Supplement to "Robust Method for Optimal Treatment Decision Making Based on Survival Data"

Yuexin Fang

School of Statistics and Management, Shanghai University of Finance and Economics, Shanghai, P.R.China., P.R.China.

Baqun Zhang

School of Statistics and Management, Shanghai University of Finance and Economics, Shanghai, P.R.China.

and

Min Zhang[*]

Department of Biostatistics, University of Michigan, Ann Arbor, U.S.A.

mzhangst@umich.edu

Additional Simulation Results

Additional simulations studies were conducted under settings where the treatment assignment was not random. For Model 1 and Model 3, A was generated from a Bernoulli distribution with $P(A = 1|X) = 1/\{1 + \exp(-\xi'X)\}$, where $\xi = (0.5, 0.5, 1, \mathbf{0}_7, -1, \mathbf{0}_{40})$. For Model 2, A was Bernoulli with $P(A = 1|X) = 1/\{1 + \exp(-\xi'X)\}$, where $\xi = (0, 0.5, -0.5, \mathbf{0}_{48})$. Results are reported in Table S1 and Table S2.

Table S1: Propensity score depends on covariates: Simulation results under Models 1-3 and independent censoring. PCD: the percentage of correct decisions; MSE: mean squared error for estimating γ for penalized methods; CR: censoring rate; Value: expectation of log survival time under the estimated optimal treatment regime; V_0 is the value of the true optimal treatment regime.

| Method | Model 1 $V_0=2.480$ | | | | Model 2 $V_0=1.877$ | | | | Model 3 $V_0=1.667$ | | | |
| | | | PCD | | | | PCD | | | | PCD | |
	MSE	Value	Unpenalized	Penalized	MSE	Value	Unpenalized	Penalized	MSE	Value	Unpenalized	Penalized
n=400, CR=15%												
AIPWE_AFT*	0.587	2.432	0.832	0.883	1.116	1.723	0.723	0.778	1.775	1.545	0.709	0.771
AIPWE_AFT	0.664	2.426	0.825	0.877	1.221	1.715	0.721	0.772	1.790	1.544	0.708	0.770
Geng et al	0.693	2.424	0.828	0.876	1.408	1.688	0.711	0.753	1.998	1.528	0.703	0.749
Tian et al	1.199	2.402	0.799	0.852	1.902	1.627	0.694	0.730	2.110	1.580	0.717	0.805
n=400, CR=40%												
AIPWE_AFT*	0.811	2.410	0.809	0.861	1.732	1.627	0.679	0.712	2.077	1.506	0.680	0.736
AIPWE_AFT	1.051	2.392	0.793	0.844	1.614	1.653	0.694	0.729	2.074	1.509	0.683	0.742
Geng et al	1.433	2.356	0.781	0.813	2.733	1.539	0.646	0.661	2.764	1.450	0.657	0.682
Tian et al	1.216	2.388	0.785	0.839	1.809	1.641	0.692	0.731	2.066	1.557	0.707	0.784
n=1000, CR=15%												
AIPWE_AFT*	0.228	2.462	0.887	0.931	0.416	1.833	0.799	0.859	1.280	1.612	0.790	0.859
AIPWE_AFT	0.281	2.457	0.877	0.923	0.465	1.823	0.790	0.850	1.327	1.609	0.787	0.855
Geng et al	0.292	2.459	0.889	0.926	0.567	1.805	0.784	0.835	1.534	1.599	0.785	0.835
Tian et al	0.936	2.425	0.847	0.876	1.588	1.732	0.755	0.789	1.816	1.612	0.779	0.854
n=1000, CR=40%												
AIPWE_AFT*	0.374	2.454	0.875	0.921	0.921	1.777	0.754	0.809	1.501	1.597	0.760	0.828
AIPWE_AFT	0.617	2.433	0.847	0.891	0.757	1.792	0.764	0.821	1.531	1.594	0.758	0.825
Geng et al	0.742	2.427	0.850	0.883	1.192	1.720	0.727	0.767	1.792	1.573	0.748	0.794
Tian et al	0.865	2.419	0.838	0.870	1.381	1.761	0.760	0.775	1.709	1.611	0.769	0.838

Table S2: Selection results under independent censoring (Propensity score depends on covariates). Incorr0: the number of non-zero coefficients incorrectly identified as zero; Corr0: the number of correct zero coefficients identified; Cover: the proportion of covering all the important variables.

Method	Model 1			Model 2			Model 3		
	Incorr0	Corr0	Cover	Incorr0	Corr0	Cover	Incorr0	Corr0	Cover
n=400, CR=15%									
AIPWE_AFT*	0.015	25.9	0.990	0.130	28.7	0.885	0.291	26.7	0.715
AIPWE_AFT	0.020	26.2	0.975	0.126	28.6	0.880	0.435	26.8	0.694
Geng et al	0.010	26.2	0.990	0.298	26.0	0.750	0.286	25.7	0.734
Tian et al	0.212	39.4	0.806	1.020	39.6	0.404	0.258	41.1	0.782
n=400, CR=40%									
AIPWE_AFT*	0.028	28.6	0.986	0.380	29.5	0.750	0.465	28.8	0.625
AIPWE_AFT	0.125	28.9	0.899	0.515	27.6	0.600	0.585	33.6	0.575
Geng et al	0.052	17.4	0.952	0.652	16.4	0.542	0.422	18.8	0.662
Tian et al	0.226	38.4	0.796	0.916	38.3	0.412	0.438	40.3	0.666
n=1000, CR=15%									
AIPWE_AFT*	0.002	33.1	0.998	0	33.7	1	0.030	34.1	0.970
AIPWE_AFT	0.010	32.8	0.994	0.002	33.2	0.998	0.036	33.7	0.959
Geng et al	0	32.6	1	0.066	31.8	0.934	0.026	31.0	0.974
Tian et al	0.004	36.9	0.996	0.106	36.5	0.902	0.018	38.5	0.982
n=1000, CR=40%									
AIPWE_AFT*	0.005	32.3	0.995	0.080	34.1	0.965	0.155	36.8	0.865
AIPWE_AFT	0.040	32.3	0.978	0.102	33.5	0.821	0.215	34.9	0.815
Geng et al	0.004	27.5	0.996	0.624	28.2	0.600	0.208	29.3	0.816
Tian et al	0.004	36.3	0.996	0.166	35.3	0.898	0.034	37.7	0.966