

# Structure and Uncertainty

Graphical modelling and complex stochastic systems

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# Building a model, for genetic testing of paternity

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# Photometric redshifts

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# Hidden Markov models

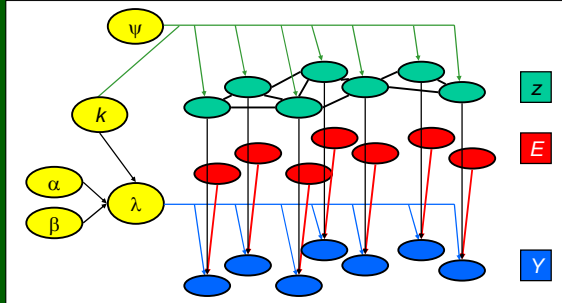
e.g. Hidden Markov chain

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# Hidden Markov random fields

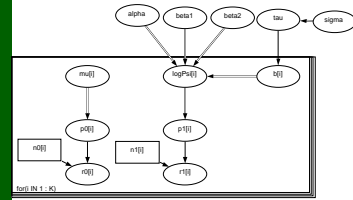
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## Hierarchical mixture model for disease mapping – a hidden MRF



Breslow and Clayton (1993) re-analyse 2 by 2 tables of cases (deaths from childhood cancer) and controls tabulated against maternal exposure to X-rays, one table for each of 120 combinations of age (0-9) and birth year (1944-1964). The data may be arranged to the following form.

Strata	Exposure: X-ray/ total Cases	Controls	age	year - 1954
1	3/28	0/28	9	-10
.....				
120	7/32	1/32	1	10

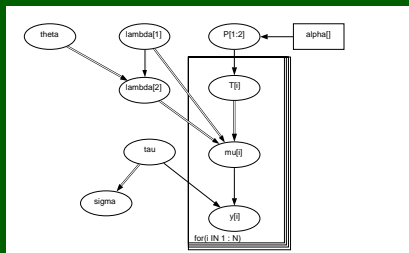


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## Eyes: Normal Mixture Model

Bowmaker et al (1985) analyse data on the peak sensitivity wavelengths for individual microspectrophotometric records on a small set of monkey's eyes. Data for one monkey (S14 in the paper) are given below (500 has been subtracted from each of the 48 measurements).

29.0	30.0	32.0	33.1	33.4	33.6	33.7	34.1	34.8	35.3
35.4	35.9	36.1	36.3	36.4	36.6	37.0	37.4	37.5	38.3
38.5	38.6	39.4	39.6	40.4	40.8	42.0	42.9	43.0	43.5
43.8	43.9	45.3	46.2	48.8	48.7	48.9	49.0	49.4	49.9
50.6	51.2	51.4	51.5	51.6	52.8	52.9	53.2		



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