Supplementary Material

Classification of sodium MRI data of cartilage using machine learning

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Tables

Table S1. Individual measurements - Resubmission - All OA

Methods	Options	Measurements	Adj. Acc. (%)	Acc. (%)	Sens. (%)	Spec. (%)
DIA	Linear	**Min[STD]$_{IRW}$**	**75.36**	**78.7**	**82.1**	**73.7**
		Max[MEAN]$_{IRW}$	58.49	70.2	82.1	52.6
		Mean[STD]$_{IRW}$	52.36	63.8	71.4	52.6
DIA	Quadratic	**Min[STD]$_{IRW}$**	**78.62**	**78.7**	**78.6**	**78.9**
		Mean[STD]$_{IRW}$	67.93	68.1	67.9	68.4
		Mean[MEAN]$_{IRW}$	54.98	70.2	85.7	47.4
LGR	Linear	**Min[STD]$_{IRW}$**	**75.36**	**78.7**	**82.1**	**73.7**
		Max[MEAN]$_{IRW}$	58.49	70.2	82.1	52.6
		Mean[STD]$_{IRW}$	56.36	63.8	71.4	52.6
LGR	Quadratic	**Min[STD]$_{IRW}$**	**75.53**	**76.6**	**75.0**	**78.9**
		Max[STD]$_{IRW}$	71.73	72.3	71.4	73.7
		Mean[STD]$_{IRW}$	69.35	72.3	67.9	78.9
LNR	Linear	**Min[STD]$_{IRW}$**	**75.36**	**78.7**	**82.1**	**73.7**
		Max[MEAN]$_{IRW}$	58.49	70.2	82.1	52.6
		Mean[STD]$_{IRW}$	56.36	63.8	71.4	52.6
LNR	Quadratic	**Min[STD]$_{IRW}$**	**75.36**	**78.7**	**82.1**	**73.7**
		Max[STD]$_{IRW}$	68.64	70.2	67.9	73.7
		Min[STD]$_{R3D}$	67.93	68.1	67.9	68.4
KNN	k = 3	**Max[MEAN]$_{IRW}$**	**81.71**	**87.2**	**92.9**	**78.9**
		Mean[STD]$_{IRW}$	78.62	78.7	78.6	78.9
		Max[STD]$_{R3D}$	78.62	78.7	78.6	78.9
KNN	k = 5	**Min[STD]$_{IRW}$**	**79.58**	**80.9**	**82.1**	**78.9**
		Max[MEAN]$_{IRW}$	76.07	80.9	85.7	73.7
		Min[MEAN]$_{IRW}$	76.36	78.7	82.1	73.7
NAB		**Min[STD]$_{IRW}$**	**78.62**	**78.7**	**78.6**	**78.9**
		Max[STD]$_{IRW}$	71.73	72.3	71.4	73.7
		Mean[STD]$_{IRW}$	69.35	72.3	67.9	78.9
NNE	N_{HL} = 10	**Min[STD]$_{IRW}$**	**78.62**	**78.7**	**78.6**	**78.9**
		Max[STD]$_{IRW}$	70.44	74.5	78.6	68.4
		Mean[MEAN]$_{R3D}$	69.73	72.3	75.0	68.4
NNE	N_{HL} = 20	**Max[MEAN]$_{IRW}$**	**76.07**	**80.9**	**85.7**	**73.7**
		Min[STD]$_{IRW}$	68.64	70.2	67.9	73.7
		Min[MEAN]$_{R3D}$	68.64	70.2	67.9	73.7
SVM	Linear	**Min[STD]$_{IRW}$**	**72.44**	**74.5**	**71.4**	**78.9**
		Mean[STD]$_{IRW}$	69.35	72.3	67.9	78.9
		Max[STD]$_{IRW}$	67.93	68.1	67.9	68.4
SVM	Quadratic	**Min[STD]$_{IRW}$**	**66.97**	**72.3**	**64.3**	**84.2**
		Std[STD]$_{R3D}$	64.09	66.0	67.9	63.2
		Mean[STD]$_{IRW}$	58.41	68.1	53.6	89.5
DTR		**Min[STD]$_{IRW}$**	**86.22**	**87.2**	**85.7**	**89.5**
		Mean[MEAN]$_{IRW}$	**86.22**	**87.2**	**85.7**	**89.5**
		Mean[STD]$_{IRW}$	85.22	87.2	89.3	84.2
TBG	N_T = 10	**Max[MEAN]$_{R3D}$**	**96.91**	**97.9**	**96.4**	**100**
		Min[MEAN]$_{R3D}$	**96.91**	**97.9**	**96.4**	**100**
		Mean[STD]$_{R3D}$	95.78	97.9	100	94.7
TBG	N_T = 20	**Min[MEAN]$_{IRW}$**	**100**	**100**	**100**	**100**
		Mean[MEAN]$_{R3D}$	**100**	**100**	**100**	**100**
		Min[MEAN]$_{R3D}$	**100**	**100**	**100**	**100**

Table S2. Individual measurements - Holdout train/test = 0.5/0.5 - 100 iterations - All OA

Methods	Options	Measurements	Adj. Acc. (%)	Acc. (%)	Sens. (%)	Spec. (%)
DIA	Linear	**Min[STD]$_{IRW}$**	**70.08±9.87**	**76.9±6.2**	**80.8±9.8**	**70.9±15.1**
		Mean[STD]$_{IRW}$	58.56±7.68	67.1±6.2	72.0±11.9	59.4±15.4
		Max[MEAN]$_{IRW}$	52.68±10.49	67.2±7.2	81.1±12.2	45.7±14.2
DIA	Quadratic	**Min[STD]$_{IRW}$**	**70.78±9.36**	**75.7±7.1**	**77.0±9.8**	**73.8±13.5**
		Mean[STD]$_{IRW}$	61.15±8.26	67.2±6.8	66.1±10.6	69.0±15.9
		Max[MEAN]$_{IRW}$	50.56±9.94	66.9±6.8	82.6±12.9	42.6±14.0
LGR	Linear	**Min[STD]$_{IRW}$**	**71.17±10.39**	**77.9±6.9**	**80.9±11.2**	**73.3±15.3**
		Mean[STD]$_{IRW}$	57.47±10.2	67.2±7.6	74.1±12.3	56.4±17.0
		Min[MEAN]$_{IRW}$	54.89±10.22	66.3±8.2	76.5±13.2	50.4±14.2
LGR	Quadratic	**Min[STD]$_{IRW}$**	**67.98±9.37**	**73.0±7.2**	**71.4±11.7**	**75.6±13.3**
		Mean[STD]$_{IRW}$	61.76±10.17	68.2±8.2	67.3±11.9	69.2±17.4
		Max[STD]$_{R3D}$	56.08±9.86	62.8±7.0	65.4±12.0	58.8±15.6
LNR	Linear	**Min[STD]$_{IRW}$**	**70.38±8.03**	**76.4±5.8**	**78.9±9.8**	**72.6±12.9**
		Mean[STD]$_{IRW}$	58.31±7.71	67.2±6.3	73.1±12.1	58.1±14.2
		Min[MEAN]$_{IRW}$	52.43±9.96	65.7±8.1	77.6±13.0	47.0±13.9
LNR	Quadratic	**Min[STD]$_{IRW}$**	**68.15±9.95**	**74.3±7.1**	**73.6±11.8**	**75.4±15.9**
		Mean[STD]$_{IRW}$	58.61±11.37	66.3±7.7	68.1±10.8	63.6±20.2
		Max[STD]$_{R3D}$	54.99±10.71	62.2±8.4	63.4±14.3	59.9±16.6
KNN	k = 3	**Min[STD]$_{IRW}$**	**63.56±9.84**	**69.9±7.7**	**71.8±12.2**	**67.0±14.9**
		Max[STD]$_{IRW}$	54.2±10.7	61.5±7.9	62.6±13.8	59.9±17.6
		Mean[STD]$_{IRW}$	53.91±12.32	62.6±8.0	65.5±13.2	58.1±21.2
KNN	k = 5	**Min[STD]$_{IRW}$**	**66.95±8.92**	**72.5±6.3**	**74.9±9.2**	**68.7±14.1**
		Mean[STD]$_{IRW}$	54.67±10.51	63.8±7.3	63.4±15.1	64.4±21.6
		Max[MEAN]$_{IRW}$	53.18±13.23	62.6±10.3	68.5±14.7	53.3±19.2
NAB		**Min[STD]$_{IRW}$**	**68.39±9.63**	**74.1±7.3**	**76.1±10.4**	**71.0±14.3**
		Mean[STD]$_{IRW}$	61.51±10.08	68.3±6.9	68.1±10.2	68.7±18.2
		Mean[STD]$_{R3D}$	51.22±12.32	61.3±7.4	66.4±15.5	53.4±21.3
NNE	N_{HL} = 10	**Min[STD]$_{IRW}$**	**50.72±19.58**	**65.3±11.7**	**76.6±13.8**	**47.7±28.7**
		Mean[STD]$_{IRW}$	42.88±17.69	61.1±9.1	77.3±13.2	36.0±26.5
		Max[STD]$_{IRW}$	40.48±16.77	56.0±11.1	68.9±14.6	35.9±24.6
NNE	N_{HL} = 20	**Min[STD]$_{IRW}$**	**49.02±18.25**	**62.7±11.6**	**72.9±16.0**	**46.8±26.9**
		Mean[MEAN]$_{IRW}$	46.37±14.55	64.0±11.2	80.1±17.1	39.0±20.1
		Min[MEAN]$_{IRW}$	46.35±16.35	62.9±10.8	78.2±13.7	39.1±21.6
SVM	Linear	**Min[STD]$_{IRW}$**	**69.68±7.44**	**74.2±6.8**	**69.8±9.8**	**81.1±10.8**
		Mean[STD]$_{IRW}$	66.56±8.06	70.7±7.4	65.9±9.9	78.3±11.0
		Max[STD]$_{IRW}$	60.13±11.66	67.1±8.9	64.9±13.6	70.7±18.9
SVM	Quadratic	**Min[STD]$_{IRW}$**	**63.99±9.76**	**70.7±7.0**	**64.4±12.2**	**80.4±15.0**
		Mean[STD]$_{IRW}$	60.24±10.27	67.7±7.9	57.3±11.8	84.0±13.5
		Max[STD]$_{R3D}$	53.15±9.57	61.1±7.8	50.1±11.5	78.2±14.7
DTR		**Min[STD]$_{IRW}$**	**60.89±14.98**	**69.3±10.2**	**72.1±15.2**	**65.0±21.0**
		Max[MEAN]$_{IRW}$	55.3±13.59	66.9±8.0	73.0±14.5	57.4±24.1
		Min[MEAN]$_{IRW}$	53.04±11.29	65.3±6.8	71.5±16.8	55.6±22.6
TBG	N_T = 10	**Max[MEAN]$_{IRW}$**	**60.44±12.47**	**68.8±9.2**	**72.3±14.8**	**63.3±19.1**
		Mean[STD]$_{IRW}$	54.96±12.06	63.0±9.2	67.6±13.9	55.8±17.9
		Min[STD]$_{IRW}$	54.87±11.09	62.5±8.7	65.1±14.3	58.6±16.6
TBG	N_T = 20	**Max[MEAN]$_{IRW}$**	**60.17±12.66**	**69.9±9.2**	**76.3±13.4**	**60.0±19.3**
		Min[STD]$_{IRW}$	54.46±11.09	61.5±7.9	64.7±11.3	56.4±17.3
		Max[STD]$_{IRW}$	56.63±11.51	61.3±10.0	63.1±15.4	58.3±16.5

Table S3. Individual measurements - Resubmission - Early OA

Methods	Options	Measurements	Adj. Acc. (%)	Acc. (%)	Sens. (%)	Spec. (%)
DIA	Linear	**Min[STD]$_{IRW}$**	**79.62**	**81.0**	**82.6**	**78.9**
		Mean[STD]$_{IRW}$	69.42	71.4	73.9	68.4
		Max[MEAN]$_{IRW}$	56.52	64.3	73.9	52.6
DIA	Quadratic	**Min[STD]$_{IRW}$**	**78.36**	**78.6**	**78.3**	**78.9**
		Mean[STD]$_{IRW}$	74.67	76.2	73.9	78.9
		Min[MEAN]$_{R3D}$	69.42	71.4	73.9	68.4
LGR	Linear	**Min[STD]$_{IRW}$**	**79.62**	**81.0**	**82.6**	**78.9**
		Mean[STD]$_{IRW}$	69.42	71.4	73.9	68.4
		Max[MEAN]$_{IRW}$	56.52	64.3	73.9	52.6
LGR	Quadratic	**Mean[STD]$_{IRW}$**	**75.47**	**78.6**	**73.9**	**84.2**
		Min[STD]$_{IRW}$	70.98	73.8	69.6	78.9
		Max[STD]$_{IRW}$	67.29	71.4	65.2	78.9
LNR	Linear	**Min[STD]$_{IRW}$**	**78.36**	**78.6**	**78.3**	**78.9**
		Mean[STD]$_{IRW}$	69.42	71.4	73.9	68.4
		Max[MEAN]$_{IRW}$	56.52	64.3	73.9	52.6
LNR	Quadratic	**Mean[STD]$_{IRW}$**	**74.67**	**76.2**	**73.9**	**78.9**
		Min[STD]$_{IRW}$	74.67	76.2	73.9	78.9
		Mean[STD]$_{R3D}$	64.33	66.7	69.6	63.2
KNN	k = 3	**Max[MEAN]$_{IRW}$**	**84.71**	**85.7**	**87.0**	**84.2**
		Min[STD]$_{IRW}$	79.62	81.0	82.6	78.9
		Mean[MEAN]$_{R3D}$	79.62	81.0	82.6	78.9
KNN	k = 5	**Min[STD]$_{IRW}$**	**79.62**	**81.0**	**82.6**	**78.9**
		Max[MEAN]$_{IRW}$	78.36	78.6	78.3	78.9
		Mean[STD]$_{IRW}$	74.67	76.2	73.9	78.9
NAB		**Min[STD]$_{IRW}$**	**78.36**	**78.6**	**78.3**	**78.9**
		Mean[STD]$_{IRW}$	74.67	76.2	73.9	78.9
		Mean[STD]$_{R3D}$	70.19	71.4	69.6	73.7
NNE	N_{HL} = 10	**Mean[STD]$_{IRW}$**	**69.42**	**71.4**	**73.9**	**68.4**
		Min[STD]$_{IRW}$	65.18	73.8	60.9	89.5
		Mean[MEAN]$_{IRW}$	57.0	66.7	52.2	84.2
NNE	N_{HL} = 20	**Max[MEAN]$_{IRW}$**	**79.62**	**81.0**	**82.6**	**78.9**
		Min[MEAN]$_{IRW}$	70.22	73.8	78.3	68.4
		Mean[MEAN]$_{IRW}$	62.41	71.4	82.6	57.9
SVM	Linear	**Mean[STD]$_{IRW}$**	**74.67**	**76.2**	**73.9**	**78.9**
		Min[STD]$_{IRW}$	**74.67**	**76.2**	**73.9**	**78.9**
		Max[STD]$_{IRW}$	73.73	73.8	73.9	73.7
SVM	Quadratic	**Min[STD]$_{IRW}$**	**68.08**	**73.8**	**65.2**	**84.2**
		Mean[STD]$_{IRW}$	60.7	69.0	56.5	84.2
		Max[STD]$_{R3D}$	56.21	64.3	52.2	78.9
DTR		**Min[STD]$_{IRW}$**	**85.51**	**88.1**	**91.3**	**84.2**
		Min[MEAN]$_{R3D}$	**85.51**	**88.1**	**91.3**	**84.2**
		Mean[STD]$_{R3D}$	84.71	85.7	87.0	84.2
TBG	N_T = 10	**Mean[MEAN]$_{IRW}$**	**100**	**100**	**100**	**100**
		Max[MEAN]$_{IRW}$	**100**	**100**	**100**	**100**
		Mean[MEAN]$_{R3D}$	**100**	**100**	**100**	**100**
TBG	N_T = 20	**Mean[STD]$_{IRW}$**	**100**	**100**	**100**	**100**
		Mean[MEAN]$_{IRW}$	**100**	**100**	**100**	**100**
		Max[MEAN]$_{IRW}$	**100**	**100**	**100**	**100**

Table S4. Individual measurements - Holdout train/test = 0.5/0.5 - 100 iterations - Early OA

Methods	Options	Measurements	Adj. Acc. (%)	Acc. (%)	Sens. (%)	Spec. (%)
DIA	Linear	**Min[STD]$_{IRW}$**	**73.19±8.56**	**78.3±6.9**	**79.4±11.7**	**77.0±11.9**
		Mean[STD]$_{IRW}$	65.29±8.91	71.7±6.7	73.0±10.0	70.1±16.2
		Min[MEAN]$_{R3D}$	54.70±11.81	64.9±7.5	74.3±10.7	53.4±19.0
DIA	Quadratic	**Min[STD]$_{IRW}$**	**70.25±8.02**	**75.3±6.7**	**73.9±11.6**	**77.1±12.2**
		Mean[STD]$_{IRW}$	69.65±9.66	74.7±8.2	72.0±9.6	78.0±15.0
		Max[STD]$_{IRW}$	59.86±9.74	66.3±7.9	66.1±14.3	66.6±14.2
LGR	Linear	**Min[STD]$_{IRW}$**	**73.63±8.42**	**78.0±6.9**	**77.9±11.7**	**78.2±10.2**
		Mean[STD]$_{IRW}$	65.30±9.50	72.1±6.6	75.8±10.3	67.4±15.7
		Min[MEAN]$_{R3D}$	57.14±11.59	65.8±7.6	73.2±10.2	56.9±18.1
LGR	Quadratic	**Min[STD]$_{IRW}$**	**67.53±9.99**	**73.1±7.7**	**70.7±13.5**	**76.1±13.1**
		Mean[STD]$_{IRW}$	62.96±12.34	70.0±9.2	66.1±15.6	74.8±16.8
		Max[STD]$_{IRW}$	60.18±9.32	67.9±6.9	62.2±15.2	74.8±14.5
LNR	Linear	**Min[STD]$_{IRW}$**	**72.51±8.93**	**77.4±7.4**	**78.3±11.3**	**76.2±11.9**
		Mean[STD]$_{IRW}$	65.13±8.5	71.5±5.9	74.8±10.6	67.3±14.5
		Min[MEAN]$_{R3D}$	58.66±12.02	55.8±8.7	71.8±11.2	60.8±19.2
LNR	Quadratic	**Min[STD]$_{IRW}$**	**68.09±9.81**	**73.7±7.6**	**70.1±13.7**	**78.0±11.9**
		Mean[STD]$_{IRW}$	66.41±10.04	71.7±8.1	70.3±11.6	73.3±15.1
		Max[STD]$_{IRW}$	55.57±9.75	64.3±7.1	55.8±14.4	74.7±16.9
KNN	k = 3	**Min[STD]$_{IRW}$**	**65.48±10.38**	**71.3±7.6**	**71.4±13.2**	**71.2±14.4**
		Max[MEAN]$_{IRW}$	62.62±12.4	68.9±10.1	67.9±13.6	70.1±18.1
		Mean[STD]$_{IRW}$	61.03±12.19	68.7±8.6	70.3±16.2	66.8±17.3
KNN	k = 5	**Min[STD]$_{IRW}$**	**68.94±8.76**	**74.1±6.8**	**72.0±12.5**	**76.7±11.3**
		Max[MEAN]$_{IRW}$	61.36±12.79	69.9±8.7	73.5±15.4	65.3±20.0
		Mean[STD]$_{IRW}$	56.93±13.08	65.6±9.6	65.2±16.1	66.2±22.0
NAB		**Min[STD]$_{IRW}$**	**69.99±9.74**	**75.5±7.9**	**75.8±12.8**	**75.0±12.6**
		Mean[STD]$_{IRW}$	68.77±9.53	74.1±7.7	71.7±12.0	76.9±13.0
		Max[STD]$_{R3D}$	56.30±11.48	64.9±8.4	61.6±15.2	68.8±19.8
NNE	N_{HL} = 10	**Min[STD]$_{IRW}$**	**53.07±21.0**	**65.7±13.8**	**74.8±16.6**	**54.6±31.2**
		Mean[STD]$_{IRW}$	49.35±19.42	62.7±12.1	73.6±17.5	49.4±29.9
		Max[STD]$_{IRW}$	43.89±15.57	58.4±11.3	71.8±17.6	42.0±24.6
NNE	N_{HL} = 20	**Min[STD]$_{IRW}$**	**52.70±22.24**	**64.5±15.0**	**73.2±16.4**	**53.8±31.1**
		Min[MEAN]$_{IRW}$	46.49±18.02	60.9±12.6	76.5±16.2	41.8±24.4
		Mean[STD]$_{IRW}$	44.70±20.37	59.3±13.0	71.5±16.3	44.4±32.0
SVM	Linear	**Mean[STD]$_{IRW}$**	**70.46±9.36**	**74.5±7.9**	**72.1±10.9**	**77.4±11.3**
		Min[STD]$_{IRW}$	70.40±9.20	75.4±8.3	71.4±12.9	80.2±10.5
		Max[STD]$_{IRW}$	63.04±11.57	70.3±7.9	69.7±13.6	71.0±18.0
SVM	Quadratic	**Min[STD]$_{IRW}$**	**64.82±9.42**	**72.2±7.4**	**62.7±11.9**	**83.8±12.8**
		Mean[STD]$_{IRW}$	61.22±10.44	70.0±8.5	58.2±13.9	84.3±12.6
		Max[STD]$_{R3D}$	53.34±8.85	66.0±6.4	48.7±12.1	87.0±14.6
DTR		**Mean[STD]$_{IRW}$**	**61.72±13.61**	**69.6±9.1**	**66.3±16.1**	**73.7±19.6**
		Min[STD]$_{IRW}$	61.51±13.37	69.0±11.3	65.9±19.9	72.8±15.5
		Max[MEAN]$_{IRW}$	55.60±16.98	67.1±10.8	74.3±17.6	58.3±25.9
TBG	N_T = 10	**Max[MEAN]$_{IRW}$**	**61.41±12.83**	**68.9±9.9**	**70.5±16.6**	**67.0±18.5**
		Mean[STD]$_{IRW}$	57.62±10.94	64.3±9.2	64.0±13.5	64.7±17.1
		Min[STD]$_{IRW}$	55.98±11.96	63.7±9.3	62.1±16.3	65.6±18.4
TBG	N_T = 20	**Max[MEAN]$_{IRW}$**	**63.16±12.33**	**70.1±10.1**	**73.5±13.2**	**65.9±17.7**
		Mean[STD]$_{IRW}$	59.73±11.30	66.3±8.1	66.5±12.0	66.1±17.8
		Min[MEAN]$_{IRW}$	54.79±10.89	63.4±8.5	69.2±15.7	56.2±16.2

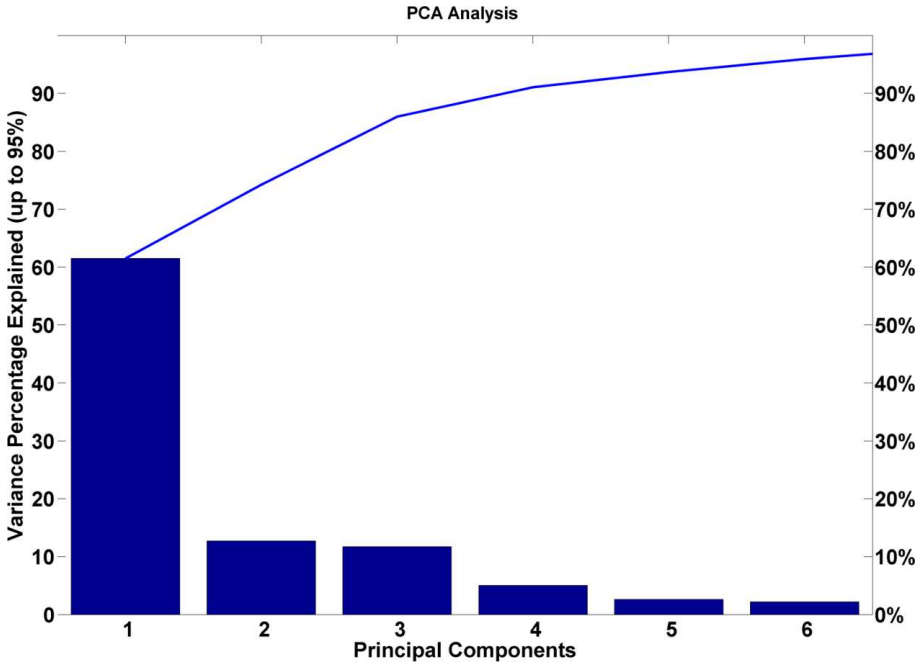
Table S5. Multi measurements - Holdout train/test = 0.5/0.5 - 100 iterations - Data from FS - All OA

Methods	FS	Adj. Acc. (%)	Acc. (%)	Sens. (%)	Spec. (%)	Data						
DIA	B	66.40±11.70	72.8±9.7	73.6±14.3	71.4±15.4	Mean[MEAN]$_{R3D}$	Min[STD]$_{R3D}$	Max[STD]$_{R3D}$	Mean[STD]$_{R3D}$	Min[MEAN]$_{IRW}$	Max[MEAN]$_{IRW}$	Mean[MEAN]$_{IRW}$
Linear	F	65.56±10.79	72.9±7.0	76.2±17.9	67.7±17.3	Min[MEAN]$_{R3D}$	Min[STD]$_{R3D}$	Min[STD]$_{IRW}$				
DIA	B	51.02±15.10	69.7±8.4	87.5±10.7	42.1±20.2	Min[STD]$_{R3D}$	Max[STD]$_{R3D}$	Min[MEAN]$_{IRW}$	Max[MEAN]$_{IRW}$	Mean[MEAN]$_{IRW}$	Min[STD]$_{IRW}$	Mean[STD]$_{IRW}$
Quadratic	F	71.17±6.91	76.0±5.8	76.4±10.3	75.2±10.8	Min[STD]$_{IRW}$						
LGR	B	63.98±10.43	70.3±9.6	72.1±13.7	67.6±15.4	Min[MEAN]$_{R3D}$	Min[STD]$_{R3D}$	Max[STD]$_{R3D}$	Mean[STD]$_{R3D}$	Min[MEAN]$_{IRW}$	Max[MEAN]$_{IRW}$	Mean[MEAN]$_{IRW}$
Linear						Max[STD]$_{IRW}$	Mean[STD]$_{IRW}$					
	F	66.40±11.60	75.5±7.0	82.0±10.1	65.3±18.2	Mean[MEAN]$_{IRW}$	Min[STD]$_{IRW}$					
LGR	B	56.81±11.8	63.4±9.9	65.2±14.3	60.6±16.7	Max[MEAN]$_{IRW}$	Min[STD]$_{IRW}$	Max[STD]$_{IRW}$	Mean[STD]$_{IRW}$			
Quadratic	F	61.75±12.41	68.4±10.4	69.8±15.6	66.3±16.3	Min[STD]$_{R3D}$	Max[STD]$_{R3D}$	Mean[MEAN]$_{IRW}$	Min[STD]$_{IRW}$			
LNR	B	67.22±11	74.0±8.7	76.4±12.2	70.3±16.8	Mean[MEAN]$_{R3D}$	Min[STD]$_{R3D}$	Max[STD]$_{R3D}$	Mean[STD]$_{R3D}$	Min[MEAN]$_{IRW}$	Max[MEAN$_{IRW}$	Mean[MEAN]$_{IRW}$
Linea	F	63.88±9.78	71.0±7.0	73.4±12.1	67.1±15.9	Min[MEAN]$_{R3D}$	Min[STD]$_{R3D}$	Min[STD]$_{IRW}$				
LNR	B	51.29±11.50	58.4±10.3	61.0±14.1	54.4±17.3	Max[STD]$_{R3D}$	Mean[STD]$_{R3D}$	Min[MEAN]$_{IRW}$	Max[MEAN]$_{IRW}$	Mean[MEAN]$_{IRW}$	Min[STD]$_{IRW}$	Max[STD]$_{IRW}$
Quadratic	F	68.65±10.19	75.1±7.5	76.6±11.3	72.7±15.7	Min[STD]$_{IRW}$						
KNN	B	64.62±12.09	71.5±9.4	75.6±11.7	65.1±16.3	Max[MEAN]$_{R3D}$	Mean[MEAN]$_{R3D}$	Min[MEAN]$_{IRW}$	Max[MEAN]$_{IRW}$	Mean[MEAN]$_{IRW}$	Mean[STD]$_{IRW}$	
k = 3	F	57.62±11.94	67.4±8.1	74.1±12.9	57.0±18.1	Max[MEAN]$_{IRW}$	Mean[MEAN]$_{IRW}$					
KNN	B	60.08±13.19	68.4±9.3	71.7±14.7	63.2±20.0	Max[MEAN]$_{R3D}$	Max[STD]$_{R3D}$	Min[MEAN]$_{IRW}$	Max[MEAN]$_{IRW}$			
k = 5	F	57.31±10.64	64.5±8.3	65.1±12.3	63.6±18.6	Max[STD]$_{R3D}$	Min[STD]$_{IRW}$					
NAB	B	66.51±9.45	71.9±7.7	71.6±11.9	72.4±13.4	Mean[STD]$_{R3D}$	Min[STD]$_{IRW}$	Mean[STD]$_{IRW}$				
	F	66.07±10.51	71.9±8.1	69.9±12.7	75.1±14.9	Min[STD]$_{IRW}$	Max[STD]$_{IRW}$					
NNE	B	48.52±12.81	61.4±10.3	72.3±15.5	44.4±18.9	Min[MEAN]$_{R3D}$	Max[MEAN]$_{R3D}$	Mean[MEAN]$_{R3D}$	Max[STD]$_{R3D}$	Mean[STD]$_{R3D}$	Min[MEAN]$_{IRW}$	Max[MEAN]$_{IRW}$
						Min[STD]$_{IRW}$	Max[STD]$_{IRW}$	Mean[STD]$_{IRW}$				
N_{HL} = 10	F	53.38±12.86	63.5±9.1	56.5±17.4	74.3±23.3	Min[STD]$_{IRW}$	Max[STD]$_{IRW}$					
NNE	B	55.39±14.87	64.7±10.6	68.9±16.5	58.2±22.5	Max[MEAN]$_{R3D}$	Mean[MEAN]$_{R3D}$	Min[STD]$_{R3D}$	Max[STD]$_{R3D}$	Mean[STD]$_{R3D}$	Min[MEAN]$_{IRW}$	Max[MEAN]$_{IRW}$
						Mean[MEAN]$_{IRW}$	Min[STD]$_{IRW}$	Mean[STD]$_{IRW}$				
N_{HL} = 20	F	44.58±18.53	60.0±12.6	72.9±15.3	39.8±26.3	Max[MEAN]$_{IRW}$						
SVM	B	60.51±9.78	66.9±7.7	66.9±10.6	67.0±17.6	Max[MEAN]$_{R3D}$	Mean[MEAN]$_{R3D}$	Min[STD]$_{R3D}$	Max[STD]$_{R3D}$	Mean[STD]$_{R3D}$	Max[MEAN]$_{IRW}$	Mean[MEAN]$_{IRW}$
						Min[STD]$_{IRW}$	Max[STD]$_{IRW}$	Mean[STD]$_{IRW}$				
Linear	F	68.17±10.32	74.2±7.7	71.9±12.8	77.8±15.1	Mean[MEAN]$_{IRW}$	Min[STD]$_{IRW}$					
SVM	B	59.06±11.82	66.5±10.2	67.2±14.6	64.9±18.9	Max[MEAN]$_{R3D}$	Min[STD]$_{R3D}$	Mean[STD]$_{R3D}$	Max[MEAN]$_{IRW}$	Mean[MEAN]$_{IRW}$	Min[STD]$_{IRW}$	Mean[STD]$_{IRW}$
Quadratic	F	65.24±9.82	71.4±8.1	70.1±12.5	73.4±16.3	Max[STD]$_{R3D}$	Min[STD]$_{IRW}$	Max[STD]$_{IRW}$				
DTR	B	57.56±14.65	66.1±9.8	70.3±14.9	59.7±21.6	Max[MEAN]$_{R3D}$	Min[STD]$_{IRW}$	Mean[STD]$_{IRW}$				
	F	49.77±13.33	66.3±18.0	55.6±25.7	59.7±21.6	Min[STD]$_{R3D}$	Min[MEAN]$_{IRW}$	Mean[STD]$_{IRW}$				
TBG	B	49.64±9.65	57.3±7.8	58.7±14.3	55.0±17.7	Mean[STD]$_{R3D}$	Mean[MEAN]$_{IRW}$					
N_T = 10	F	51.55±10.21	58.6±8.2	60.1±13.0	56.2±17.4	Max[STD]$_{R3D}$						
TBG	B	52.42±11.15	61.3±7.1	67.6±10.2	51.4±17.7	Mean[STD]$_{IRW}$						
N_T = 20	F	50.82±10.51	60.8±8.5	67.9±13.8	49.7±16.7	Max[MEAN]$_{R3D}$						

Table S6. Multi measurements - Holdout train/test = 0.5/0.5 - 100 iterations - Data from FS - Early OA

Methods	FS	Adj. Acc. (%)	Acc. (%)	Sens. (%)	Spec. (%)	Data						
DIA	B	64.31±9.81	71.0±7.8	69.8±15.1	72.4±14.0	$Min[STD]_{R3D}$	$Mean[STD]_{R3D}$	$Max[MEAN]_{R3D}$	$Mean[MEAN]_{R3D}$	$Min[STD]_{IRW}$	$Mean[STD]_{IRW}$	
Linear	F	73.38±8.36	78.6±6.9	80.5±11.4	76.3±11.9	$Min[STD]_{IRW}$						
DIA	B	51.47±16.14	66.8±8.9	81.9±18.2	48.3±24.6	$Min[STD]_{R3D}$	$Max[STD]_{R3D}$	$Min[MEAN]_{IRW}$	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$	$Mean[STD]_{IRW}$
Quadratic	F	59.52±14.06	71.2±9.1	81.8±14.2	58.1±21.2	$Min[STD]_{R3D}$	$Min[MEAN]_{IRW}$	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$		
LGR	B	58.53±11.69	64.7±10.3	62.8±15.5	66.9±15.3	$Min[MEAN]_{R3D}$	$Mean[MEAN]_{R3D}$	$Min[STD]_{R3D}$	$Max[STD]_{R3D}$	$Mean[STD]_{R3D}$	$Min[MEAN]_{IRW}$	$Max[MEAN]_{IRW}$
Linear						$Mean[MEAN]_{IRW}$	$Max[STD]_{IRW}$	$Mean[STD]_{IRW}$				
	F	67.33±15.29	75.2±10.0	81.3±12.8	67.8±20.3	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$					
LGR	B	54.00±13.58	61.8±12.2	63.5±18.4	59.6±18.5	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$	$Max[STD]_{IRW}$	$Mean[STD]_{IRW}$			
Quadratic	F	44.51±15.65	52.6±12.7	53.2±16.7	51.8±23.3	$Min[MEAN]_{R3D}$	$Max[MEAN]_{R3D}$	$Max[STD]_{R3D}$	$Max[STD]_{IRW}$	$Mean[STD]_{IRW}$		
LNR	B	65.65±9.42	71.7±7.7	71.0±13.5	72.7±14.3	$Min[STD]_{R3D}$	$Mean[STD]_{R3D}$	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$	$Mean[STD]_{IRW}$	
Linea	F	65.38±12.18	72.8±8.0	77.4±11.9	67.2±17.8	$Max[MEAN]_{R3D}$	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$				
LNR	B	48.25±13.63	56.1±12.6	56.5±17.3	55.4±20.4	$Max[STD]_{R3D}$	$Min[MEAN]_{IRW}$	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$	$Max[STD]_{IRW}$	
Quadratic	F	47.49±14.08	54.9±12.8	57.1±17.3	52.1±19.3	$Max[MEAN]_{R3D}$	$Max[STD]_{R3D}$	$Mean[STD]_{R3D}$	$Min[MEAN]_{IRW}$	$Min[STD]_{IRW}$	$Max[STD]_{IRW}$	
KNN	B	62.06±12.15	68.5±10.4	67.9±15.6	69.1±16.6	$Max[MEAN]_{R3D}$	$Mean[MEAN]_{R3D}$	$Min[MEAN]_{IRW}$	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$		
k = 3	F	59.24±12.87	66.0±11.0	64.3±14.9	68.0±19.1	$Max[STD]_{R3D}$	$Max[MEAN]_{IRW}$					
KNN	B	60.32±11.58	68.1±9.3	72.2±14.4	63.2±18.2	$Min[MEAN]_{R3D}$	$Max[MEAN]_{R3D}$	$Mean[MEAN]_{R3D}$	$Mean[MEAN]_{IRW}$	$Max[STD]_{IRW}$	$Mean[STD]_{IRW}$	
k = 5	F	53.86±13.02	64.9±9.9	70.9±19.5	57.6±21.0	$Min[STD]_{R3D}$	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$				
NAB	B	67.16±11.31	73.7±8.4	76.2±13.1	70.7±16.1	$Min[MEAN]_{IRW}$	$Min[STD]_{IRW}$					
	F	63.41±9.81	69.4±8.1	71.6±11.4	66.7±14.9	$Mean[STD]_{R3D}$	$Min[STD]_{IRW}$					
NNE	B	50.6±12.05	61.6±9.5	71.1±16.8	50.0±19.5	$Min[MEAN]_{R3D}$	$Max[MEAN]_{R3D}$	$Mean[MEAN]_{R3D}$	$Min[STD]_{R3D}$	$Max[STD]_{R3D}$	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$
						$Min[STD]_{IRW}$	$Max[STD]_{IRW}$	$Mean[STD]_{IRW}$				
N_{HL} = 10	F	51.99±17.73	64.3±10.2	75.7±16.9	50.3±25.5	$Min[STD]_{R3D}$	$Min[MEAN]_{IRW}$	$Min[STD]_{IRW}$				
NNE	B	57.35±12.87	65.9±9.4	63.3±17.9	69.2±19.1	$Min[MEAN]_{R3D}$	$Max[MEAN]_{R3D}$	$Mean[MEAN]_{R3D}$	$Min[STD]_{R3D}$	$Max[STD]_{R3D}$	$Mean[STD]_{R3D}$	$Min[MEAN]_{IRW}$
						$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$	$Max[STD]_{IRW}$	$Mean[STD]_{IRW}$		
N_{HL} = 20	F	54.22±12.5	62.0±9.1	53.5±17.6	72.4±14.2	$Max[STD]_{R3D}$	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$				
SVM	B	62.44±9.46	69.1±8.0	65.4±14.0	73.6±14.2	$Min[MEAN]_{R3D}$	$Max[STD]_{R3D}$	$Mean[STD]_{R3D}$	$Max[MEAN]_{IRW}$	$Min[STD]_{IRW}$	$Max[STD]_{IRW}$	
Linear	F	68.8±12.18	75.6±9.1	77.3±14.1	73.6±16.9	$Min[MEAN]_{IRW}$	$Min[STD]_{IRW}$					
SVM	B	51.28±11.55	58.4±9.5	56.6±15.5	60.4±17.2	$Mean[MEAN]_{R3D}$	$Max[STD]_{R3D}$	$Mean[STD]_{R3D}$	$Min[MEAN]_{IRW}$	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$
						$Max[STD]_{IRW}$	$Mean[STD]_{IRW}$					
Quadratic	F	53.12±11.75	60.4±9.8	61.6±14.7	58.9±18.6	$Min[MEAN]_{R3D}$	$Max[MEAN]_{R3D}$	$Min[STD]_{R3D}$	$Max[STD]_{R3D}$	$Max[MEAN]_{IRW}$	$Mean[MEAN]_{IRW}$	$Min[STD]_{IRW}$
						$Max[STD]_{IRW}$						
DTR	B	59.35±14.05	66.7±9.9	69.5±13.6	63.3±20.6	$Max[MEAN]_{R3D}$	$Max[STD]_{R3D}$	$Min[STD]_{IRW}$	$Mean[STD]_{IRW}$			
	F	60.87±13.78	67.5±10.5	67.1±16.9	68.1±16.6	$Min[MEAN]_{R3D}$	$Max[MEAN]_{R3D}$	$Min[STD]_{IRW}$				
TBG	B	50.54±9.82	58.5±7.5	55.0±14.7	62.8±18.0	$Mean[MEAN]_{R3D}$	$Min[STD]_{R3D}$	$Mean[MEAN]_{IRW}$	$Max[STD]_{IRW}$			
N_T = 10	F	47.05±10.06	54.5±8.7	49.8±14.6	60.3±17.6	$Max[STD]_{R3D}$						
TBG	B	56.97±12.44	64.2±9.8	62.5±16.0	66.2±18.0	$Max[STD]_{IRW}$	$Mean[STD]_{IRW}$					
N_T = 20	F	52.16±9.80	58.3±9.2	61.0±14.3	55.0±14.2	$Min[MEAN]_{R3D}$						

Principal Component Analysis (PCA)



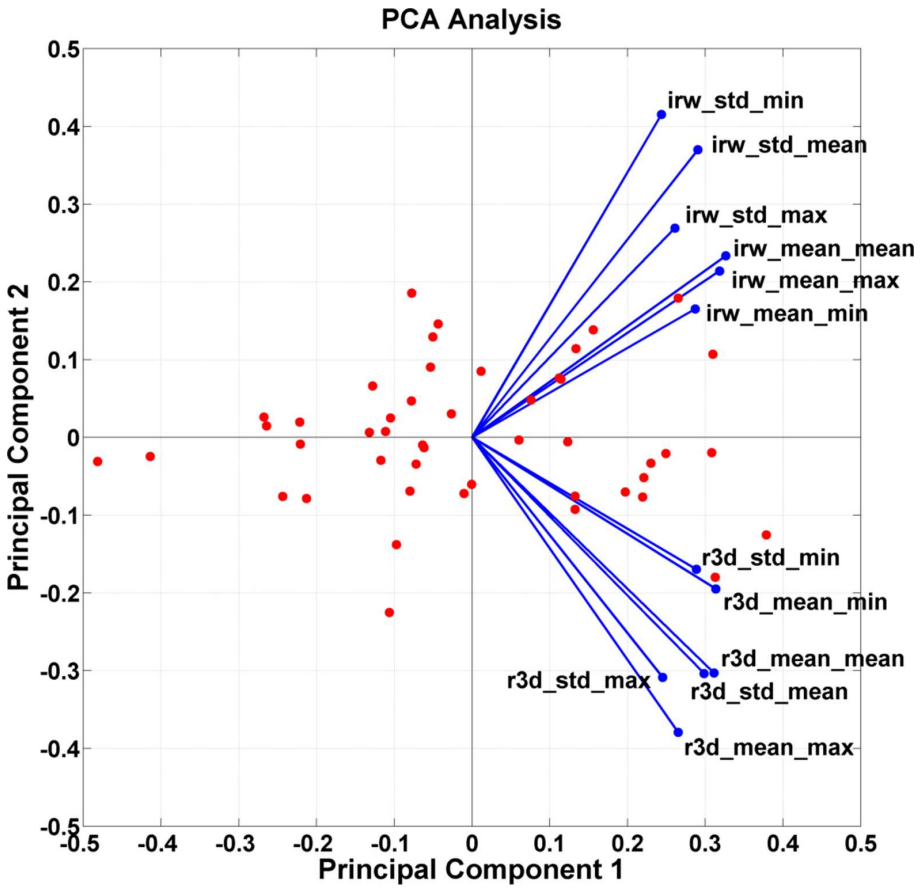


Figure S2. Biplot of PCA results. The axes in the biplot represent the principal components, and the observed variables are represented as vectors (in blue). Here, sodium data measurements are represented in red in the 2D space of the two first components.

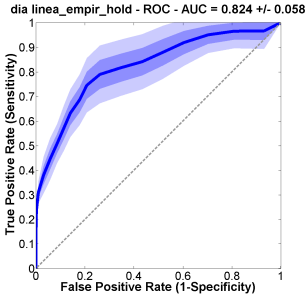
Table S7. Classification of all OA vs. controls for sodium measurements after PCA, with holdout cross-validation of the data (train ratio = test ratio = 0.5) and 100 iterations. The best results for each classifier were selected and then ranked by level of adjusted (Adj.) accuracy. The 4 first principal components were used for classification, as they represent 91% of the variance of the whole data described by the 12 initial sodium variables. Results are shown as mean ± standard deviation. N_{HL} = number of hidden layers, N_T = number of trees, PCs = principal components.

Rank	Methods	Options	PCs	Adj. Accuracy (%)	Accuracy (%)	Sensitivity (%)	Specificity (%)
1	**LNR**	Linear	1, 2, 3, 4	62.24±11.23	69.9±8.2	73.9±13.6	63.7±16.8
2	**DIA**	Linear	1, 2, 3, 4	61.90±11.83	71.0±8.80	77.2±14.1	61.2±16.5
3	**SVM**	Linear	1, 2, 3, 4	61.38±9.57	68.3±7.3	66.8±11.7	70.6±18.0
4	**LGR**	Linear	1, 2, 3, 4	59.16±12.79	69.5±8.4	76.4±13.3	58.8±19.9
5	**NAB**		1, 2, 3, 4	58.55±10.51	68.1±8.2	76.3±12.0	55.4±14.5
6	**KNN**	k = 3	1, 2, 3, 4	58.10±8.04	64.7±7.2	57.1±10.7	76.4±14.9
7	**SVM**	Quadratic	1, 2, 3, 4	57.79±11.66	63.9±9.4	62.9±14.0	65.4±16.6
8	**KNN**	k = 5	1, 2, 3, 4	56.92±8.88	63.6±7.3	60.4±11.8	68.4±17.4
9	**DIA**	Quadratic	1, 2, 3, 4	54.53±12.83	67.2±7.9	77.8±14.0	50.8±19.6
10	**LNR**	Quadratic	1, 2, 3, 4	53.80±12.30	61.2±10.4	62.7±16.0	58.9±17.8
11	**LGR**	Quadratic	1, 2, 3, 4	51.53±11.81	58.8±10.0	58.8±14.4	58.9±19.2
12	**TBG**	N_T= 20	1, 2, 3, 4	48.76±11.95	58.5±10.0	64.1±16.5	49.8±17.8
13	**TBG**	N_T= 10	1, 2, 3, 4	48.26±11.57	57.2±9.2	59.4±16.3	53.8±20.2
14	**DTR**		1, 2, 3, 4	46.42±11.85	57.9±8.8	65.4±16.9	46.3±19.3
15	**NNE**	N_{HL}= 20	1, 2, 3, 4	44.34±15.1	54.7±11.6	50.0±21.0	62.1±25.6
16	**NNE**	N_{HL}= 10	1, 2, 3, 4	36.94±14.91	52.3±11.4	63.6±21.4	34.6±24.0

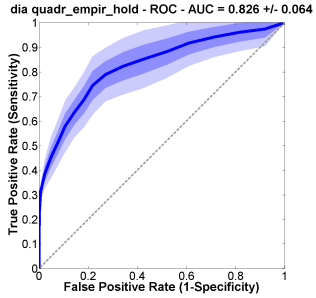
Table S8. Classification of early OA vs. controls for sodium measurements after PCA, with holdout cross-validation of the data (train ratio = test ratio = 0.5) and 100 iterations. The best results for each classifier were selected and then ranked by level of adjusted (Adj.) accuracy. The 4 first principal components were used for classification, as they represent 91% of the variance of the whole data described by the 12 initial sodium variables. Results are shown as mean ± standard deviation. N_{HL} = number of hidden layers, N_T = number of trees, PCs = principal components.

Rank	Methods	Options	PCs	Adj. Accuracy (%)	Accuracy (%)	Sensitivity (%)	Specificity (%)
1	**DIA**	Linear	1, 2, 3, 4	62.75±11.77	70.0±9.1	73.9±13.9	65.1±16.2
2	**SVM**	Linear	1, 2, 3, 4	62.55±11.99	69.8±8.4	68.6±13.8	71.2±18.8
3	**LNR**	Linear	1, 2, 3, 4	61.92±11.82	69.2±8.6	73.1±13.9	64.6±17.4
4	**LGR**	Linear	1, 2, 3, 4	60.60±12.06	67.7±9.6	69.9±15.1	64.9±16.6
5	**SVM**	Quadratic	1, 2, 3, 4	58.08±13.47	65.3±10.8	62.8±16.3	68.2±18.7
6	**KNN**	k = 3	1, 2, 3, 4	57.91±10.97	66.4±9.0	57.1±14.1	77.7±17.3
7	**NAB**		1, 2, 3, 4	57.47±11.55	66.9±8.6	73.5±16.6	58.9±16.8
8	**KNN**	k = 5	1, 2, 3, 4	56.99±11.35	66.4±9.9	57.1±15.6	77.7±19.7
9	**LNR**	Quadratic	1, 2, 3, 4	55.66±12.51	62.4±11.0	60.2±15.7	65.1±17.4
10	**DIA**	Quadratic	1, 2, 3, 4	54.25±13.17	65.2±8.9	77.0±14.6	50.8±18.0
11	**LGR**	Quadratic	1, 2, 3, 4	51.65±12.68	59.4±11.2	59.2±17.0	59.7±19.5
12	**TBG**	N_T= 20	1, 2, 3, 4	50.62±11.88	58.6±9.8	60.5±15.9	56.2±18.5
13	**TBG**	N_T= 10	1, 2, 3, 4	50.50±11.95	56.8±10.4	55.2±16.9	58.8±16.1
14	**NNE**	N_{HL}= 20	1, 2, 3, 4	50.50±14.72	61.4±10.2	51.6±22.2	73.2±20.4
15	**DTR**		1, 2, 3, 4	47.20±10.89	57.8±9.0	64.8±18.3	49.1±18.8
16	**NNE**	N_{HL}= 10	1, 2, 3, 4	33.00±16.11	48.10±13.2	60.3±23.3	33.2±29.1

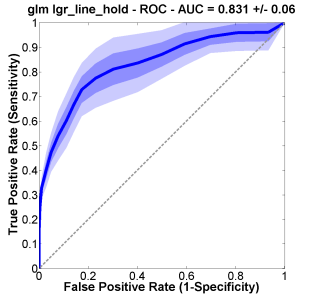
ROC Analysis



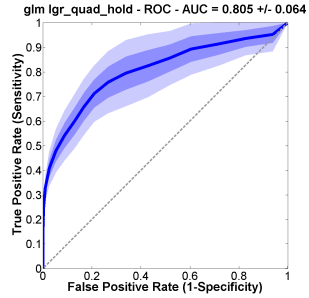
S3.a. Method 1: DIA Linear.



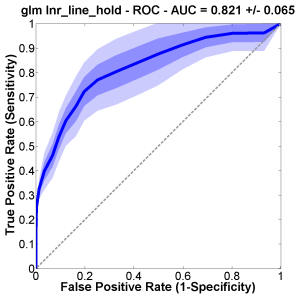
S3.b. Method 2: DIA Quadratic.



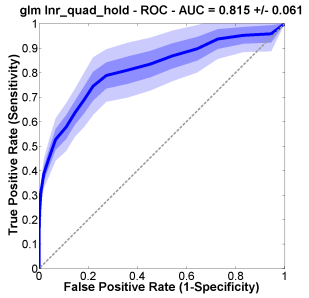
S3.c. Method 3: LGR Linear.



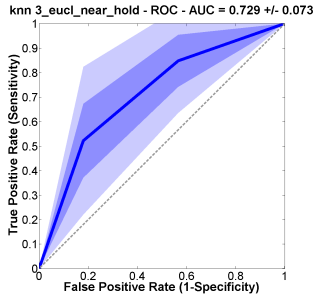
S3.d. Method 4: LGR Quadratic.



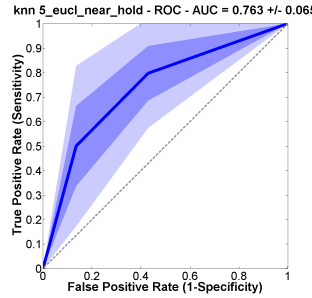
S3.e. Method 5: LNR Linear.



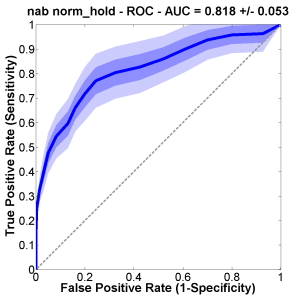
S3.f. Method 6: LNR Quadratic.



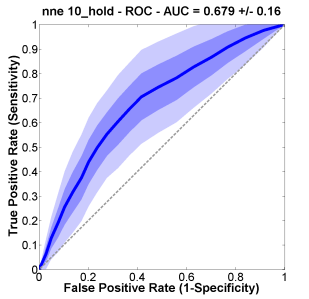
S3.g. Method 7: KNN k=3.



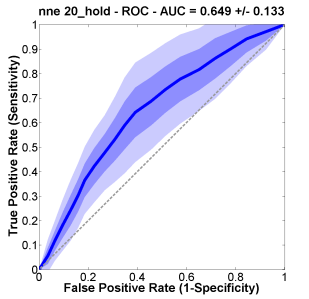
S3.h. Method 8: KNN k=5.



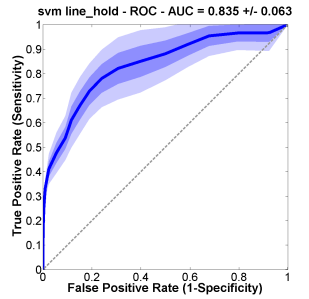
S3.i. Method 9: NAB.



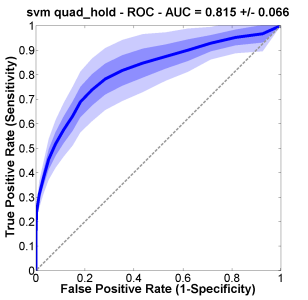
S3.j. Method 10: NNE N_{HL}=10.



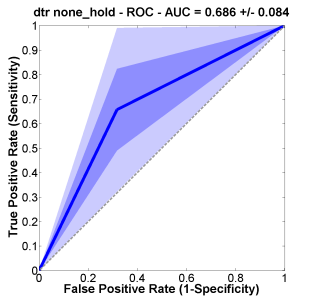
S3.k. Method 11: NNE N_{HL}=20.



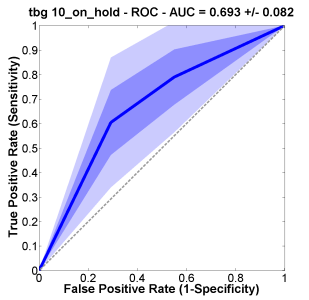
S3.l. Method 12: SVM Linear.



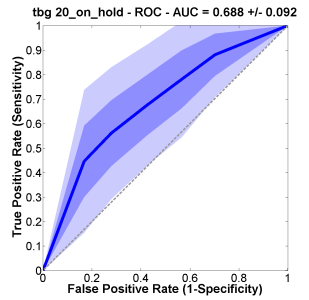
S3.m. Method 13: SVM Quadratic.



S3.n. Method 14: DTR.



S3.o. Method 15: TBG N_T=10.



S3.p. Method 16: TBG N_T=20.

Figure S3. ROC curves of classification methods 1 to 16 (see Table 1). The ROC curves were calculated for the classification of all OA vs. controls data using the **Min[STD]$_{IRW}$** variable only, with holdout cross-validation of the data (train ratio = test ratio = 0.5) and 100 iterations. Mean and standard deviation (std) of area under the curve (AUC) was calculated over 100 iterations. The (darker) blue area represents the ROC curve $\pm$ 1$\times$std, the lighter blue area represents the ROC curve $\pm$ 2$\times$std.

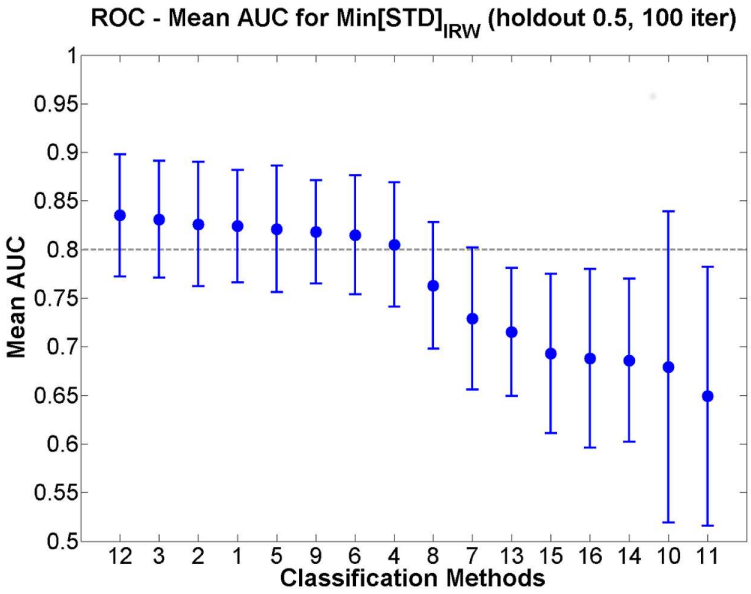


Figure S4. Mean areas under the curve (AUC) $\pm$ std, for all 16 classification methods (from Fig. S3). The AUCs were calculated for the classification of all OA vs. controls data using the **Min[STD]$_{IRW}$** variable only, with holdout cross-validation of the data (train ratio = test ratio = 0.5) and 100 iterations. The mean AUCs are ranked from highest to lowest (left to right). Note that the 8 methods with the highest AUC (>0.8) correspond to the 8 most performing classification methods shown in Table 5 of the article, with the highest (adjusted) accuracy, for the same data and same variable.