

CHAPTER SIX

FORWARD SEARCH METHOD

Atkinson and Riani (2000) proposed the forward search (FS) method for detecting influential observations in regression models. The FS method is made up of three steps. The first step focuses on selecting an initial subset of size m chosen from a data set of size n ($m < n$). In the second step, an observation is added into the initial subset based on a specific rule until $m = n$. Finally, we monitor the statistics of interest during the progression of the search by looking at significant changes that is caused by the inclusion of the observation. Influential observations are then identified at the end of search. The FS method has been successfully applied to a number of problems, including regressions.

Atkinson and Riani (2001) adapted the FS procedures in regression diagnosis for binomial data. Similar steps of FS method are applied where, in step 3, the effect of transforming the data with outliers is monitored. Later the FS method is used to study the effect of masked outliers on model selection in regression model (see Atkinson and Riani (2002)). The investigation focuses on screening the significance of model selection. Similar method has been extended by Atkinson *et al.* (2004) to study the effect of masked outliers on multivariate data. FS method has also been used in other areas of research such as image processing by Crosilla *et al.* (2007). The method is adapted to outlier classification for spatial objects (3D object) based on high density laser scanning range measurements. Recently, Coin (2008) adapted the FS method to test the normality assumption in linear regression model. FS method is performed and the result of Shapiro-Wilk test is monitored. The proposed procedure is capable of identifying observations which agree with the hypothesis of normality.

In this study, the FS method is extended to the Cox PHM. The discussion on different FS method for Cox PHM is given in section 6.1 and the illustration is given in section 6.2.

6.1 Cox PHM FS Method

The FS method in this section is designed to extend and improve the method of Atkinson and Riani (2000) which uses the deviance residual r_{Di} to identify influential observations in regression model. The FS method proposed for the Cox PHM, referred to Cox PHM FS herewith, use three types of residual as described in Chapter 5. The residuals are deviance r_{Di} , normal deviate r_{Ni} and log-odds r_{Li} residuals. The Cox PHM FS method still comprises three main steps as given below:

1. Choosing an initial subset from the full data set
2. Adding observations during the forward search
3. Monitoring the search

First step: Choosing the Initial Subset Set

The Cox PHM FS method begins with fitting the full data set by the Cox PHM given by equation (3.1), and we denote the ‘best’ fitted model as *Model A*. Then choose any techniques 1 to 7 as listed in Table 6.1 to obtain the initial subset of the Cox PHM FS method. Denote the initial subset as $S_*^{(m)}$, where m is the size of the initial subset.

Technique 1 is almost similar to the scheme employed by Atkinson and Riani (2000). After fitting *Model A* to the full data set, we obtain the r_{Di}^2 values. The initial subset is formed by choosing at least 50% of the observations that give the smallest

r_{Di}^2 values. On the other hand, techniques 2 and 3 use r_{Ni} and r_{Li} respectively instead of r_{Di} .

Table 6.1
Techniques in forming the initial subset in the Cox PHM FS method

Technique	Detail
1	Fit <i>Model A</i> to the full data set and obtain the r_{Di}^2 values. Then rank the data set based on the resulting r_{Di}^2 . The initial subset is formed by choosing at least 50% of the observations that give the smallest r_{Di}^2 values.
2	The technique is similar to technique 1. However, r_{Ni} is used instead of r_{Di} .
3	The technique is similar to technique 1, but r_{Li} is used instead of r_{Di} .
4	Perform the case-deletion method on the full data set. Let one observation be removed at a time. Then the reduced data set is fitted using <i>Model A</i> . The parameter estimates $(\hat{\beta}_1, \hat{\beta}_2, \dots, \hat{\beta}_p)$ are then recorded. This is repeated for every observation in the data set. Construct the interval median $(\hat{\beta}_j^{(-i)}) \pm \gamma \text{MAD}(\hat{\beta}_j^{(-i)})$ where $\hat{\beta}_j^{(-i)}$ is the estimate of the parameter β_j where $j=1,2,\dots,p$ when the i th observation is removed and $\gamma = 1, 2, \dots$. If $\hat{\beta}_j^{(-i)}$ lies outside the interval, then the i th observation will not be included in the initial subset for all $j = 1,2,\dots,p$.
5	Fit the <i>Model A</i> to the full data set and obtain r_{Di} . Then the initial subset is formed by choosing observation with r_{Di} values between -1 and 3.
6	The technique is similar to technique 5. However, r_{Ni} is used instead of r_{Di} .
7	Fit the <i>Model A</i> to the full data set and obtain r_{Li} . Then the initial subset is formed by choosing observation with r_{Li} values between -1 and 6.

As for technique 4, we perform the case-deletion method on the data set and observe the parameter estimates $(\hat{\beta}_1^{(-i)}, \hat{\beta}_2^{(-i)}, \dots, \hat{\beta}_p^{(-i)})$ when the i th observation is removed where $\hat{\beta}_j^{(-i)}$ is the estimate of the parameter β_j , $j = 1, 2, \dots, p$. By constructing the interval median $(\hat{\beta}_j^{(-i)}) \pm \gamma \text{MAD}(\hat{\beta}_j^{(-i)})$ with $\gamma = 1, 2, \dots$ for all $j = 1, 2, \dots, p$ we obtain the initial subset by choosing the observations with the corresponding $\hat{\beta}_j^{(-i)}$ lie inside the intervals. Meanwhile, techniques 5, 6 and 7 are formed by choosing observations that give residual values between the cut points obtained through simulation studies given in Section 5.2.2 based on r_{Di} , r_{Ni} and r_{Li} respectively.

Second step: Adding observation

The next step is to choose an observation to be included into $S_*^{(m)}$. For example, let us consider technique 1 in Table 6.1. Fit Model A to the initial subset $S_*^{(m)}$. Then the estimates of statistics of interest such as parameter estimates $\hat{\beta}$ and variance σ_e^2 , denoted by $\hat{\beta}^{(m)}$ and $\sigma_e^{2(m)}$, respectively are recorded. Next, the parameter estimates $\hat{\beta}^{(m)}$ are used to obtain the new r_{Di} for full data set. Then the data are ranked based on the new r_{Di}^2 . Consequently, a new subset $S_*^{(m+1)}$ of size $m + 1$ is formed by choosing $m + 1$ observations with the smallest r_{Di}^2 .

This process is repeated until all observations are in the subset $S_*^{(n)}$ where n is the sample size of the full data set. Similar steps are followed when r_{Li} or r_{Ni} are used instead of r_{Di} .

Third step: Monitoring the Search

Any changes in $\hat{\beta}^{(\ell)}$ and $\sigma_c^{2(\ell)}$ for $\ell = m, m+1, \dots, n$ are investigated by plotting $\hat{\beta}^{(\ell)}$ against index ℓ giving a progression plot. For illustration, the progression plot for variable 'weight' in prostate cancer data is given in Figure 6.1. From the plot we can identify the iteration which causes large change and hence the corresponding patient can be determined.

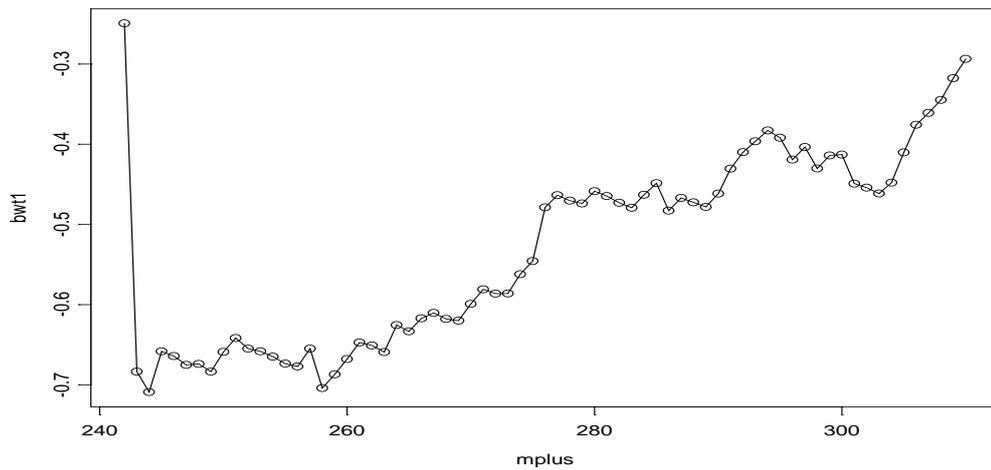


Figure 6.1
Progression plot on *wt* factor of prostate cancer patients in FS method

6.1.1 Different types of Cox PHM FS Method

Table 6.2 lists the combination of techniques of the first and second steps giving different types of Cox PHM FS method. The FS1, FS2, and FS3 use techniques 1, 2, and 3 respectively to find outlier-free initial subset for the first step and use r_{Di} , r_{Ni} and r_{Li} respectively to select observation for inclusion in the second step. The other three types of the Cox PHM FS method; FS4, FS5 and FS6 use technique 4 for the first step while r_{Di} , r_{Ni} and r_{Li} respectively for the second step. These three FS methods

used the similar technique on forming the outlier-free initial subset but different type of residual are apply on the progression of the search the significant observation that might change the model inferences. The last three FS methods use cut points obtained in section 5.2.3. In addition, FS1, FS2, and FS3 require the size of initial subset to be at 50% of the original data set.

Table 6.2
Combination of procedures in Cox PHM FS method

Name of Cox PHM FS Method	First Step	Second Step	Percentage of Initial Subset from Full Data Set
FS1	Technique 1	r_{Di}	At least 50%
FS2	Technique 2	r_{Ni}	At least 50%
FS3	Technique 3	r_{Li}	At least 50%
FS4	Technique 4	r_{Di}	-
FS5	Technique 4	r_{Ni}	-
FS6	Technique 4	r_{Li}	-
FS7	Technique 5	r_{Di}	-
FS8	Technique 6	r_{Ni}	-
FS9	Technique 7	r_{Li}	-

6.1.2 Measure of influential observations

In identifying the influential observations using the Cox PHM FS method, the changes in parameter estimates are monitored through the progression plot. However, it is quite difficult to identify observations which have large changes for the progression plot. Therefore, it is helpful if a suitable statistic to measure the changes is defined. Let $\hat{\beta}^{(l)}$ be the statistics of interest at step l of the Cox PHM FS method, $l = m, m+1, m+2, \dots, n$.

Define an influence measure (IM) at the l -step for variable p as

$$IM_p^{(l)} = |\beta_p^{(l)} - \beta_p^{(l-1)}| \quad (6.1).$$

Then, any large changes on equation (6.1) can be investigated by plotting IM_p against the l giving an influence measure plot. For example, the IM plot for variable 'wt' on prostate cancer data is given in Figure 6.2. By introducing the cut point of the statistic as

$$IM_{cp} = \text{mean}(IM) + 2 \text{s.d.}(IM),$$

any $IM_p^{(l)}$ greater than IM_{cp} suggests that the observation that enters the subset at the j th ordered time is a candidate to be an influential observation. The horizontal red line in Figure 6.2 is the line representing the cut point IM_{cp} .

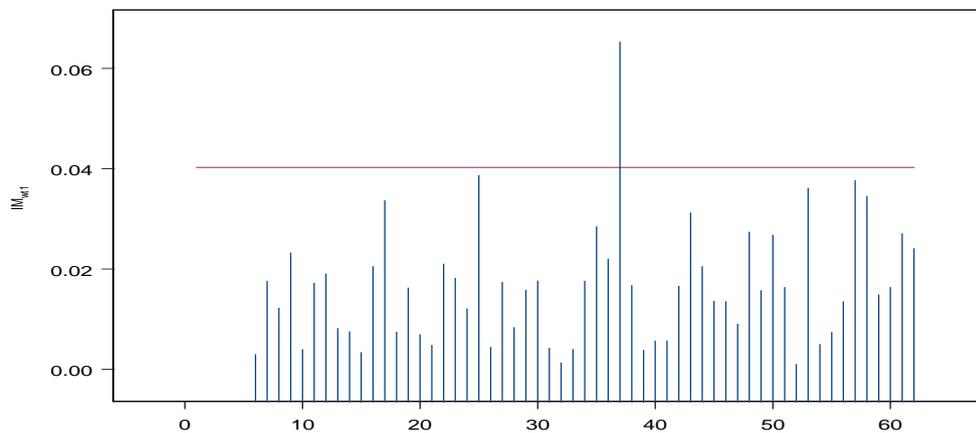


Figure 6.2
 IM plot on wt factor of prostate cancer data

6.2 Real Data Analysis - Prostate Cancer

For illustration, we again consider the prostate cancer data given in Andrews and Herzberg (1985). The data has been used in Chapter 5 for the problem of outlier

detection. The ‘best’ fitted Cox PHM is given by:

$$h_i(t_k) = \exp \left(0.7105x_{sg} + 0.4325x_{HX} + 0.8158x_{sz} - 0.3502x_{rx} - 0.2936x_{wt} + 0.0771x_{pf} - 0.2403x_{hg} \right) h_0(t_k)$$

where $i = 1, 2, 3, \dots, n$ and n is the number of patients in the data set. The interactions terms between prognostic factors are found to be insignificant.

Here, we set the percentage of initial subset for techniques 1, 2 and 3 to be 85% and the values of γ for technique 4 to be 3, 6 and 9. For techniques 5, 6 and 7, we set the lower cut point equals -1 and the upper cut point equals 3 for deviance and normal deviate residual, while -1 and 6 respectively for log-odds residual.

6.2.1. Comparison of Technique for Selecting Initial Subset

Table 6.3 gives the proportion of similar and non-similar patients selected by seven different techniques of the initial subset. The result shows that the proportions of similar patients for all techniques are more than 0.5 as shown in Table 6.3(a). The proportions are the same for techniques 2 and 3. While for technique 4, the proportion is larger when larger value of γ is used. In technique 5, 6 and 7, the results are almost the same and the three proportions are more than 75%. Technique 5 gives closer initial subset to techniques 2 and 3. Meanwhile, techniques 6 and 7 give initial subsets which are closer to technique 1. As mentioned earlier, techniques 2 and 3 with normal deviate and log-odds residuals respectively give the same selection. However, techniques 6 and 7 which use the same two types of residuals as techniques 2 and 3 respectively give different initial subsets. Meanwhile, the initial subset using technique 6 give larger proportion compared to techniques 5 and 7. On the other hand, Table 6.3(b) gives the non-similarity proportions of patients selected by seven different initial subset

techniques. The proportions of non-similarity are less than 31%. The result shows that techniques with larger size of initial subset have a larger non-similarity proportion. For example, when techniques 3 and 7 are compared, the proportion of non-similarity of technique 3 in the technique 7 is 24%, but only 1% for technique 7 in the technique 3. Moreover, the use of technique 7 gives a smaller proportion compared to techniques 5 and 6. It is found that, the initial subset for techniques 5 and 7 are subset to the initial subset obtained using technique 6. Hence, the Cox PHM FS method based on techniques 5 and 7, which are FS7 and FS9, are not considered for further analysis.

Table 6.3
Proportion of patients selected by seven different initial subset techniques, a) similar proportion b) non-similar proportion

		Techniques									
		(a)	1	2	3	4			5	6	7
					$\gamma=3$	$\gamma=6$	$\gamma=9$				
Techniques	1	1	0.74	0.74	0.78	0.84	0.85	0.66	0.81	0.58	
	2		1	1	0.68	0.78	0.80	0.82	0.76	0.75	
	3			1	0.68	0.78	0.80	0.82	0.76	0.75	
	4	$\gamma=3$				1	0.88	0.85	0.64	0.79	0.60
		$\gamma=6$					1	0.96	0.71	0.87	0.65
		$\gamma=9$						1	0.72	0.88	0.65
	5							1	0.81	0.89	
	6								1	0.75	
	7									1	
	(b)										
Techniques	1	0.00	0.13	0.13	0.07	0.10	0.11	0.11	0.11	0.11	
	2	0.13	0.00	0.00	0.12	0.13	0.13	0.03	0.10	0.01	
	3	0.13	0.00	0.00	0.12	0.13	0.13	0.03	0.10	0.01	
	4	$\gamma=3$	0.15	0.19	0.19	0.00	0.12	0.15	0.16	0.16	0.13
		$\gamma=6$	0.06	0.10	0.10	0.00	0.00	0.04	0.07	0.06	0.06
		$\gamma=9$	0.04	0.06	0.06	0.00	0.00	0.00	0.04	0.04	0.04
	5	0.23	0.16	0.16	0.20	0.22	0.23	0.00	0.17	0.00	
	6	0.08	0.07	0.07	0.05	0.07	0.08	0.01	0.00	0.00	
	7	0.31	0.24	0.24	0.27	0.30	0.31	0.11	0.25	0.00	

6.2.2. Influential Observation

Figure 6.3 shows the progression plot for FS1. It is found that the parameter estimates are constantly changing for one point to another in each prognostic factor. It can be observed that some of the fluctuations are constantly changing at the initial, middle and end of the plots. Consequently, it is difficult to identify patients that may greatly change the parameter estimates.

Thus, to identify which patients may affect the parameter estimates, we use the *IM* plots as given in Figure 6.4. It can be seen that the influential patients exist at step $m+i$ equal to 7, 19, 21, 27, 41, 45 and 46 where the vertical line crosses or touches the horizontal line. The $m+i$ steps above correspond to patients number 208, 266, 477, 479, 41, 293 and 50, respectively. We also obtain the progression and *IM* plots for the other methods and are given in Appendix A.

Table 6.4 gives the full list of influential patients identified by Cox PHM FS methods. It is found that the number of influential patients detected by different Cox PHM FS methods is between 2% - 5% of the data set. Three main results are observed. Firstly, we find that patients' number 50, 293 and 477 are identified as influential patients by every Cox PHM FS method. Note that, patients 50 and 293 have also been identified as outliers in Chapter 5. Secondly, the FS4, FS5 and FS6 methods identify larger number of influential patients compared to FS1, FS2 and FS3 methods respectively, though similar type of residuals are employed. Lastly, another six patients are selected by at least four Cox PHM FS methods while another 15 patients are selected by less than three Cox PHM FS methods.

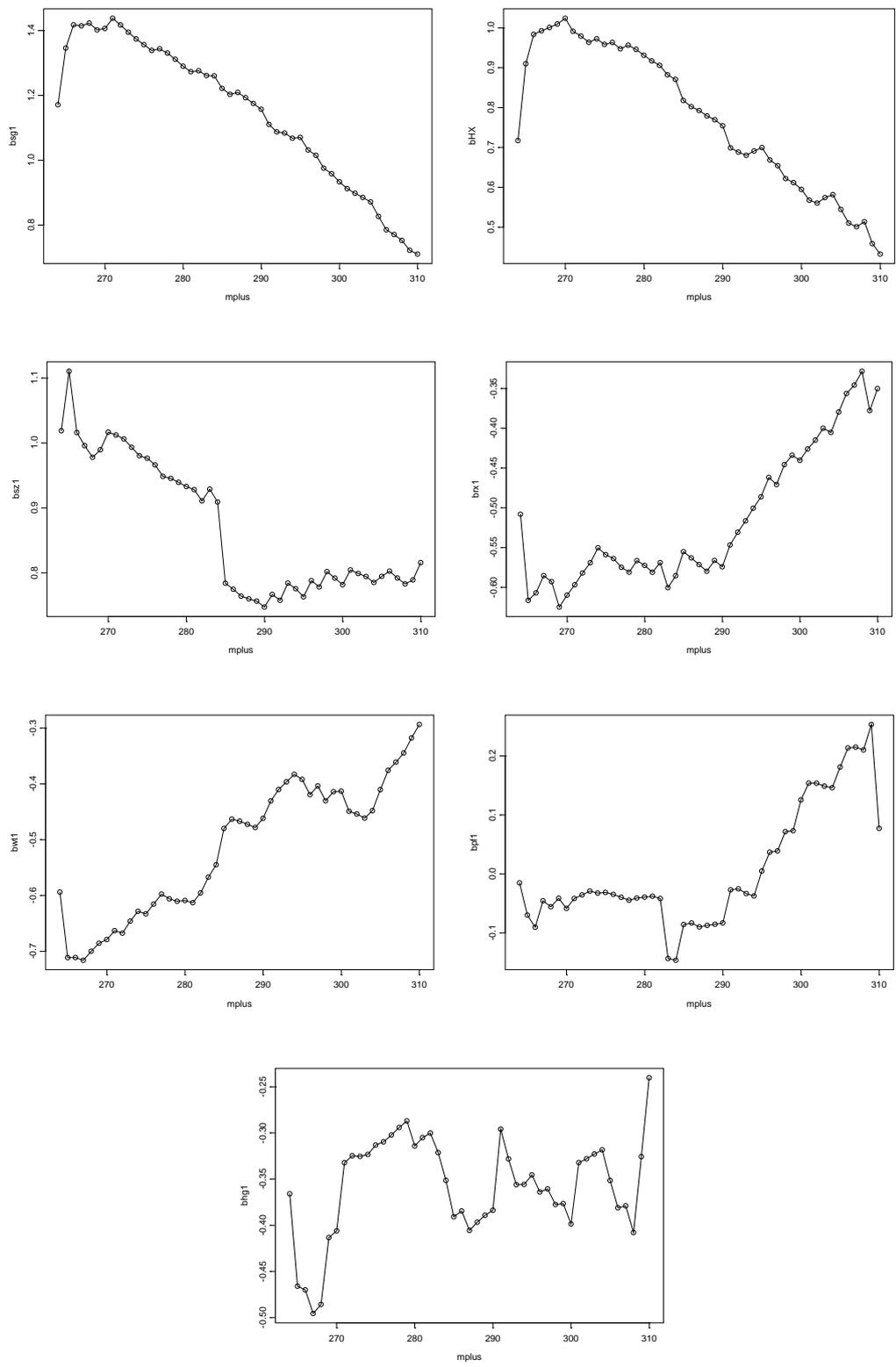


Figure 6.3
 Progression plot on prostate cancer data using FS1 method

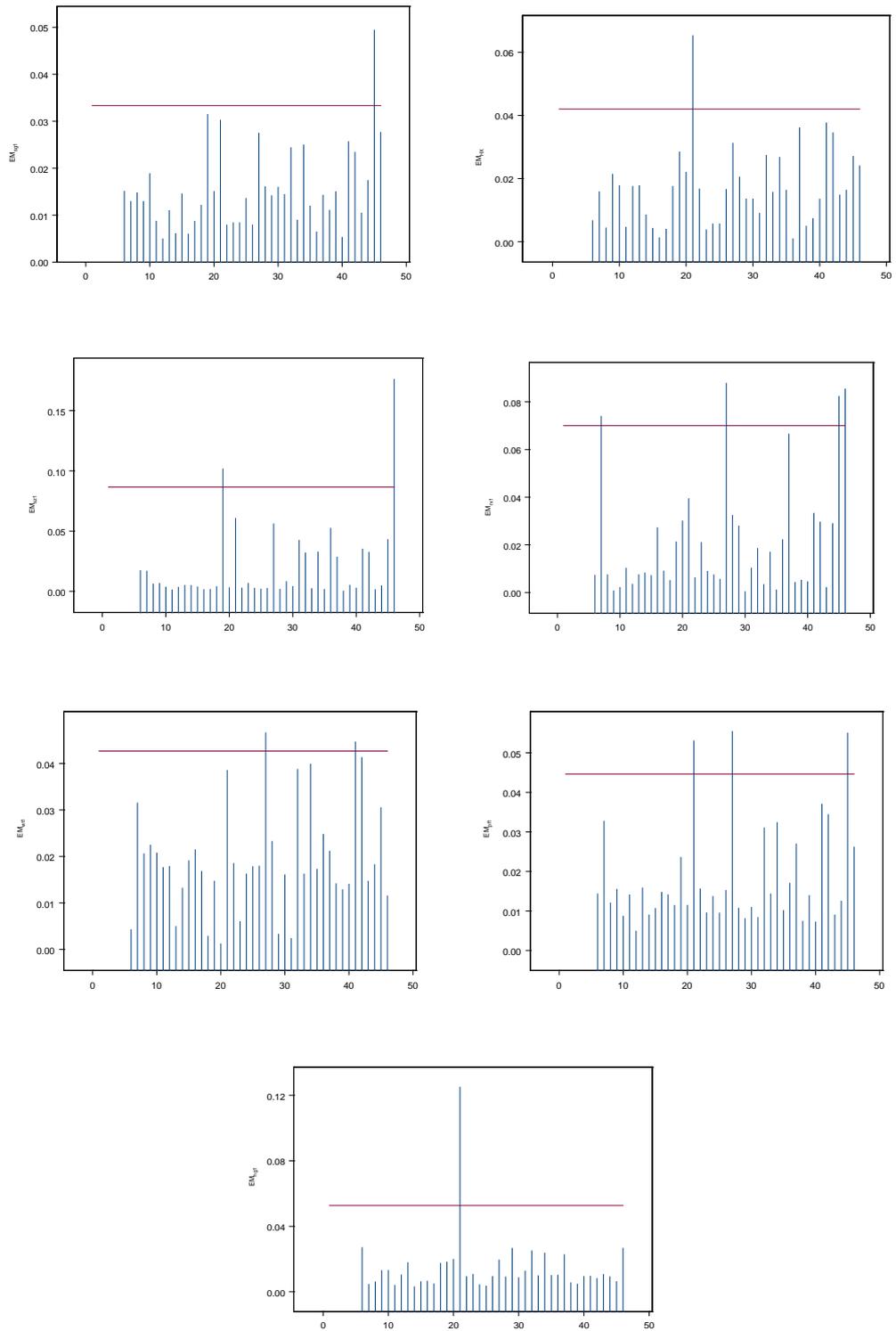


Figure 6.4
IM plot on prostate cancer data using FS1 method

Table 6.4
Patients selected as Influential observation by seven different FS procedures

Patients (i)	FS1	FS2	FS3	FS4 $\gamma = 3$	FS5 $\gamma = 3$	FS6 $\gamma = 3$	FS8
50	/	/	/	/	/	/	/
293	/	/	/	/	/	/	/
477	/	/	/	/	/	/	/
266	/	/	/		/	/	
292		/	/		/	/	/
408		/	/		/	/	/
41	/	/	/	/			/
232		/	/		/	/	
417		/	/		/	/	
192				/	/	/	
260		/	/				/
273					/	/	/
294					/	/	/
392		/	/	/			
427		/	/				/
129					/	/	
249					/	/	
254					/	/	
284					/	/	
479	/			/			
Total	7	12	12	10	15	15	10

Note: observations 44, 118, 148 detected by FS4 only
observation 208 is detected by FS1 only

In this study, we are also interested to know the effect of the choice of γ on the identification of influential patients. We consider γ to be 3, 6 and 9. Table 6.5 gives the list of influential patients identified by FS4, FS5 and FS6 procedures with different values of γ . It can be seen that, for all procedures, the number of influential patients identified is getting smaller as larger γ is used. In fact, the influential patients with largest γ are a subset of influential patients with smaller γ . Note that patients 50 and 293 are identified as influential patients for γ value up to 9. As we know these patients are also identified as outliers in Chapter 5.

Table 6.5
Patients identified as influential observation by different γ values on FS method

Patients number	$\gamma = 3$			$\gamma = 6$			$\gamma = 9$		
	FS4	FS5	FS6	FS4	FS5	FS6	FS4	FS5	FS6
41	/								
44	/								
50	/	/	/	/	/	/	/	/	/
129		/	/						
118	/								
148	/								
192	/	/	/						
232		/	/		/	/			
249		/	/						
254		/	/						
266		/	/						
273		/	/						
284		/	/						
292		/	/						
293	/	/	/	/	/	/	/	/	/
294		/	/						
392	/								
408		/	/		/	/			
417		/	/		/	/			
477	/	/	/	/	/	/		/	/
479	/			/					
total	10	15	15	4	6	6	2	3	3

6.2.3. Discussion

Table 6.6 gives the estimate of the β -parameters, hazard and the values of global test of PHA for Cox PHM after omitting the influential patients selected by each FS procedures. It is found that the influential patients do give an effect to the statistic

considered. However, the changes for all statistics on each prognostic factor are not too large except for *sg*, *HX* and *pf* prognostic factors. For these three prognostic factors the changes is more than 0.2 on parameter estimates and hazard. On the other hand, the results of PHA test indicate that there are changes when influential patients detected by each Cox PHM FS procedures are removed. For example, the p-value changes from 0.754 to 0.958 when influential patients detected by FS1 procedure are omitted. On the other hand, we observe that omitting the influential patients detected by FS8 method changes the parameter estimate of *pf* factor from positive to negative values.

Table 6.7 gives the profile of influential patients detected by every Cox PHM FS methods based on Table 6.5. Note that twelve of them are also detected by the delete-case method and three of them are identified as outliers by r_{Ni} and r_{Li} techniques in Chapter 5. They are patients 50, 293 and 477 who are also identified as influential patients by every Cox PHM FS methods considered in this chapter. These patients have long survival times, though with prognostic factors values that should die earlier. Therefore, further investigation should be carried out to determine other factors that contribute to the long survival of these patients. For example, improvement in doses of treatment supplied for patients such as aromatase inhibitor or LHRH Agonists might contribute to this phenomenon.

6.3 Summary

In this chapter, method of identification of influential observation in Cox PHM has been proposed using seven different types of Cox PHM FS method. In general, for prostate cancer data, we find that the Cox PHM FS methods based on r_{Ni} or r_{Li}

Table 6.6
Result in Cox PHM by omitting the influential observation

Patient omitted	Variables	Parameter estimate	Hazard	Standard error	C.I. of hazard	Global test (PHA)
None	<i>sgl</i>	0.7105	2.035	0.152	(1.512, 2.739)	0.754
	<i>HX</i>	0.4325	1.541	0.146	(1.158, 2.051)	
	<i>szl</i>	0.8158	2.261	0.204	(1.515, 3.374)	
	<i>rxl</i>	-0.3502	0.705	0.144	(0.531, 0.934)	
	<i>wtl</i>	-0.2936	0.746	0.146	(0.560, 0.992)	
	<i>pfl</i>	0.0771	1.080	0.230	(0.688, 1.696)	
	<i>hgl</i>	-0.2403	0.786	0.178	(0.554, 1.116)	
Influential patients detected by FS1	<i>sgl</i>	0.8168	2.263	0.153	(1.677, 3.054)	0.958
	<i>HX</i>	0.6509	1.917	0.148	(1.434, 2.563)	
	<i>szl</i>	0.8182	2.266	0.210	(1.500, 3.424)	
	<i>rxl</i>	-0.3642	0.695	0.144	(0.524, 0.922)	
	<i>wtl</i>	-0.4672	0.627	0.149	(0.648, 0.840)	
	<i>pfl</i>	0.1873	1.206	0.229	(0.769, 1.890)	
	<i>hgl</i>	-0.4516	0.637	0.179	(0.448, 0.908)	
Influential patients detected by FS2 and FS3	<i>sgl</i>	1.0116	2.750	0.156	(2.024, 3.736)	0.874
	<i>HX</i>	0.7850	2.192	0.150	(1.633, 2.944)	
	<i>szl</i>	0.8208	2.272	0.221	(1.475, 3.501)	
	<i>rxl</i>	-0.4429	0.642	0.146	(0.483, 0.855)	
	<i>wtl</i>	-0.3476	0.706	0.149	(0.527, 0.946)	
	<i>pfl</i>	0.1864	1.205	0.238	(0.755, 1.922)	
	<i>hgl</i>	-0.2785	0.757	0.180	(0.532, 1.077)	
Influential patients detected by FS4	<i>sgl</i>	0.9471	2.578	0.155	(1.903, 3.494)	0.942
	<i>HX</i>	0.6685	1.951	0.150	(1.454, 2.619)	
	<i>szl</i>	0.7719	2.164	0.211	(1.431, 3.272)	
	<i>rxl</i>	-0.3755	0.687	0.146	(0.516, 0.914)	
	<i>wtl</i>	-0.4595	0.632	0.152	(0.469, 0.851)	
	<i>pfl</i>	-0.0018	0.998	0.231	(0.634, 1.571)	
	<i>hgl</i>	-0.5566	0.573	0.181	(0.402, 0.817)	
Influential patients detected by FS5 and FS6	<i>sgl</i>	0.8814	2.414	0.155	(1.783, 3.269)	0.986
	<i>HX</i>	0.7706	2.161	0.155	(1.595, 2.928)	
	<i>szl</i>	1.0146	2.758	0.225	(1.775, 4.287)	
	<i>rxl</i>	-0.3426	0.710	0.147	(0.532, 0.947)	
	<i>wtl</i>	-0.2581	0.772	0.151	(0.574, 1.038)	
	<i>pfl</i>	0.4887	1.630	0.242	(1.015, 2.617)	
	<i>hgl</i>	-0.4073	0.665	0.181	(0.467, 0.949)	
Influential patients detected by FS8	<i>sgl</i>	0.897	2.453	0.153	(1.816, 3.314)	0.910
	<i>HX</i>	0.705	2.024	0.147	(1.517, 2.700)	
	<i>szl</i>	0.862	2.369	0.214	(1.556, 3.606)	
	<i>rxl</i>	-0.425	0.654	0.145	(0.492, 0.869)	
	<i>wtl</i>	-0.243	0.784	0.150	(0.584, 1.053)	
	<i>pfl</i>	0.370	1.448	0.241	(0.903, 2.321)	
	<i>hgl</i>	-0.404	0.668	0.179	(0.470, 0.949)	
50, 293, 477	<i>sgl</i>	0.765	2.148	0.151	(1.597, 2.890)	0.967
	<i>HX</i>	0.535	1.708	0.147	(1.280, 2.278)	
	<i>szl</i>	0.840	2.316	0.210	(1.533, 3.497)	
	<i>rxl</i>	-0.340	0.712	0.145	(0.536, 0.946)	
	<i>wtl</i>	-0.370	0.691	0.148	(0.517, 0.923)	
	<i>pfl</i>	0.183	1.201	0.228	(0.768, 1.880)	
	<i>hgl</i>	-0.390	0.677	0.177	(0.479, 0.958)	

perform better than the method based on r_{Di} where the changes after omitted the influential patients from the data set is large in parameters estimate and hazard (see Table 6.6). We also discover that the Cox PHM FS methods further filter the influential observation identified by the delete-case method.

Table 6.7
Profile of influential patients selected by Cox PHM FS method

patient (<i>i</i>)	MF	status	wt	pf	prognostic factors				
					HX	hg	sz	sg	rx
41	60	0	0	0	1	1	0	1	0
44	53	0	1	0	0	0	0	1	0
50	72	0	0	1	1	0	0	1	0
118	51	0	1	0	1	0	0	1	1
129	33	1	1	0	0	1	0	0	1
148	68	0	0	0	0	0	0	1	1
192	32	1	0	0	1	0	0	1	0
208	64	0	0	0	1	0	0	0	0
232	46	1	1	0	1	1	1	1	1
249	39	1	0	0	1	1	0	1	0
254	58	1	1	0	1	1	0	1	0
260	64	0	1	0	1	1	0	1	0
266	53	0	0	1	1	1	0	1	1
273	21	1	1	1	1	0	1	1	0
284	66	1	1	0	1	1	0	1	0
292	71	1	1	1	1	1	0	1	0
293	76	0	0	0	1	0	0	1	1
294	46	1	1	1	1	1	1	1	1
392	64	0	0	0	1	1	0	1	0
408	56	0	1	0	1	0	0	1	0
417	30	1	1	0	1	1	1	1	0
427	70	0	1	0	1	1	0	1	0
477	30	1	0	0	1	1	1	1	0
479	53	1	0	0	1	0	0	1	0