Optimal Data Analysis
Vol. 5 (November 16, 2016), 216-217

2155-0182/10/$3.00

ODA *vs*. Log-Linear Model: Gender and Surgical Operation

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Prior research[1] modeled surgical operation (dummy-coded as 1=neurosurgery; 2=ophthalmology; 3=otorhinolaryngology, 4=vascular-cardiac; 5=thoracic; 6=abdominal; 7=urological; 8=breast; 9=orthopedic; 10=plastic; 11=oral-dental; 12=biopsy) as a function of gender using a log-linear model of: "…quasi-perfect mobility. In this model the main diagonal entries are fixed to their observed values, and the off-diagonal entries are estimated as in a model of quasi-independence" (p. 65). Regardless of the modality of maximum-accuracy analysis used with these data, a single optimal model emerged.

Data analyzed herein[1] are indicated in SAS™ code used to construct the data set required for analysis (see Appendix). No matter if ODA, HO- or EO-CTA, or novometric analysis[3] was employed, a single two-strata optimal model emerged: if operation=otorhinolaryngology, vascular-cardiac, thoracic, or urological then predict gender=male; otherwise predict gender=female. Table 1 gives the confusion matrix for this relatively weak model (ESS=17.07, $p<$ 0.001). The LOO-stable model accurately predicted 3 in 4 females (50% accuracy is expected by chance for each class category in two-category applications without analytic weighting[3]), but only 4 in 9 males.

Table 2: Confusion Matrix, GO Model

		Predicted Gender		
		Female	Male	
Actual	Female	528	184	74.2%
Gender	Male	447	336	42.9%

References

[1]Knoke D, Burke PJ (1980). *Log-linear models*. Beverly Hills, CA: Sage (pp. 65-66).

[2]Bryant FB, Harrison PR (2013). How to create an ASCII input data file for UniODA and CTA software. *Optimal Data Analysis*, *2*, 2-6.

[3]Yarnold PR, Soltysik RC (2005). *Optimal data analysis: A guidebook with software for Windows*. Washington, DC: APA Books.

[4]Yarnold PR, Soltysik RC (2016). *Maximizing predictive accuracy*. Chicago, IL: ODA Books. DOI: 10.13140/RG.2.1.1368.3286

Author Notes

This study analyzed publically available data. No conflict of interest was reported.

2155-0182/10/$3.00

Appendix

SAS™ Code used to Construct (Reproduce[1]) the Data File for Analysis by ODA Software[2,3]

```
data real;
infile datalines;
input row column;
cards;
1 1
;
Data example;
Do n=1 to 18;
put '1 1';
end;
Do n=1 to 20;
put '1 0';
end;
Do n=1 to 33;
put '2 1';
end;
Do n=1 to 44;
put '2 0';
end;
Do n=1 to 175;
put '3 1';
end;
Do n=1 to 89;
put '3 0';
end;
Do n=1 to 59;
put '4 1';
end;
Do n=1 to 38;
put '4 0';
end;
Do n=1 to 16;
put '5 1';
end;
Do n=1 to 12;
put '5 0';
end;
Do n=1 to 139;
put '6 1';
end;
Do n=1 to 142;
put '6 0';
end;
Do n=1 to 86;
put '7 1';
end;
Do n=1 to 45;
put '7 0';
end;
Do n=1 to 2;
put '8 1';
end;
Do n=1 to 36;
put '8 0';
end;
Do n=1 to 135;
put '9 1';
end;
Do n=1 to 129;
put '9 0';
end;
Do n=1 to 55;
put '10 1';
end;
Do n=1 to 53;
put '10 0';
end;
Do n=1 to 26;
put '11 1';
end;
Do n=1 to 30;
put '11 0';
end;
Do n=1 to 39;
put '12 1';
end;
Do n=1 to 74;
put '12 0';
end;
Output;
Run;
```