Ablation Study on Parameters and Algorithms for Calibrated Explanations

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August 10, 2024

Abstract

This presents the information shown in the ablation study performed on 25 classification data sets. The main conclusion is that the choice of classifier influences the mean variance more than the size of the calibration set or the percentile sampling. Furthermore, runtime increases almost linearly with the number of percentiles sampled for numerical features, while calibration size has a much smaller effect. Factual explanations are faster than counterfactual explanations.

1 Computing time

The ablation study is focused on evaluating how the algorithm is affected by the calibration size and the number of percentiles sampled for numerical features. It is using the following setup:

- The number of percentiles sampled for numerical features is varied between 1, 2, 3 (default), 4, and 9. The set of percentiles used are: [50], [33, 67], [25, 50, 75], [20, 40, 60, 80], [10, 20, 30, 40, 50, 60, 70, 80, 90]
- The calibration size is varied between 10%, 20% and 40% of the data not used for testing.
- Test size is fixed to 10% of the data.
- Only one repetition per percentile and calibration size is used.

Everything was run on 25 data sets. See the Classification_Experiment_Ablation.py for details on the experiment.

First, lets look at the runtime taken to compute the explanations. The tabulated runtime is the average time in seconds per instance. Table 1 show the summary over all data sets over calibration sizes and Table 2 show the summary over all data sets over percentile samplings (indicated by the number of samples drawn).

Detailed results per calibration size and percentile sampling is shown per algorithm in Tables 3 and 4.

The results regarding runtime are as can be expected and the observations are summarised below:

- The runtime increases almost linearly with the number of percentiles sampled for numerical features.
- The runtime increases with the calibration size, even if the difference in runtime is fairly small.
- CE is faster than CCE, as expected. The reason is that CCE will generally require additional calculations than CE, at least for numerical features.

	CE			CCE		
Calibration Size	10%	20%	40%	10%	20%	40%
xGB	0.11	0.11	0.11	0.20	0.21	0.22
RF	0.11	0.11	0.11	0.20	0.21	0.22

Table 1: Computation Time - Calibration Size

	CE					CCE				
Sample Size	1	2	3	4	9	1	2	3	4	9
xGB	0.05	0.06	0.09	0.11	0.25	0.08	0.12	0.16	0.21	0.49
RF	0.04	0.06	0.08	0.10	0.25	0.07	0.12	0.16	0.21	0.48

Table 2: Computation Time - Sample Size

- The runtime tend to increase with the number of features, even if it is not a linear increase. This is due to the fact that categorical features with many categories are more expensive to compute, at least as long as the sampling size is small. Consequently, the number of categorical features together with the number of categories per feature is more important than the total number of features, especially when the sampling size (only affecting numerical features) is small.
- With the old implementation (where one call was made to the learner's perdict_proba for each perturbed instance), a great part of the difference in runtime could be attributed to the underlying model, indicating that they had a large difference in overhead. With the new implementation, the difference is negligible.

2 Ablation Analysis

The tabulated results in Tables 5 and 6 are the mean variance of the ablation measured per calibration size or percentile sampling. The variance is measured per instance and computed over the runs having the same calibration size/percentile sampling. The feature importance weight of the most influential feature, defined as the feature most often having highest absolute feature importance weight, is used to measure on. The average variance is computed over the entire test set. The most influential feature is used since it is the feature that is most likely to be used in a decision but also the feature with the greatest expected variation (as a consequence of the weights having the highest absolute values).

2.1 Calibration Size

First out is a table with results per calibration size. Since different sampling sizes may result in different results for numerical features, the mean variance is only expected to be 0 for categorical-only datasets. The results are shown in Table 5.

The most interesting observation from the results is that difference in mean variance is fairly low between the different calibration sizes. This indicates that the calibration size does not have a large impact on the feature importance weights. In fact, a smaller calibration set even tend to have a lower mean variance.

2.2 Percentile Sampling

Table 6 show the results per percentile sampling. Even if there is some difference in the mean variance when varying the percentile sampling, the difference can mainly be attributed to the difference in underlying ML algorithm. There is a tendency that a larger set of percentiles tend to reduce the mean variance, which is expected. However, the tendency is not very strong.

3 Conclusion

The individual algorithmic parameter that influence runtime most is the number of percentiles sampled for numerical features. As this tend to have a fairly small impact on the feature importance, it may be a reason to consider decreasing the number of percentiles sampled by default for numerical features (currently the default is 3: [25, 50, 75]). Using only the median ([50]) would on average reduce the runtime with almost half.

3.1 Final Note

The core algorithm was updated early August 2024. The results reported here are using the code committed in chore: redirected __call__() to explain(). Average speedups per instance over all data sets range from 2-9 times faster depending on setup, with substantially higher speedups of up to almost 40 times faster for individual data sets and setups.

CE	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	
Cal.Size	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.4	.4	.4	.4	.4	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.4	.4	.4	.4	.4	
Sample Size	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9	
colic	.12	.13	.15	.16	.24	.13	.14	.15	.17	.24	.13	.14	.16	.18	.25	.15	.17	.18	.21	.32	.15	.17	.19	.22	.31	.16	.17	.20	.22	.34	60
creditA	.16	.18	.20	.21	.31	.20	.22	.24	.26	.38	.21	.23	.25	.28	.39	.18	.22	.23	.26	.38	.23	.26	.30	.33	.49	.24	.28	.30	.34	.50	43
diabetes	.01	.01	.02	.02	.04	.01	.01	.02	.02	.04	.01	.01	.02	.02	.04	.02	.03	.04	.06	.11	.02	.04	.05	.06	.12	.02	.03	.04	.06	.11	9
german	.08	.08	.08	.09	.10	.08	.08	.08	.09	.10	.08	.08	.08	.09	.10	.08	.09	.09	.09	.11	.08	.09	.09	.10	.12	.08	.09	.09	.09	.11	28
haberman	.00	.00	.01	.01	.01	.00	.01	.01	.01	.01	.00	.00	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.02	.01	.01	.01	.01	.01	4
heartC	.02	.03	.03	.03	.05	.02	.03	.03	.03	.05	.02	.03	.03	.04	.05	.03	.04	.05	.05	.07	.03	.04	.04	.05	.08	.03	.04	.05	.05	.08	23
heartH	.02	.02	.02	.02	.04	.02	.02	.03	.03	.04	.02	.02	.03	.03	.04	.02	.03	.03	.03	.05	.03	.03	.04	.04	.06	.03	.03	.04	.04	.06	21
heartS	.01	.02	.02	.02	.03	.01	.02	.02	.02	.03	.01	.02	.02	.02	.03	.02	.03	.03	.03	.05	.02	.02	.03	.03	.05	.02	.02	.03	.03	.05	14
hepati	.02	.02	.02	.02	.03	.02	.02	.02	.02	.03	.02	.02	.02	.02	.03	.02	.02	.03	.03	.04	.02	.02	.03	.03	.04	.02	.03	.03	.03	.05	20
iono	.04	.07	.10	.14	.38	.05	.07	.10	.14	.36	.04	.07	.10	.13	.34	.09	.16	.23	.32	.81	.11	.18	.26	.36	.87	.11	.18	.25	.33	.81	34
je4042	.01	.01	.01	.01	.02	.01	.01	.01	.02	.02	.01	.01	.01	.02	.03	.01	.02	.02	.02	.04	.01	.02	.02	.03	.04	.02	.02	.03	.03	.05	9
je4243	.01	.01	.02	.02	.03	.01	.01	.01	.02	.03	.01	.01	.01	.02	.03	.01	.02	.02	.03	.05	.01	.02	.02	.03	.05	.02	.02	.03	.03	.06	9
kc1	.05	.09	.13	.18	.48	.05	.09	.14	.18	.49	.05	.09	.13	.18	.49	.13	.25	.37	.49	1.19	.13	.25	.36	.48	1.15	.13	.25	.37	.49	1.15	22
kc2	.02	.04	.07	.07	.16	.03	.04	.05	.06	.16	.03	.04	.06	.07	.17	.05	.08	.11	.12	.28	.05	.08	.11	.15	.32	.07	.10	.13	.18	.40	22
kc3	.06	.10	.15	.20	.57	.06	.10	.16	.21	.56	.06	.10	.16	.21	.56	.13	.23	.33	.44	1.08	.12	.21	.31	.41	1.00	.12	.22	.31	.42	1.01	40
liver	.01	.01	.01	.01	.02	.01	.01	.01	.01	.02	.01	.01	.01	.01	.02	.01	.01	.02	.02	.04	.01	.01	.02	.02	.03	.01	.01	.02	.02	.04	7
pc1req	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.02	.01	.01	.01	.01	.01	.01	.02	.01	.01	.01	9
pc4	.17	.34	.49	.69	1.83	.18	.32	.49	.67	1.78	.19	.34	.51	.71	1.94	.38	.71	1.05	1.45	3.53	.40	.73	1.09	1.47	3.53	.47	.85	1.25	1.68	3.97	38
sonar	.09	.16	.25	.35	1.09	.09	.16	.25	.36	1.13	.09	.17	.26	.38	1.17	.18	.33	.51	.70	2.05	.19	.36	.58	.79	2.31	.19	.37	.57	.81	2.36	61
spect	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	23
spectf	.06	.11	.16	.23	.67	.06	.11	.17	.23	.66	.06	.11	.17	.23	.67	.12	.22	.33	.45	1.18	.13	.25	.37	.50	1.31	.14	.27	.41	.56	1.41	45
transfusion	.00	.01	.01	.01	.01	.00	.01	.01	.01	.01	.00	.01	.01	.01	.01	.01	.01	.01	.01	.02	.01	.01	.01	.02	.02	.01	.01	.01	.02	.03	5
ttt	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	28
vote	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	17
wbc	.01	.02	.02	.02	.03	.01	.02	.02	.02	.03	.01	.02	.02	.02	.03	.02	.02	.03	.03	.05	.02	.03	.03	.04	.07	.02	.03	.04	.04	.07	10
Average	.04	.06	.08	.11	.25	.05	.06	.08	.11	.25	.05	.07	.09	.11	.26	.07	.11	.15	.20	.46	.08	.12	.16	.21	.48	.08	.13	.17	.22	.51	24.0

Table 3: Computation Time - xGB

CE	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	ce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	cce	
Cal.Size	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.4	.4	.4	.4	.4	.1	.1	.1	.1	.1	.2	.2	.2	.2	.2	.4	.4	.4	.4	.4	
Sample Size	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9	
colic	.12	.13	.15	.17	.23	.12	.14	.15	.17	.23	.12	.14	.15	.17	.25	.14	.16	.18	.21	.31	.15	.17	.19	.21	.31	.15	.17	.19	.21	.33	60
creditA	.16	.18	.19	.22	.31	.19	.22	.24	.27	.38	.20	.23	.25	.28	.39	.19	.21	.23	.25	.39	.23	.26	.29	.32	.49	.24	.27	.30	.33	.50	43
diabetes	.01	.01	.02	.02	.04	.01	.01	.02	.02	.04	.01	.01	.02	.02	.04	.02	.03	.04	.05	.10	.02	.03	.05	.06	.12	.02	.03	.04	.05	.11	9
german	.08	.08	.08	.09	.10	.08	.08	.08	.08	.10	.08	.08	.08	.09	.10	.08	.08	.09	.09	.10	.08	.09	.09	.09	.11	.08	.09	.09	.09	.11	28
haberman	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.01	.00	.00	.01	.01	.01	.00	.01	.01	.01	.01	.00	.01	.01	.01	.01	4
heartC	.02	.02	.03	.03	.05	.02	.02	.03	.03	.05	.02	.03	.03	.03	.05	.03	.03	.04	.04	.07	.03	.03	.04	.05	.07	.03	.04	.04	.05	.07	23
heartH	.02	.02	.02	.02	.03	.02	.02	.02	.02	.04	.02	.02	.02	.02	.04	.02	.02	.03	.03	.04	.02	.03	.03	.03	.05	.02	.03	.03	.04	.06	21
heartS	.01	.01	.02	.02	.03	.01	.01	.02	.02	.03	.01	.01	.02	.02	.03	.02	.02	.02	.03	.05	.02	.02	.02	.03	.04	.02	.02	.02	.03	.05	14
hepati	.01	.01	.02	.02	.03	.01	.01	.02	.02	.03	.01	.01	.02	.02	.03	.01	.02	.02	.02	.04	.02	.02	.02	.03	.04	.02	.02	.02	.03	.04	20
iono	.04	.07	.10	.14	.38	.04	.07	.10	.13	.36	.04	.06	.09	.13	.33	.09	.16	.23	.31	.82	.10	.19	.26	.35	.86	.10	.17	.25	.34	.80	34
je4042	.01	.01	.01	.01	.02	.01	.01	.01	.01	.02	.01	.01	.01	.01	.02	.01	.01	.02	.02	.03	.01	.02	.02	.02	.04	.01	.02	.02	.02	.04	9
je4243	.01	.01	.01	.01	.03	.01	.01	.01	.01	.02	.01	.01	.01	.01	.03	.01	.02	.02	.03	.05	.01	.02	.02	.02	.04	.01	.02	.02	.03	.05	9
kc1	.05	.09	.13	.18	.48	.05	.09	.13	.18	.49	.05	.09	.13	.18	.49	.13	.25	.37	.50	1.19	.13	.25	.37	.48	1.16	.13	.25	.36	.49	1.15	22
kc2	.02	.03	.05	.06	.15	.02	.03	.05	.06	.15	.03	.04	.05	.06	.17	.04	.06	.09	.11	.26	.05	.07	.10	.13	.32	.06	.10	.13	.17	.39	22
kc3	.05	.10	.14	.20	.56	.05	.10	.15	.21	.57	.06	.10	.15	.20	.54	.12	.22	.33	.43	1.08	.11	.21	.30	.39	1.00	.12	.21	.31	.41	1.02	40
liver	.01	.01	.01	.01	.01	.00	.01	.01	.01	.01	.00	.01	.01	.01	.01	.01	.01	.01	.02	.03	.01	.01	.01	.02	.03	.01	.01	.01	.02	.03	7
pc1req	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	9
pc4	.17	.32	.48	.67	1.82	.18	.32	.48	.66	1.76	.19	.35	.51	.71	1.91	.38	.71	1.04	1.41	3.45	.40	.73	1.09	1.46	3.51	.50	.86	1.25	1.68	3.95	38
sonar	.08	.15	.24	.35	1.10	.08	.16	.25	.35	1.13	.08	.16	.25	.37	1.19	.17	.32	.50	.69	2.04	.19	.36	.56	.80	2.33	.19	.36	.57	.81	2.35	61
spect	.02	.01	.02	.02	.02	.01	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	23
spectf	.06	.11	.16	.22	.67	.06	.10	.16	.22	.66	.06	.11	.16	.22	.67	.12	.21	.33	.44	1.18	.13	.24	.36	.50	1.30	.14	.27	.40	.55	1.41	45
transfusion	.00	.00	.01	.01	.01	.00	.00	.01	.01	.01	.00	.00	.01	.01	.01	.01	.01	.01	.01	.02	.01	.01	.01	.01	.02	.01	.01	.01	.02	.02	5
ttt	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07	28
vote	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	17
wbc	.01	.01	.02	.02	.03	.01	.01	.01	.02	.03	.01	.01	.02	.02	.03	.01	.02	.02	.03	.05	.02	.02	.03	.04	.06	.02	.03	.03	.04	.06	10
Average	.04	.06	.08	.10	.25	.04	.06	.08	.10	.25	.04	.06	.08	.11	.26	.07	.11	.15	.19	.46	.07	.12	.16	.21	.48	.08	.12	.17	.22	.51	24.0

Table 4: Computation Time - RF

Calibration Size	xGB 10%	xGB 20%	xGB 40%	xGB 10%	xGB 20%	xGB 40%	RF 10%	RF 20%	RF 40%	RF 10%	RF 20%	RF 40%
Dataset	CE	CE	CE	CCE	CCE	CCE	CE	CE	CE	CCE	CCE	CCE
colic	2.4e-05	1.8e-05	2.7e-05	2.4e-05	1.8e-05	2.7e-05	6.9e-08	1.1e-06	7.4e-07	6.9e-08	1.1e-06	7.4e-07
creditA	.00056	.00043	.0004	.00056	.00043	.0004	2.4e-05	4.1e-05	6e-05	2.4e-05	4.1e-05	6e-05
diabetes	.00024	.00024	.00027	.00024	.00024	.00027	.00037	.00032	.0003	.00037	.00032	.0003
german	2.2e-05	1.1e-05	2.2e-05	2.2e-05	1.1e-05	2.2e-05	5.1e-06	2.6e-06	1.8e-05	5.1e-06	2.6e-06	1.8e-05
haberman	.0014	.00084	.00062	.0014	.00084	.00062	.00034	.00094	.00083	.00034	.00094	.00083
heartC	7.6e-06	6.4e-05	4.7e-05	7.6e-06	6.4e-05	4.7e-05	2.7e-07	1.5e-05	1.4e-05	2.7e-07	1.5e-05	1.4e-05
heartH	5.2e-05	3.2e-05	5.6e-05	5.2e-05	3.2e-05	5.6e-05	2.3e-06	1.3e-06	9e-07	2.3e-06	1.3e-06	9e-07
heartS	.00015	.00026	.00025	.00015	.00026	.00025	3e-05	2.7e-05	5.5e-05	3e-05	2.7e-05	5.5e-05
hepati	9.5e-05	.00017	.00014	9.5e-05	.00017	.00014	2e-05	4.7e-05	6.6e-05	2e-05	4.7e-05	6.6e-05
iono	.00011	.00011	7.5e-05	.00011	.00011	7.5e-05	5.2e-05	5.2e-05	8.2e-05	5.2e-05	5.2e-05	8.2e-05
je4042	.00016	.00022	.00026	.00016	.00022	.00026	3.5e-05	5e-05	4.5e-05	3.5e-05	5e-05	4.5e-05
je4243	4.8e-05	5.9e-05	5.1e-05	4.8e-05	5.9e-05	5.1e-05	.00036	.00026	.00024	.00036	.00026	.00024
kc1	.00025	.00017	.00016	.00025	.00017	.00016	.00037	.00022	.00017	.00037	.00022	.00017
kc2	.00019	.0002	.00016	.00019	.0002	.00016	5.6e-06	3.4e-05	8.8e-05	5.6e-06	3.4e-05	8.8e-05
kc3	5e-06	9e-06	7.2e-06	5e-06	9e-06	7.2e-06	7.3e-06	6.3e-06	4.5e-06	7.3e-06	6.3e-06	4.5e-06
liver	.00014	.00013	.0001	.00014	.00013	.0001	.00061	.00044	.0005	.00061	.00044	.0005
pc1req	.0	3.5e-35	2.9e-35	.0	3.5e-35	2.9e-35	6.3e-07	3.1e-07	2.1e-07	6.3e-07	3.1e-07	2.1e-07
pc4	.00014	.00011	9.9e-05	.00014	.00011	9.9e-05	4.1e-05	4.7e-05	4.8e-05	4.1e-05	4.7e-05	4.8e-05
sonar	1.3e-05	.00015	.0002	1.3e-05	.00015	.0002	4.8e-05	.00013	.00011	4.8e-05	.00013	.00011
spect	1.4e-34	1.1e-34	7e-35	1.4e-34	1.1e-34	7e-35	.0	1.8e-35	2.3e-35	.0	1.8e-35	2.3e-35
spectf	.00014	7e-05	8.5e-05	.00014	7e-05	8.5e-05	8.5e-05	5.9e-05	7.7e-05	8.5e-05	5.9e-05	7.7e-05
transfusion	.00034	.00025	.00025	.00034	.00025	.00025	.00031	.00035	.00033	.00031	.00035	.00033
ttt	2.8e-33	3.2e-33	3.3e-33	2.8e-33	3.2e-33	3.3e-33	1e-33	1.6e-33	1.7e-33	1e-33	1.6e-33	1.7e-33
vote	1.3e-34	1.7e-34	1.2e-34	1.3e-34	1.7e-34	1.2e-34	1.3e-34	8.9e-35	1.1e-34	1.3e-34	8.9e-35	1.1e-34
wbc	.00016	.00027	.00036	.00016	.00027	.00036	.00056	.00077	.00075	.00056	.00077	.00075
Average	.00017	.00015	.00015	.00017	.00015	.00015	.00013	.00015	.00015	.00013	.00015	.00015

Table 5: Calibration Size - Mean variance of most important feature

	xGB	xGB	xGB	xGB	xGB	xGB	xGB	xGB	xGB	xGB	RF	RF	RF	RF	RF	RF	RF	RF	RF	RF
Sample Size	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9	1	2	3	4	9
Dataset	CE	CE	CE	CE	CE	CCE	CCE	CCE	CCE	CCE	CE	CE	CE	CE	CE	CCE	CCE	CCE	CCE	CCE
colic	.0026	.0027	.0027	.0027	.0027	.0026	.0027	.0027	.0027	.0027	.0043	.0043	.0043	.0043	.0043	.0043	.0043	.0043	.0043	.0043
creditA	.007	.0066	.0064	.0062	.0061	.007	.0066	.0064	.0062	.0061	.003	.003	.003	.003	.0029	.003	.003	.003	.003	.0029
diabetes	.0045	.0044	.0043	.0042	.0041	.0045	.0044	.0043	.0042	.0041	.0096	.0097	.0096	.0095	.0094	.0096	.0097	.0096	.0095	.0094
german	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.0027	.0027	.0026	.0026	.0026	.0027	.0027	.0026	.0026	.0026
haberman	.012	.012	.012	.011	.011	.012	.012	.012	.011	.011	.0072	.0064	.0061	.0057	.0055	.0072	.0064	.0061	.0057	.0055
heartC	.0043	.0043	.0043	.0043	.0043	.0043	.0043	.0043	.0043	.0043	.004	.004	.004	.004	.0041	.004	.004	.004	.004	.0041
heartH	.0054	.0054	.0054	.0053	.0053	.0054	.0054	.0054	.0053	.0053	.0069	.0069	.0069	.0069	.0069	.0069	.0069	.0069	.0069	.0069
heartS	.0096	.0087	.0084	.0083	.0082	.0096	.0087	.0084	.0083	.0082	.0054	.0053	.0052	.0052	.0052	.0054	.0053	.0052	.0052	.0052
hepati	.0075	.0067	.0065	.0063	.0061	.0075	.0067	.0065	.0063	.0061	.001	.0011	.0012	.0011	.0011	.001	.0011	.0012	.0011	.0011
iono	.002	.002	.002	.002	.0021	.002	.002	.002	.002	.0021	.0041	.0041	.0041	.0041	.0039	.0041	.0041	.0041	.0041	.0039
je4042	.0087	.0087	.0083	.0082	.008	.0087	.0087	.0083	.0082	.008	.0054	.0052	.0052	.0052	.0051	.0054	.0052	.0052	.0052	.0051
je4243	.0027	.0027	.0026	.0026	.0026	.0027	.0027	.0026	.0026	.0026	.003	.0028	.0027	.0026	.0025	.003	.0028	.0027	.0026	.0025
kc1	.0064	.0064	.0063	.0062	.0061	.0064	.0064	.0063	.0062	.0061	.0048	.0041	.004	.0038	.0037	.0048	.0041	.004	.0038	.0037
kc2	.0045	.0043	.0042	.0042	.0042	.0045	.0043	.0042	.0042	.0042	.0039	.0038	.0038	.0037	.0037	.0039	.0038	.0038	.0037	.0037
kc3	.00065	.00063	.00063	.00063	.00062	.00065	.00063	.00063	.00063	.00062	.0023	.0023	.0023	.0023	.0023	.0023	.0023	.0023	.0023	.0023
liver	.0097	.0098	.0098	.0098	.0097	.0097	.0098	.0098	.0098	.0097	.0057	.0059	.0057	.0057	.0056	.0057	.0059	.0057	.0057	.0056
pc1req	.0035	.0035	.0035	.0035	.0035	.0035	.0035	.0035	.0035	.0035	.004	.004	.004	.004	.004	.004	.004	.004	.004	.004
pc4	.00097	.00098	.001	.001	.001	.00097	.00098	.001	.001	.001	.00085	.00082	.00081	.00081	.00081	.00085	.00082	.00081	.00081	.00081
sonar	.0095	.0087	.0084	.0084	.0083	.0095	.0087	.0084	.0084	.0083	.0048	.0048	.0047	.0048	.0048	.0048	.0048	.0047	.0048	.0048
spect	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.0021
spectf	.0094	.0097	.0097	.0097	.0096	.0094	.0097	.0097	.0097	.0096	.0058	.0058	.0057	.0056	.0056	.0058	.0058	.0057	.0056	.0056
transfusion	.0011	.001	.001	.00099	.00097	.0011	.001	.001	.00099	.00097	.0041	.0036	.0034	.0033	.0033	.0041	.0036	.0034	.0033	.0033
ttt	.0037	.0037	.0037	.0037	.0037	.0037	.0037	.0037	.0037	.0037	.0017	.0017	.0017	.0017	.0017	.0017	.0017	.0017	.0017	.0017
vote	.003	.003	.003	.003	.003	.003	.003	.003	.003	.003	.0023	.0023	.0023	.0023	.0023	.0023	.0023	.0023	.0023	.0023
wbc	.0085	.0082	.0082	.0082	.0079	.0085	.0082	.0082	.0082	.0079	.002	.0018	.0016	.0016	.0015	.002	.0018	.0016	.0016	.0015
Average	.0053	.0051	.005	.005	.0049	.0053	.0051	.005	.005	.0049	.004	.0039	.0039	.0038	.0038	.004	.0039	.0039	.0038	.0038

Table 6: Percentile Sampling - Mean variance of most important feature