

Homework 5

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Question 4 : Do LS, Best Subset, Ridge, Lasso, LARS, PCR, PLSR with Prostate

Cancer and choose the parameter by 10-fold CV.

	LS	Ridge(lambda=0.01)	Ridge(lambda=0.1)
β_1	-0.022816619	-0.022825136	-0.022900739
β_2	-0.019708175	-0.019701508	-0.019641695
β_3	0.105675239	0.105661597	0.105538827
β_4	-0.042963598	-0.042955127	-0.042878958
β_5	0.020376072	0.020375991	0.020375188
β_6	-0.060737449	-0.060707380	-0.060438320
β_7	-0.130085841	-0.130024357	-0.129473623
β_8	0.158879025	0.158805053	0.158142626
β_9	0.002055289	0.002051329	0.002015508
MSE(10-FLOD CV)	0.2279896	0.2259593	0.2230038

	Ridge(lambda=1)	Ridge(lambda=5)	LASSO(0.01)
β_1	-0.023560939	-2.502647e-02	-0.012816619
β_2	-0.019062110	-1.684944e-02	-0.009708175
β_3	0.104313195	9.901306e-02	0.095675239
β_4	-0.042124540	-3.896894e-02	-0.032963598
β_5	0.020360046	2.012843e-02	0.010376072
β_6	-0.057893497	-4.903214e-02	-0.050737449
β_7	-0.124213289	-1.052057e-01	-0.120085841
β_8	0.151830972	1.292461e-01	0.148879025
β_9	0.001642905	-9.375573e-05	0.000000000
MSE(10-FLOD CV)	0.242609	0.2366071	0.2196436

	LASSO(0.02)	LASSO(0.03)	LASSO(0.05)
β_1	-0.0028166193	0.000000000	0.000000000
β_2	0.0000000000	0.000000000	0.000000000
β_3	0.0856752389	0.07567524	0.05567524
β_4	-0.0229635977	-0.01296360	0.000000000
β_5	0.0003760723	0.000000000	0.000000000
β_6	-0.0407374491	-0.03073745	-0.01073745
β_7	-0.1100858410	-0.10008584	-0.08008584
β_8	0.1388790249	0.12887902	0.10887902

β_9	0.0000000000	0.00000000	0.00000000
MSE(10-FLOD CV)	0.2318425	0.2207072	0.1968821
	LASSO(0.1)	Best Subset	PCR(1)
β_1	0.0000000000	-0.02163232	0.0006921215
β_2	0.0000000000	-0.01923371	0.0003372718
β_3	0.005675239	0.10539357	0.0003234757
β_4	0.0000000000	-0.04271377	0.0001517125
β_5	0.0000000000	0.02093752	0.0006168642
β_6	0.0000000000	-0.06100147	0.0007085804
β_7	-0.030085841	-0.13002255	0.0005899729
β_8	0.058879025	0.15910287	0.0006510095
β_9	0.0000000000	0.00000000	0.0006754488
MSE(10-FLOD CV)	0.2168831	0.2917189	0.2178586
	PCR(2)	PCR(3)	PCR(4)
β_1	-0.0001190851	-0.011593678	-0.0003191936
β_2	0.0078100655	-0.005622088	-0.0110940841
β_3	0.0064078896	0.021671646	0.1064959099
β_4	0.0087198460	0.013546986	-0.0394822990
β_5	-0.0023635475	-0.013738651	0.0127040892
β_6	-0.0022056350	-0.004616834	-0.0091060871
β_7	-0.0009181297	0.022322605	-0.0030571624
β_8	-0.0010491802	0.018390805	-0.0005624229
β_9	0.0016719457	-0.014375592	-0.0309121918
MSE(10-FLOD CV)	0.2174949	0.227207	0.2266494
	PCR(5)	PCR(6)	PCR(7)
β_1	-0.020015474	-0.030608847	-0.044960374
β_2	-0.014881233	0.005062743	-0.003589797
β_3	0.105732728	0.101643791	0.103140906
β_4	-0.023803516	-0.036718742	-0.037717211
β_5	0.040169824	0.041626362	0.060674626
β_6	0.002615193	0.001347470	-0.033352408
β_7	-0.015100687	-0.011737722	-0.003125007
β_8	0.003798126	0.011007649	0.014319365
β_9	-0.043057872	-0.047188896	-0.020364226
MSE(10-FLOD CV)	0.2280498	0.2322715	0.2282045
	PCR(8)	PLSR(1)	PLSR(2)
β_1	-0.06399927	-0.030361573	-0.03573465
β_2	-0.02578972	-0.006484562	-0.01759495
β_3	0.11736556	0.115863446	0.09973165
β_4	-0.05058417	-0.019530651	-0.03979879

β_5	0.00332877	0.017482048	0.02113773
β_6	-0.02412064	-0.024414846	-0.03322488
β_7	-0.11879835	-0.028814246	-0.05833363
β_8	0.13237690	0.065569570	0.06764430
β_9	0.03624421	-0.022107204	-0.02086022
MSE(10-FLOD CV)	0.2342747	0.2473562	0.2217202

	PLSR(3)	PLSR(4)	PLSR(5)
β_1	-0.022054890	-0.026525846	-0.025084043
β_2	-0.010668604	-0.000142802	-0.011678847
β_3	0.096938684	0.091889794	0.086080006
β_4	-0.038710215	-0.015013097	-0.016730041
β_5	0.032693964	0.012641590	0.005532991
β_6	-0.023902144	-0.039158254	-0.038578900
β_7	-0.061954514	-0.075620441	-0.067478888
β_8	0.085214588	0.095452919	0.108937100
β_9	-0.001603748	0.003222890	-0.001184578
MSE(10-FLOD CV)	0.212475	0.2265447	0.2157245

	PLSR(6)	PLSR(7)	PLSR(8)
β_1	-0.016242114	-0.016217743	-0.015867080
β_2	-0.011754000	-0.010333879	-0.010214655
β_3	0.087929563	0.086288028	0.086245614
β_4	-0.017317278	-0.015981423	-0.016359212
β_5	0.002999730	0.006045184	0.006328569
β_6	-0.039033898	-0.039688760	-0.041141271
β_7	-0.070082435	-0.070130378	-0.069473396
β_8	0.107729008	0.108935196	0.108886996
β_9	-0.004784083	-0.008245989	-0.007822117
MSE(10-FLOD CV)	0.2197911	0.2204942	0.2248497

Question 5 : Do Forward stepwise regression, Forward stagewise regression, Lasso,

LARS, Best subset with Prostate Cancer.

	LASSO(0.01)(8x)	LASSO(0.02)(7x)	LASSO(0.03)(5x)
β_1	-0.012816619	-0.0028166193	0.00000000
β_2	-0.009708175	0.0000000000	0.00000000
β_3	0.095675239	0.0856752389	0.07567524
β_4	-0.032963598	-0.0229635977	-0.01296360
β_5	0.010376072	0.0003760723	0.00000000
β_6	-0.050737449	-0.0407374491	-0.03073745

β_7	-0.120085841	-0.1100858410	-0.10008584
β_8	0.148879025	0.1388790249	0.12887902
β_9	0.000000000	0.0000000000	0.000000000

	LASSO(0.05)(4x)	LASSO(0.07)(3x)	LASSO(0.11)(2x)
β_1	0.00000000	0.00000000	0.00000000
β_2	0.00000000	0.00000000	0.00000000
β_3	0.05567524	0.03567524	0.00000000
β_4	0.00000000	0.00000000	0.00000000
β_5	0.00000000	0.00000000	0.00000000
β_6	-0.01073745	0.00000000	0.00000000
β_7	-0.08008584	-0.06008584	-0.02008584
β_8	0.10887902	0.08887902	0.04887902
β_9	0.00000000	0.00000000	0.00000000

	LASSO(0.14)(1x)	LASSO(0.16)(0x)
β_1	0.00000000	0
β_2	0.00000000	0
β_3	0.00000000	0
β_4	0.00000000	0
β_5	0.00000000	0
β_6	0.00000000	0
β_7	0.00000000	0
β_8	0.01887902	0
β_9	0.00000000	0

	Forward stage(1x)	Forward stage(2x)	Forward stage(3x)
β_1	0.00000	0.000000	0.000000
β_2	0.00000	0.000000	0.000000
β_3	0.01055	0.010525	0.010524
β_4	0.00000	0.000000	-0.001856
β_5	0.00000	0.000000	0.000000
β_6	0.00000	0.000000	0.000000
β_7	0.00000	0.000000	0.000000
β_8	0.00000	0.000789	0.000801
β_9	0.00000	0.000000	0.000000

	Forward stage(4x)	Forward stage(5x)	Forward stage(6x)
β_1	-0.000390	-0.007005	-0.025627
β_2	0.000000	0.000000	0.000000
β_3	0.010524	0.010524	0.017315
β_4	-0.002158	-0.007954	-0.040333
β_5	0.000000	0.000000	0.000000
β_6	0.000000	-0.006506	-0.033646

β_7	0.000000	0.000000	-0.069791
β_8	0.000815	0.001169	0.003510
β_9	0.000000	0.000000	0.000000

	Forward stage(7x)	Forward stage(8x)
β_1	-0.025779	-0.025986
β_2	0.000000	0.000000
β_3	0.017326	0.017339
β_4	-0.040401	-0.040462
β_5	0.000000	0.000939
β_6	-0.033676	-0.033874
β_7	-0.069944	-0.070138
β_8	0.003513	0.003517
β_9	0.000187	0.000357

	Forward step(1x)	Forward step(2x)	Forward step(3x)
β_1	0.00000000	0.00000000	0.00000000
β_2	0.00000000	0.00000000	0.00000000
β_3	0.08166895	0.08166895	0.08166895
β_4	0.00000000	-0.04207109	-0.04207109
β_5	0.00000000	0.00000000	0.00000000
β_6	0.00000000	0.00000000	0.00000000
β_7	0.00000000	0.00000000	-0.03880383
β_8	0.00000000	0.00000000	0.00000000
β_9	0.00000000	0.00000000	0.00000000

	Forward step(4x)	Forward step(5x)	Forward step(6x)
β_1	0.00000000	-0.04589480	-0.04589480
β_2	0.00000000	0.00000000	-0.01464704
β_3	0.08166895	0.10557998	0.10557998
β_4	-0.04207109	-0.04207109	-0.04207109
β_5	0.00000000	0.00000000	0.00000000
β_6	0.00000000	0.00000000	0.00000000
β_7	-0.03880383	-0.08902687	-0.08902687
β_8	0.05604369	0.09303533	0.10909578
β_9	0.00000000	0.00000000	0.00000000

	Forward step(7x)	Forward step(8x)
β_1	-0.04589480	-0.02920704
β_2	-0.01464704	-0.01824257
β_3	0.10557998	0.10557998
β_4	-0.04207109	-0.04207109
β_5	0.00000000	0.01572855
β_6	-0.02060772	-0.05079352

β_7	-0.08902687	-0.12279031
β_8	0.10909578	0.15045320
β_9	0.00000000	0.00000000

	Best subsets(1x)	Best subsets(2x)	Best subsets(3x)
β_1	0.08251966	-0.1280040	0.08465495
β_2	0.00000000	0.1429464	-0.13993976
β_3	0.00000000	0.0000000	0.12854667
β_4	0.00000000	0.0000000	0.00000000
β_5	0.00000000	0.0000000	0.00000000
β_6	0.00000000	0.0000000	0.00000000
β_7	0.00000000	0.0000000	0.00000000
β_8	0.00000000	0.0000000	0.00000000
β_9	0.00000000	0.0000000	0.00000000

	Best subsets(4x)	Best subsets(5x)	Best subsets(6x)
β_1	0.08106324	- 0.09929064	-0.02139243
β_2	-0.06279554	-0.05174146	0.10422377
β_3	-0.13365699	-0.06624574	-0.04371276
β_4	0.16447150	-0.13366843	-0.06148830
β_5	0.00000000	0.16568583	-0.13632261
β_6	0.00000000	0.00000000	0.16498158
β_7	0.00000000	0.00000000	0.00000000
β_8	0.00000000	0.00000000	0.00000000
β_9	0.00000000	0.00000000	0.00000000

	Best subsets(7x)	Best subsets(8x)
β_1	-0.02299990	-0.02163232
β_2	0.10336792	-0.01923371
β_3	-0.04121096	0.10539357
β_4	0.01783413	-0.04271377
β_5	-0.07258264	0.02093752
β_6	-0.13440567	-0.06100147
β_7	0.16259746	-0.13002255
β_8	0.00000000	0.15910287
β_9	0.00000000	0.00000000

Ps: 我觉得自己的 best subsets 有点问题 ,因为感觉不应该是从第一个到第八个这样出来 ,
可是没有 debug 出来 , 原来用别的数据是好的。