Homework 3 - Question 1: Early Head Start Program

Riley Smith

03 Dec 2016

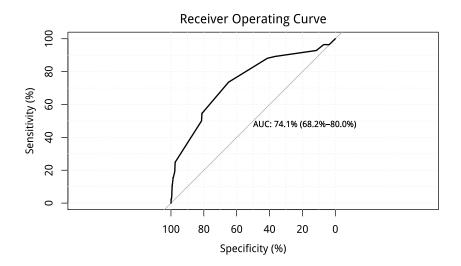
Data

Table 1: Fitting generalized (binomial/logit) linear model: abuse ~ program + boyfriend + white + welfare

	Estimate	Std. Error	z value	Pr(> z)
program	-0.2454	0.2369	-1.035	0.3004
boyfriend	-0.8127	0.3954	-2.056	0.03981
white	0.8045	0.2428	3.313	0.0009237
welfare	0.8665	0.1468	5.901	0.000000003615
(Intercept)	-2.983	0.2222	-13.42	4.32e-41

Table 2: Analysis of Deviance Table

				Resid.	
	Df	Deviance	Resid. Df	Dev	Pr(>Chi)
NULL			1212	610.6	
program	1	1.046	1211	609.6	0.3064
boyfriend	1	3.836	1210	605.7	0.05016
white	1	13.42	1209	592.3	0.0002496
welfare	1	36.54	1208	555.8	0.00000000149



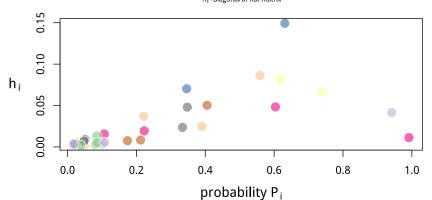
n y1hat y1 y0hat y0 199 16.1928 16 182.8072 183 201 20.4411 21 180.5589 180 274 13.2065 12 260.7935 262 2 0.0803 0 1.9197 2 2 0.1015 0 1.8985 2 1 0.1067 0 0.8933 1 5 1.6692 2 3.3308 3 2 0.1710 0 1.8290 2 1 0.9413 1 0.0587 0 2 1.1183 1 0.8817 1 53 2.0040 3 50.9960 50 38 0.8350 0 37.1650 38 3 0.6681 1 2.3319 2 2 0.4243 0 1.5757 2 57 2.7260 1 54.2740 56 282 <th></th>											
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282 10.7475 3 271.2525 279 45 0.7774 3 44.2226 42 5 1.9522 3 3.0478 2 1 0.7393 1 0.2607 0 1 0.3459 0 0.6541 1 3 1.8112 1 1.1888 2 1 0.4053 1 0.5947 0 1 0.3478 1 0.6522 0 7 0.6029 4 6.3971 3 8 0.8600 5 7.1400 3 1 0.2213 1 0.7787 0 1 0.6185 0 0.3815 1 1 0.6311 0 0.3689 1 1 0.9915 0 0.0085 1 test chiSq df pVal PrI 1263.40 1208 0.1305 drI 555.77 1208 1.0000 PrG 188.84 25 0.0000 drCT 64.84 25 0.0000 drCT 64.84 25 0.0000		2	0.	4 2 43	О		1.5			2	2
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7 0.6029 4 6.3971 3 8 0.8600 5 7.1400 3 1 0.2213 1 0.7787 0 1 0.6185 0 0.3815 1 1 0.6311 0 0.3689 1 1 0.9915 0 0.0085 1 test chiSq df pVal PrI 1263.40 1208 0.1305 drI 555.77 1208 1.0000 PrG 188.84 25 0.0000 drG 64.84 25 0.0000 drCT 64.84 25 0.0000		1	0.	4053	1		0.5	947	7	C)
8 0.8600 5 7.1400 3 1 0.2213 1 0.7787 0 1 0.6185 0 0.3815 1 1 0.6311 0 0.3689 1 1 0.9915 0 0.0085 1 est chiSq df pVal PrI 1263.40 1208 0.1305 drI 555.77 1208 1.0000 PrG 188.84 25 0.0000 drG 64.84 25 0.0000 drCT 64.84 25 0.0000		1	0.	3478	1		0.6522		C)	
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1 0.6311 0 0.3689 1 1 0.9915 0 0.0085 1 test chiSq df pVal PrI 1263.40 1208 0.1305 drI 555.77 1208 1.0000 PrG 188.84 25 0.0000 drG 64.84 25 0.0000 drCT 64.84 25 0.0000		1	0.	2213	1		0.7	787	7	C)
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drI 555.77 1208 1.0000 PrG 188.84 25 0.0000 drG 64.84 25 0.0000 PrCT 188.84 25 0.0000 drCT 64.84 25 0.0000		test		ch	iSq		df	p\		Val	
PrG 188.84 25 0.0000 drG 64.84 25 0.0000 PrCT 188.84 25 0.0000 drCT 64.84 25 0.0000		PrI		1263	3.40		1208 0.1		13	05	
drG 64.84 25 0.0000 PrCT 188.84 25 0.0000 drCT 64.84 25 0.0000		drI		555	555.77		1208 1.00		00	000	
PrCT 188.84 25 0.0000 drCT 64.84 25 0.0000				188	3.84		25	0.	00	000	
drCT 64.84 25 0.0000				64	.84		25	0.	00	000	
		PrCT		188	3.84		25	0.	00	000	
yı yıhat yo yohat n		drCT		64	.84		25	0.	00	000	
		y1	у	1hat	yo)	yoh	at		n	

P	y1	y1hat	yo	yohat	n	Pbar
0.022	3	1.612	80	81.39	83	0.0194
0.0378	3	2.004	50	51.00	53	0.0378
0.0478	4	13.554	337	327.45	341	0.0397
0.0507	12	13.308	264	262.69	276	0.0482
0.0861	20	16.967	188	191.03	208	0.0816
0.991	42	36.555	210	215.44	252	0.1451

test	stat	val	df	pVal	method	R2
HL	chiSq	10.4195	8	0.2368	ssI	0.0672
mHL	F	0.8881	5	0.5044	ssG	0.9925
OsRo	Z	11.8799	NA	0.0000	111	0.0898

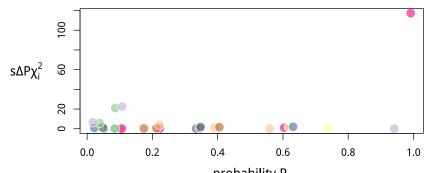
Probability P_i × leverage h_i

 $\begin{array}{ccc} 0.1 < P_i > 0.9 & \rightarrow & h_i \propto x_i \neg \mu_x \\ h_i \approx \text{distance of covariate pattern } x_i \text{ from mean } \mu_x \end{array}$ h_i=diagonal of hat matrix



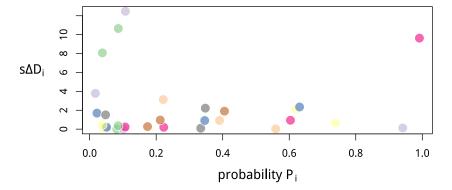
Probability $P_i \times \text{scaled change in Pearson chi-sq } s\Delta P \chi_i^2$

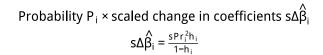
$$Pr_i = \frac{y_i - \mu_y}{\sigma_y}$$
, $s\Delta P\chi_i^2 = \frac{Pr_i}{\sqrt{1 - h_i}}$

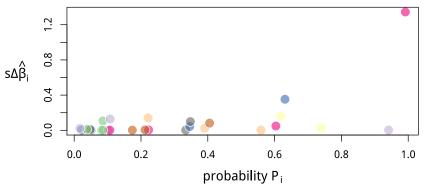


 $probability \; P_i \\ Probability \; P_i \times scaled \; change \; in \; deviance \; \Delta D_i \\$

$$dr_i = sign(y_i - \hat{y}_i)\sqrt{d_i}$$
, $s\Delta D_i = \frac{dr_i}{\sqrt{1-h_i}}$

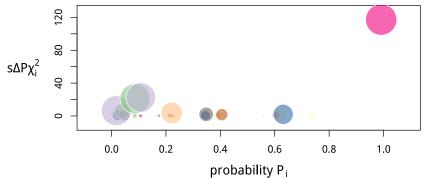




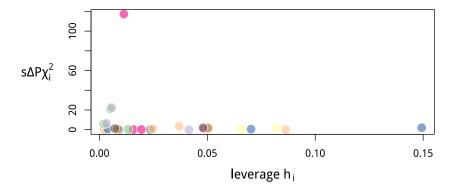


Probability $P_i \times scaled$ change in Pearson chi-sq $s\Delta P\chi_i^2$

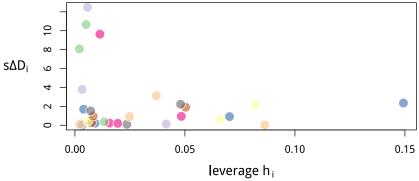
area
$$\propto s\Delta \hat{\beta_i}$$
, radius = $\sqrt{\frac{s\Delta \hat{\beta_i}}{P_i}}$



Leverage $h_i \times \text{scaled}$ change in Pearson chi-sq $s\Delta P \chi_i^2$ $h_i \approx x_i - \mu_x$, $s\Delta P \chi_i^2 = sPr_i^2$

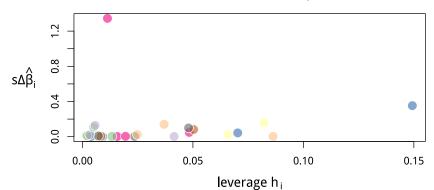


Leverage $h_i \times scaled$ change in deviance $s\Delta D_i$ $dr_i = sign(y_i - \hat{y}_i)\sqrt{d_i}, s\Delta D_i = \frac{dr_i}{\sqrt{1-h_i}}$



Leverage h_i × scaled change in coefficients $s\Delta\hat{\beta}_i$

$$h_i \approx x_i - \overline{x}$$
, $s\Delta \hat{\beta}_i = \frac{sPr_i^2h_i}{1-h_i}$



Correlation between $s\Delta P\chi_i^2$, $s\Delta D_i$ and $s\Delta \hat{\beta}_i$

