Homework 3 - Question 1: Early Head Start Program

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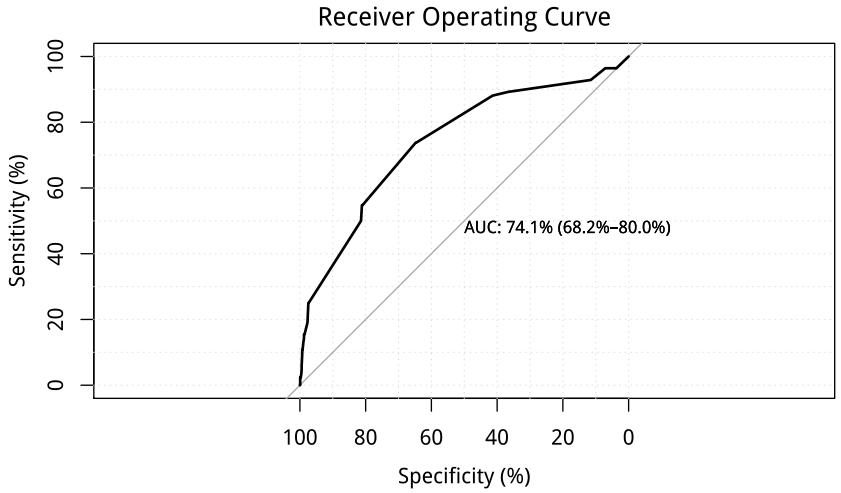
Data

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

	Df	Deviance	Resid. Df	Resid. 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	0.000000001497



n	y1hat	y1	yohat	yo
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
13	2.2623	3	10.7377	10
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	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
drG	64.84	25	0.0000
PrCT	188.84	25	0.0000
drCT	64.84	25	0.0000

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

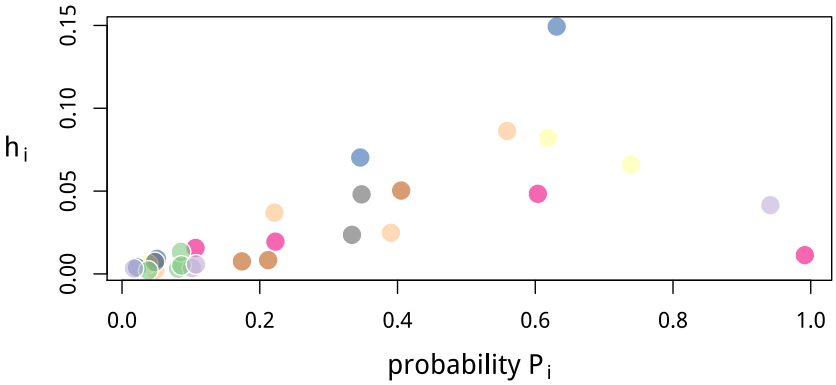
test	stat	val	df	pVal	method	R2
HL	chiSq	10.4195	8	0.2368	ssI	0.0672
mHL	F	0.8881	5	0.5044	ssG	0.9925
OsRo	Z	11.8799	NA	0.0000	llI	0.0898

Probability P_i × leverage h_i

$0.1<P_i>0.9 \rightarrow h_i \propto x_i - \mu_x$

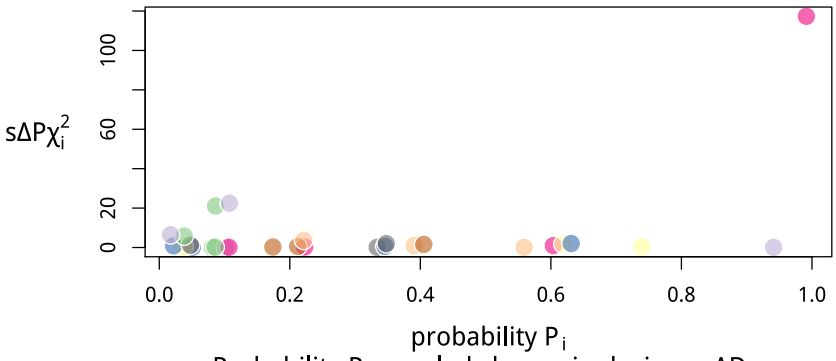
$h_i \approx$ distance of covariate pattern x_i from mean μ_x

h_i=diagonal of hat matrix



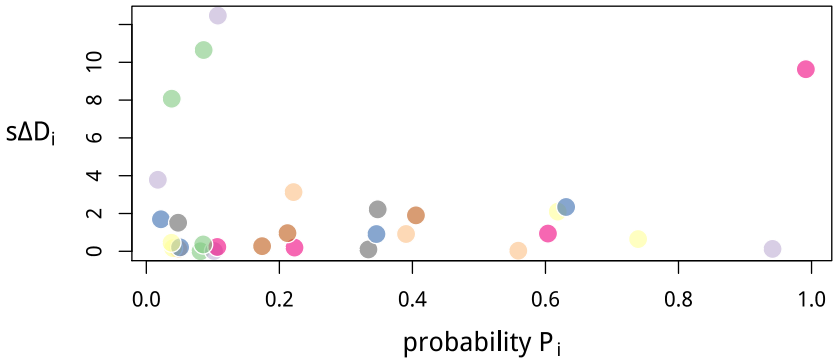
Probability P_i × scaled change in Pearson chi-sq $s\Delta P\chi_i^2$

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



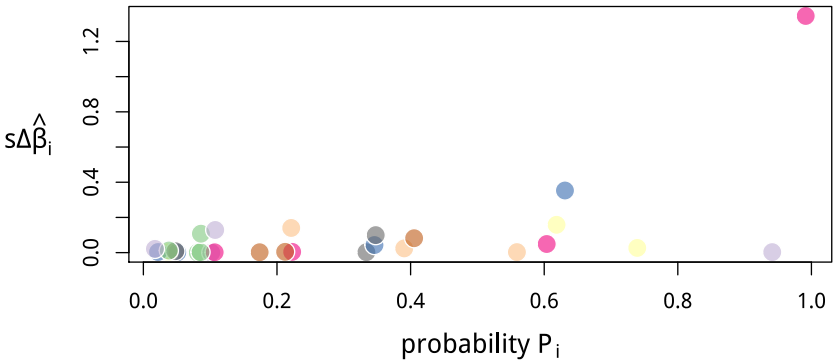
Probability P_i × scaled change in deviance ΔD_i

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



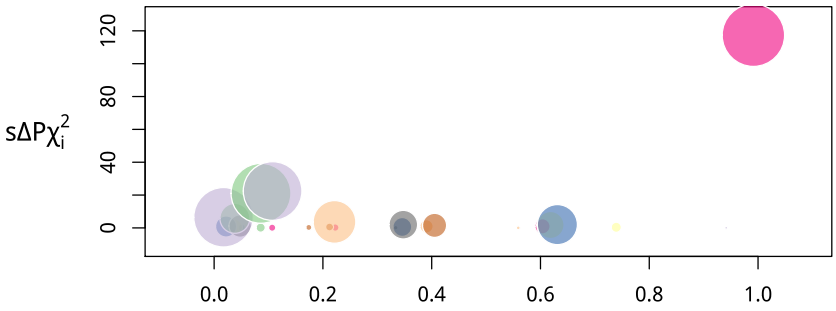
Probability P_i × scaled change in coefficients $s\Delta\hat{\beta}_i$

$$s\Delta\hat{\beta}_i = \frac{sPr_i^2 h_i}{1-h_i}$$



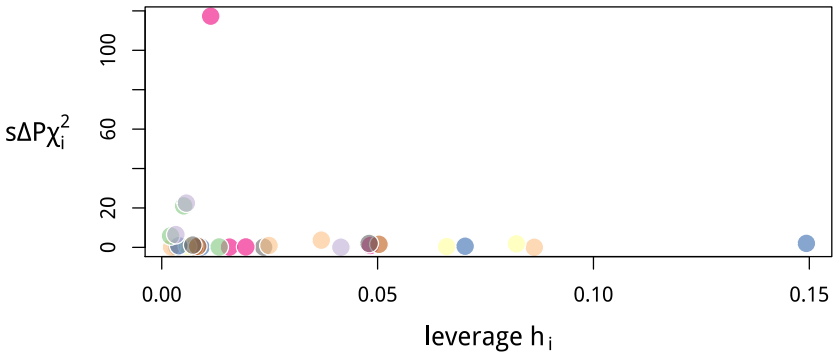
Probability P_i × scaled change in Pearson chi-sq $s\Delta P\chi_i^2$

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



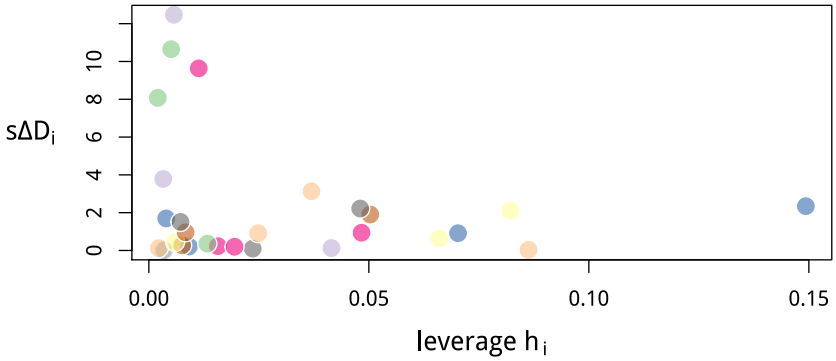
Leverage h_i × scaled change in Pearson chi-sq $s\Delta P\chi_i^2$

$h_i \approx x_i - \mu_x$, $s\Delta P\chi_i^2 = sPr_i^2$



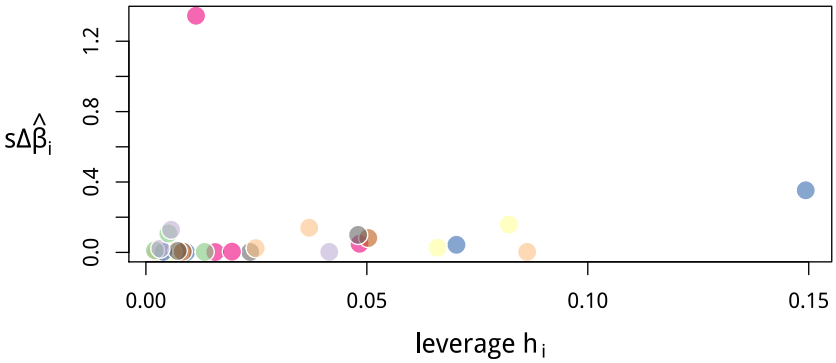
Leverage h_i × scaled change in deviance $s\Delta D_i$

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



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

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



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