=0.9000000000000001)
credit-a	88.6%	88.2%	LogisticRegression(C=10.0, dual=False, penalty="l1")

Dataset	Glaucus	500-tree RF	Pipeline
credit-g	74.7%	74.2%	RandomForestClassifier(bootstrap=True, criterion="gini", max_features=0.7500000000000001, min_samples_leaf=5, min_samples_split=19, n_estimators=100)
crx	86.1%	85.7%	make_pipeline(StackingEstimator(estimator=BernoulliNB(alpha=100.0, fit_prior=False)), GradientBoostingClassifier(learning_rate=0.01, max_depth=4, max_features=0.2, min_samples_leaf=8, min_samples_split=19, n_estimators=100, subsample=0.45))
dermatology	98%	98.1%	RandomForestClassifier(bootstrap=False, criterion="entropy", max_features=0.1, min_samples_leaf=2, min_samples_split=8, n_estimators=100)
diabetes	78.6%	78.1%	ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.9000000000000001, min_samples_leaf=4, min_samples_split=17, n_estimators=100)
dis	99.0%	74.2%	DecisionTreeClassifier(criterion="entropy", max_depth=9, min_samples_leaf=14, min_samples_split=11)
dna	95.6%	95.2%	make_pipeline(SelectFwe(score_func=f_classif, alpha=0.048), StackingEstimator(estimator=LinearSVC(C=0.0001, dual=False, loss="squared_hinge", penalty="l1", tol=0.01)), BernoulliNB(alpha=0.001, fit_prior=True))
ecoli	88.2%	94.3%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), LogisticRegression(C=15.0, dual=False, penalty="l2"))
fars	79.9%	80.3%	make_pipeline(make_union(FunctionTransformer(copy), FunctionTransformer(copy)), ExtraTreesClassifier(bootstrap=False, criterion="gini", max_features=0.8500000000000001, min_samples_leaf=20, min_samples_split=15, n_estimators=100))
flags	52.1%	51.8%	GradientBoostingClassifier(learning_rate=0.01, max_depth=10, max_features=0.6000000000000001, min_samples_leaf=3, min_samples_split=11, n_estimators=100, subsample=0.9000000000000001)

Dataset	Glaucus	500-tree RF	Pipeline
flare	83.6%	83.2%	make_pipeline(OneHotEncoder(minimum_fraction=0.1, sparse=False), Binarizer(threshold=0.9500000000000001), ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.6500000000000001, min_samples_leaf=18, min_samples_split=2, n_estimators=100))
german	74.3%	74.7%	make_pipeline(make_union(FunctionTransformer(copy), FunctionTransformer(copy)), RandomForestClassifier(bootstrap=True, criterion="entropy", max_features=0.6500000000000001, min_samples_leaf=1, min_samples_split=16, n_estimators=100))
glass	69.1%	69.2%	ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.5, min_samples_leaf=6, min_samples_split=7, n_estimators=100)
glass2	80.8%	80.7%	ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.45, min_samples_leaf=5, min_samples_split=3, n_estimators=100)
haberman	79.4%	79.7%	make_pipeline(ZeroCount(), GaussianNB())
hayes-roth	83.9%	83.7%	ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.5, min_samples_leaf=1, min_samples_split=5, n_estimators=100)
heart-c	86.3%	85.9%	LogisticRegression(C=15.0, dual=False, penalty="l2")
heart-h	83.4%	83.9%	make_pipeline(RobustScaler(), KNeighborsClassifier(n_neighbors=5, p=2, weights="uniform"))
heart-statlog	86.8%	86.8%	RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.3, min_samples_leaf=14, min_samples_split=4, n_estimators=100)
hepatitis	88.2%	87.8%	GradientBoostingClassifier(learning_rate=0.1, max_depth=6, max_features=0.2, min_samples_leaf=6, min_samples_split=17, n_estimators=100, subsample=0.9500000000000001)
horse-colic	86.8%	86.4%	make_pipeline(StandardScaler(), DecisionTreeClassifier(criterion="gini", max_depth=2, min_samples_leaf=19, min_samples_split=17))

Dataset	Glaucus	500-tree RF	Pipeline
house-votes-84	95.7%	95.9%	DecisionTreeClassifier(criterion="gini", max_depth=7, min_samples_leaf=14, min_samples_split=16)
hungarian	84.4%	84.8%	make_pipeline(ZeroCount(), StackingEstimator(estimator=GaussianNB()), ExtraTreesClassifier(bootstrap=True, criterion="gini", max_features=0.5, min_samples_leaf=1, min_samples_split=12, n_estimators=100))
hypothyroid	98.3%	98.4%	make_pipeline(StackingEstimator(estimator=ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.6500000000000001, min_samples_leaf=1, min_samples_split=14, n_estimators=100)), ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.8, min_samples_leaf=7, min_samples_split=7, n_estimators=100))
ionosphere	93.5%	93.3%	make_pipeline(StackingEstimator(estimator=RandomForestClassifier(bootstrap=True, criterion="entropy", max_features=0.55, min_samples_leaf=1, min_samples_split=4, n_estimators=100)), DecisionTreeClassifier(criterion="gini", max_depth=6, min_samples_leaf=15, min_samples_split=17))
iris	98.1%	98.3%	make_pipeline(Normalizer(norm="l1"), GaussianNB())
irish	100%	100%	DecisionTreeClassifier(criterion="gini", max_depth=9, min_samples_leaf=18, min_samples_split=12)
kddcup	99.96%	99.9%	RandomForestClassifier(bootstrap=True, criterion="gini", max_features=0.15000000000000002, min_samples_leaf=2, min_samples_split=10, n_estimators=100)
kr-vs-kp	99.2%	99.6%	GradientBoostingClassifier(learning_rate=0.1, max_depth=6, max_features=0.6000000000000001, min_samples_leaf=17, min_samples_split=8, n_estimators=100, subsample=0.8500000000000001)
krkopt	76.6%	76.6%	RandomForestClassifier(bootstrap=True, criterion="gini", max_features=0.35000000000000003, min_samples_leaf=1, min_samples_split=5, n_estimators=100)

Dataset	Glaucus	500-tree RF	Pipeline
labor	93.1%	92.1%	ExtraTreesClassifier(bootstrap=False, criterion="gini", max_features=0.9000000000000001, min_samples_leaf=4, min_samples_split=20, n_estimators=100)
led24	73.6%	73.7%	GradientBoostingClassifier(learning_rate=0.001, max_depth=8, max_features=0.45, min_samples_leaf=19, min_samples_split=3, n_estimators=100, subsample=0.15000000000000002)
led7	74.1%	73.7%	make_pipeline(SelectFwe(score_func=f_classif, alpha=0.012), StackingEstimator(estimator=GradientBoostingClassifier(learning_rate=0.1, max_depth=5, max_features=0.3, min_samples_leaf=4, min_samples_split=20, n_estimators=100, subsample=0.9000000000000001)), BernoulliNB(alpha=100.0, fit_prior=False))
letter	90.7%	90.6%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), StackingEstimator(estimator=GradientBoostingClassifier(learning_rate=0.5, max_depth=1, max_features=0.7500000000000001, min_samples_leaf=13, min_samples_split=11, n_estimators=100, subsample=0.15000000000000002)), RandomForestClassifier(bootstrap=False, criterion="entropy", max_features=0.35000000000000003, min_samples_leaf=20, min_samples_split=4, n_estimators=100))
liver-disorder	73.1%	73.2%	KNeighborsClassifier(n_neighbors=19, p=2, weights="distance")
lupus	78.3%	78.5%	GradientBoostingClassifier(learning_rate=0.01, max_depth=4, max_features=0.7500000000000001, min_samples_leaf=9, min_samples_split=3, n_estimators=100, subsample=0.5)
lymphography	81.7%	80.9%	make_pipeline(StackingEstimator(estimator=RandomForestClassifier(bootstrap=True, criterion="gini", max_features=0.35000000000000003, min_samples_leaf=5, min_samples_split=16, n_estimators=100)), ExtraTreesClassifier(bootstrap=False, criterion="gini", max_features=0.9000000000000001, min_samples_leaf=14, min_samples_split=7, n_estimators=100))

Dataset	Glaucus	500-tree RF	Pipeline
magic	87.7%	87.6%	GradientBoostingClassifier(learning_rate=0.1, max_depth=4, max_features=0.7500000000000001, min_samples_leaf=17, min_samples_split=6, n_estimators=100, subsample=0.9500000000000001)
mfeat-factors	97.3%	97.5%	LogisticRegression(C=5.0, dual=False, penalty="l1")
mfeat-fourier	84.2%	83.7%	make_pipeline(SelectFwe(score_func=f_classif, alpha=0.015), ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.7000000000000001, min_samples_leaf=1, min_samples_split=12, n_estimators=100))
mfeat-karhunen	95.6%	95.2%	make_pipeline(StackingEstimator(estimator=ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.15000000000000002, min_samples_leaf=4, min_samples_split=10, n_estimators=100)), GaussianNB())
mfeat-morphological	74.2%	74.7%	make_pipeline(StackingEstimator(estimator=GradientBoostingClassifier(learning_rate=0.01, max_depth=9, max_features=0.2, min_samples_leaf=14, min_samples_split=2, n_estimators=100, subsample=0.05)), LogisticRegression(C=20.0, dual=False, penalty="l1"))
mfeat-pixel	96.7%	96.8%	KNeighborsClassifier(n_neighbors=7, p=1, weights="distance")
mfeat-zernike	81.4%	81.1%	KNeighborsClassifier(n_neighbors=16, p=2, weights="uniform")
mnist	95.8%	95.7%	make_pipeline(MaxAbsScaler(), ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.1, min_samples_leaf=9, min_samples_split=16, n_estimators=100))
mofn-3-7-10	100%	93.3%	XGBClassifier(learning_rate=0.5, max_depth=2, min_child_weight=11, n_estimators=100, nthread=1, subsample=0.8500000000000001)

Dataset	Glaucus	500-tree RF	Pipeline
molecular-biology_promoters	100%	100%	make_pipeline(RFE(estimator=ExtraTreesClassifier(criterion="gini", max_features=0.1, n_estimators=100), step=0.9500000000000001), StackingEstimator(estimator=GradientBoostingClassifier(l earning_rate=0.5, max_depth=10, max_features=0.6500000000000001, min_samples_leaf=10, min_samples_split=19, n_estimators=100, subsample=1.0)), RandomForestClassifier(bootstrap=True, criterion="gini", max_features=0.35000000000000003, min_samples_leaf=20, min_samples_split=11, n_estimators=100))
monk1	99.7%	97.3%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), StackingEstimator(estimator=GradientBoostingClassifier(l earning_rate=0.5, max_depth=6, max_features=0.15000000000000002, min_samples_leaf=4, min_samples_split=2, n_estimators=100, subsample=0.8)), GaussianNB())
monk2	87.6%	82.2%	make_pipeline(StackingEstimator(estimator=LogisticRegression(C=15.0, dual=True, penalty="l2")), StackingEstimator(estimator=GradientBoostingClassifier(l earning_rate=0.5, max_depth=7, max_features=0.7500000000000001, min_samples_leaf=11, min_samples_split=8, n_estimators=100, subsample=0.4)), ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.45, min_samples_leaf=2, min_samples_split=15, n_estimators=100))
monk3	98.7%	99.1%	make_pipeline(StackingEstimator(estimator=DecisionTreeClassifier(criteri on="gini", max_depth=7, min_samples_leaf=2, min_samples_split=10)), StackingEstimator(estimator=DecisionTreeClassifier(criteri on="gini", max_depth=3, min_samples_leaf=5, min_samples_split=13)), LogisticRegression(C=0.1, dual=False, penalty="l2"))
movement_libras	70.8%	71.1%	LogisticRegression(C=15.0, dual=False, penalty="l1")

Dataset	Glaucus	500-tree RF	Pipeline
mushroom	100%	100%	GradientBoostingClassifier(learning_rate=1.0, max_depth=1, max_features=0.45, min_samples_leaf=18, min_samples_split=2, n_estimators=100, subsample=0.35000000000000003)
mux6	85.3%	85.5%	KNeighborsClassifier(n_neighbors=66, p=1, weights="distance")
new-thyroid	96.1%	95.8%	make_pipeline(StackingEstimator(estimator=LogisticRegression(C=0.1, dual=False, penalty="l2")), StackingEstimator(estimator=RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.35000000000000003, min_samples_leaf=20, min_samples_split=16, n_estimators=100)), StackingEstimator(estimator=RandomForestClassifier(bootstrap=True, criterion="entropy", max_features=0.4, min_samples_leaf=6, min_samples_split=10, n_estimators=100)), GaussianNB())
nursery	99.9%	100%	GradientBoostingClassifier(learning_rate=0.1, max_depth=6, max_features=0.9500000000000001, min_samples_leaf=19, min_samples_split=6, n_estimators=100, subsample=0.6000000000000001)
optdigits	97.5%	98.0%	make_pipeline(StandardScaler(), StackingEstimator(estimator=KNeighborsClassifier(n_neighbors=8, p=1, weights="distance")), RandomForestClassifier(bootstrap=True, criterion="gini", max_features=0.35000000000000003, min_samples_leaf=3, min_samples_split=7, n_estimators=100))
page-blocks	97.2%	97.2%	RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.55, min_samples_leaf=9, min_samples_split=12, n_estimators=100)
parity5+5	63.2%	32.3%	make_pipeline(PCA(iterated_power=3, svd_solver="randomized"), RandomForestClassifier(bootstrap=False, criterion="entropy", max_features=0.8500000000000001, min_samples_leaf=7, min_samples_split=7, n_estimators=100))

Dataset	Glaucus	500-tree RF	Pipeline
parity5	65.9%	0.1%	make_pipeline(StackingEstimator(estimator=ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.7000000000000001, min_samples_leaf=7, min_samples_split=8, n_estimators=100)), KNeighborsClassifier(n_neighbors=11, p=2, weights="uniform"))
pendigits	98.8%	99.1%	ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.6000000000000001, min_samples_leaf=6, min_samples_split=14, n_estimators=100)
phoneme	88.8%	89%	make_pipeline(make_union(FunctionTransformer(copy), FunctionTransformer(copy)), ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.8500000000000001, min_samples_leaf=5, min_samples_split=8, n_estimators=100))
pima	78.4%	82.5%	make_pipeline(make_union(FunctionTransformer(copy), FunctionTransformer(copy)), LogisticRegression(C=1.0, dual=False, penalty="l1"))
poker	63.97%	63.5%	make_pipeline(MaxAbsScaler(), ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.2, min_samples_leaf=8, min_samples_split=19, n_estimators=100))
postoperative-patient-data	75.4%	75.6%	LinearSVC(C=0.0001, dual=False, loss="squared_hinge", penalty="l1", tol=0.001)
prnn_crabs	100%	94.7%	LogisticRegression(C=1.0, dual=False, penalty="l1")
prnn_fglass	80.5%	80.3%	make_pipeline(StackingEstimator(estimator=DecisionTreeClassifier(criterion="gini", max_depth=9, min_samples_leaf=19, min_samples_split=11)), RandomForestClassifier(bootstrap=True, criterion="gini", max_features=0.9000000000000001, min_samples_leaf=1, min_samples_split=9, n_estimators=100))

Dataset	Glaucus	500-tree RF	Pipeline
prnn_synth	87.4%	87.7%	KNeighborsClassifier(n_neighbors=35, p=2, weights="distance")
profb	68.5%	68.6%	RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.45, min_samples_leaf=19, min_samples_split=16, n_estimators=100)
promoters	98.8%	98.7%	RandomForestClassifier(bootstrap=False, criterion="entropy", max_features=0.55, min_samples_leaf=2, min_samples_split=3, n_estimators=100)
ring	98.1%	97.8%	make_pipeline(FastICA(tol=0.8), StackingEstimator(estimator=LinearSVC(C=0.1, dual=False, loss="squared_hinge", penalty="l1", tol=0.1)), GaussianNB())
saheart	73.7%	73.7%	RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.25, min_samples_leaf=10, min_samples_split=20, n_estimators=100)
satimage	89.6%	89.8%	GradientBoostingClassifier(learning_rate=0.01, max_depth=9, max_features=0.8500000000000001, min_samples_leaf=5, min_samples_split=13, n_estimators=100, subsample=0.9500000000000001)
schizo	71.3%	71.1%	make_pipeline(StackingEstimator(estimator=DecisionTreeClassifier(criterion="entropy", max_depth=7, min_samples_leaf=6, min_samples_split=20)), DecisionTreeClassifier(criterion="entropy", max_depth=7, min_samples_leaf=18, min_samples_split=9))
segmentation	96.0%	96.5%	make_pipeline(StackingEstimator(estimator=ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.5, min_samples_leaf=18, min_samples_split=8, n_estimators=100)), RandomForestClassifier(bootstrap=False, criterion="entropy", max_features=0.55, min_samples_leaf=12, min_samples_split=12, n_estimators=100))
shuttle	99.98%	99.91%	RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.55, min_samples_leaf=4, min_samples_split=6, n_estimators=100)

Dataset	Glaucus	500-tree RF	Pipeline
sleep	76.9%	76.4%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.25, min_samples_leaf=5, min_samples_split=4, n_estimators=100))
solar-flare_1	73.7%	73.3%	RandomForestClassifier(bootstrap=True, criterion="entropy", max_features=0.5, min_samples_leaf=16, min_samples_split=3, n_estimators=100)
solar-flare_2	73.7%	73.5%	make_pipeline(VarianceThreshold(threshold=0.45), StackingEstimator(estimator=ExtraTreesClassifier(bootstrap=False, criterion="entropy", max_features=0.15000000000000002, min_samples_leaf=1, min_samples_split=19, n_estimators=100)), GradientBoostingClassifier(learning_rate=0.001, max_depth=8, max_features=0.1, min_samples_leaf=2, min_samples_split=12, n_estimators=100, subsample=0.7500000000000001))
sonar	80.0%	79.9%	GradientBoostingClassifier(learning_rate=1.0, max_depth=6, max_features=0.3, min_samples_leaf=14, min_samples_split=15, n_estimators=100, subsample=0.8)
soybean	91.4%	91.7%	RandomForestClassifier(bootstrap=True, criterion="entropy", max_features=0.8500000000000001, min_samples_leaf=1, min_samples_split=11, n_estimators=100)
spambase	95.2%	95.2%	make_pipeline(MinMaxScaler(), RandomForestClassifier(bootstrap=True, criterion="gini", max_features=0.15000000000000002, min_samples_leaf=1, min_samples_split=4, n_estimators=100))
spect	83.3%	83.3%	make_pipeline(PCA(iterated_power=4, svd_solver="randomized"), RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.15000000000000002, min_samples_leaf=15, min_samples_split=18, n_estimators=100))

Dataset	Glaucus	500-tree RF	Pipeline
spectf	86.5%	86.1%	make_pipeline(StackingEstimator(estimator=LinearSVC(C=0.0001, dual=True, loss="squared_hinge", penalty="l2", tol=0.001)), GradientBoostingClassifier(learning_rate=0.1, max_depth=4, max_features=0.3, min_samples_leaf=17, min_samples_split=4, n_estimators=100, subsample=0.9000000000000001))
splice	94.9%	74.5%	ExtraTreesClassifier(bootstrap=False, criterion="gini", max_features=0.55, min_samples_leaf=7, min_samples_split=6, n_estimators=100)
tae	54.7%	55.1%	DecisionTreeClassifier(criterion="entropy", max_depth=4, min_samples_leaf=4, min_samples_split=15)
texture	99.8%	99.5%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), LogisticRegression(C=25.0, dual=False, penalty="l2"))
threeOf9	100%	99.7%	make_pipeline(StackingEstimator(estimator=GradientBoostingClassifier(learning_rate=0.1, max_depth=3, max_features=0.8500000000000001, min_samples_leaf=20, min_samples_split=18, n_estimators=100, subsample=0.9000000000000001)), LogisticRegression(C=15.0, dual=False, penalty="l1"))
tic-tac-toe	98.4%	92.7%	make_pipeline(ZeroCount(), ExtraTreesClassifier(bootstrap=True, criterion="entropy", max_features=0.9000000000000001, min_samples_leaf=5, min_samples_split=14, n_estimators=100))
titanic	79%	79.4%	make_pipeline(FastICA(tol=0.5), KNeighborsClassifier(n_neighbors=15, p=2, weights="uniform"))
tokyo1	93.1%	92.8%	make_pipeline(StackingEstimator(estimator=ExtraTreesClassifier(bootstrap=False, criterion="gini", max_features=0.35000000000000003, min_samples_leaf=4, min_samples_split=16, n_estimators=100)), StandardScaler(), GradientBoostingClassifier(learning_rate=0.5, max_depth=7, max_features=0.5, min_samples_leaf=7, min_samples_split=5, n_estimators=100, subsample=0.8))

Dataset	Glaucus	500-tree RF	Pipeline
twonorm	97.6%	97.3%	make_pipeline(PCA(iterated_power=4, svd_solver="randomized"), GradientBoostingClassifier(learning_rate=0.1, max_depth=6, max_features=0.4, min_samples_leaf=10, min_samples_split=10, n_estimators=100, subsample=1.0))
vehicle	80.2%	79.7%	make_pipeline(StackingEstimator(estimator=DecisionTreeClassifier(criterion="gini", max_depth=2, min_samples_leaf=18, min_samples_split=8)), LogisticRegression(C=0.5, dual=False, penalty="l2"))
vote	96.4%	96.8%	LogisticRegression(C=10.0, dual=False, penalty="l1")
vowel	91.4%	90.9%	make_pipeline(StackingEstimator(estimator=GradientBoostingClassifier(learning_rate=0.1, max_depth=7, max_features=0.35000000000000003, min_samples_leaf=4, min_samples_split=12, n_estimators=100, subsample=0.7000000000000001)), ExtraTreesClassifier(bootstrap=True, criterion="gini", max_features=0.7000000000000001, min_samples_leaf=7, min_samples_split=8, n_estimators=100))
waveform-21	87.0%	87.3%	LogisticRegression(C=1.0, dual=False, penalty="l1")
waveform-40	86.4%	86.7%	make_pipeline(SelectFwe(score_func=f_classif, alpha=0.045), KNeighborsClassifier(n_neighbors=100, p=2, weights="distance"))
wdbc	96.0%	95.9%	make_pipeline(PolynomialFeatures(degree=2, include_bias=False, interaction_only=False), RandomForestClassifier(bootstrap=False, criterion="gini", max_features=0.35000000000000003, min_samples_leaf=10, min_samples_split=7, n_estimators=100))
wine-quality-red	65.2%	65.4%	make_pipeline(ZeroCount(), RandomForestClassifier(bootstrap=True, criterion="entropy", max_features=0.05, min_samples_leaf=1, min_samples_split=6, n_estimators=100))
wine-quality-white	63.5%	63.7%	GradientBoostingClassifier(learning_rate=0.1, max_depth=7, max_features=0.7000000000000001, min_samples_leaf=5, min_samples_split=12, n_estimators=100, subsample=0.9500000000000001)

Dataset	Glaucus	500-tree RF	Pipeline
wine-recognition	92.6%	99.7%	ExtraTreesClassifier(bootstrap=True, criterion="gini", max_features=0.9500000000000001, min_samples_leaf=13, min_samples_split=16, n_estimators=100)
xd6	100%	100%	GradientBoostingClassifier(learning_rate=0.5, max_depth=9, max_features=1.0, min_samples_leaf=8, min_samples_split=8, n_estimators=100, subsample=0.6500000000000001)
yeast	61.9%	61.9%	RandomForestClassifier(bootstrap=False, criterion="entropy", max_features=0.4, min_samples_leaf=11, min_samples_split=9, n_estimators=100)

*green shows better，red shows worse，black shows no differ（beyond 0.5%）

B. line graph