

MA5771: Applied Generalized Linear Models

Week 5 Quiz 2

Quiz Problem 5.3 (40 points) The uk700 randomized trial compared the 2-year costs (in dollars) of treating mentally-ill patients in the community using two different management approaches: intensive (caseload of 10–15 patients) and standard (caseload of 30–35 patients). Data for 667 patients are available. Numerous models were fitted, including those summarized in the following table. For all these models, $g(\mu) = \beta_0 + \beta_1 x_1 + \beta_2 x_2$, where $x_1 = 1$ for the intensive group and is zero otherwise, and x_2 is the patient age in completed years.

Table. Summaries of the GLMs fitted to the mental care cost data, using identity and logarithmic link functions.

	EDM	$g(\mu)$	$\hat{\beta}_1$	95% CI	$\hat{\beta}_2$	95% CI	AIC
	Normal	Identity	2032	(-1371, 5435)	-3324	(-4812, -1836)	15259
	Gamma	Identity	1533	(-1746, 4813)	-2622	(-3975, -1270)	14765
	Inverse Gaussian	Identity	1361	(-1877, 4601)	-2416	(-3640, -1091)	15924
	Normal	Log	1.10	(0.95, 1.27)	0.84	(0.79, 0.90)	15256
	Gamma	Log	1.07	(0.93, 1.24)	0.88	(0.82, 0.93)	14763
	Inverse Gaussian	Log	1.07	(0.93, 1.23)	0.89	(0.84, 0.95)	15924

- (1) Based on the AIC, which EDM seems most appropriate?
- (2) The constants in the models β_0 are not revealed. Nonetheless, write down the two models based on this EDM as comprehensively as possible.
- (3) Interpret the regression parameters for x_1 in both models.
- (4) Interpret the regression parameters for x_2 in both models.
- (5) Is the type of treatment significant for modelling cost? Explain.
- (6) Is the patient age significant for modelling cost? Explain.
- (7) Which interpretation (i.e. the use of which link function) seems most appropriate? Why?

Quiz Problem 5.4 (10 points) For the small-leaved lime data in data set lime, the Gamma GLM with the log link is fitted for `Foliage` (y) and `log(DBH)` (x). Determine if a model that also includes `Age` improves the model.