Report of fitting

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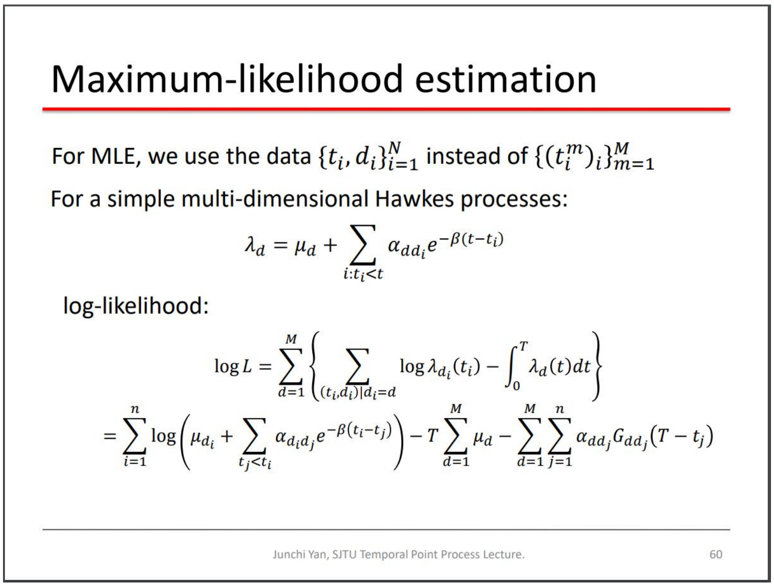
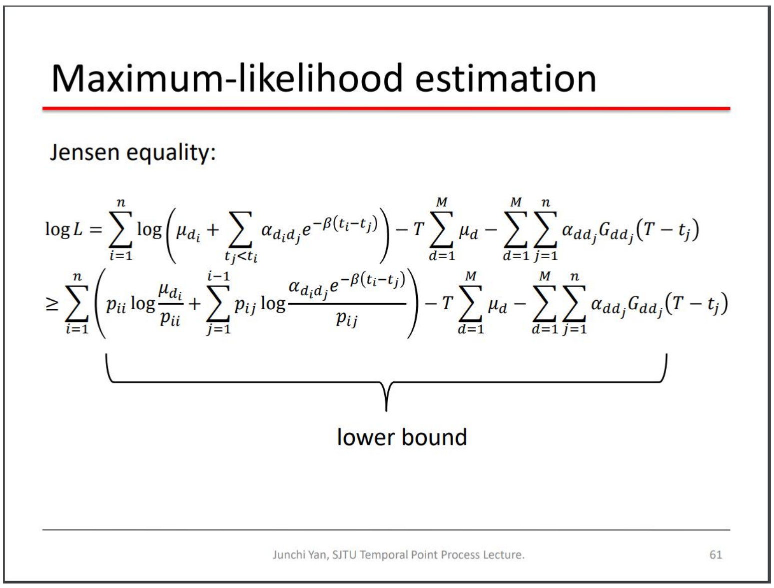
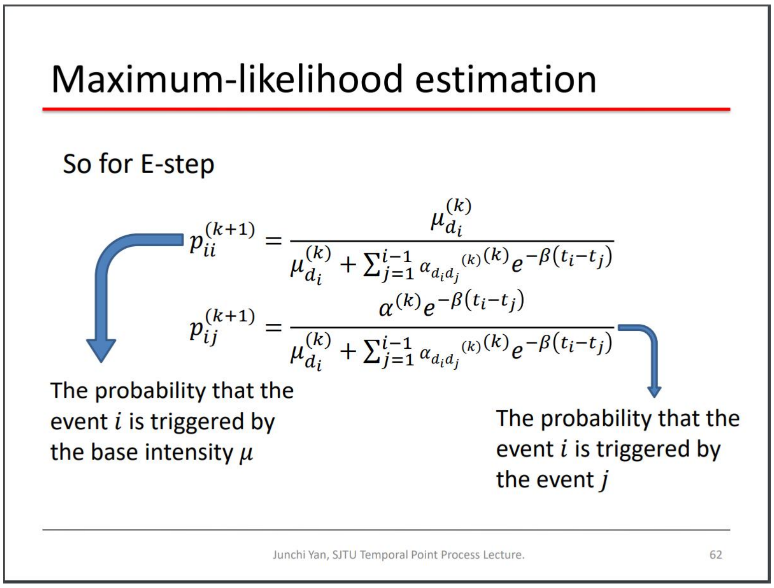
This is the fitting report of the multi-hawkes point process. In last assignment, the simulation has been implemented. And in this assignment, EM algorithm is used to optimize the likelihood of the model.

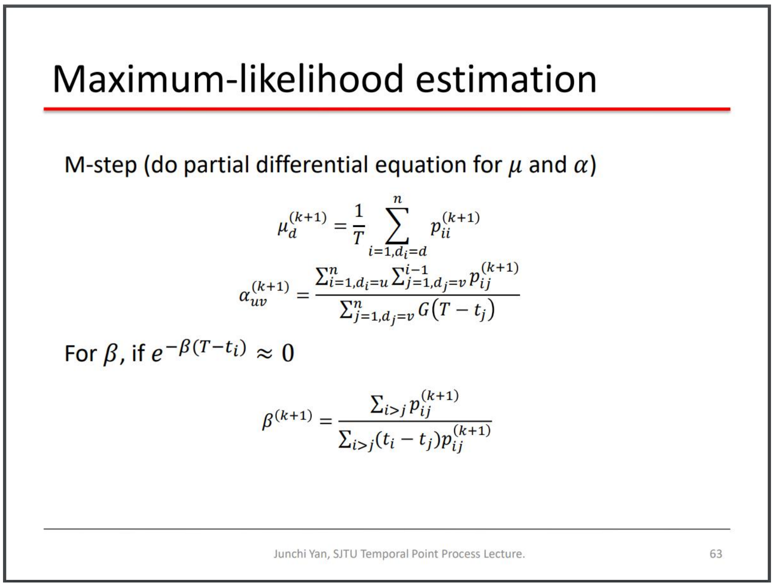
EM algorithm

Here is the inductions in Prof. Yan's slides and I just copy them here for simplicity.









Implementation details

In the implementation, 10 event sequences are simulated out first. Then for each sequence, above algorithm will be used to optimize the parameters. Finally, we will get 10 sets of parameters. And their mean will be used as the result.

Result and discovery

~U	0.0026	0.0006	0.0972	0.0058	0.0061	0.0035	0.0035	0.0055	0.0074	0.0058
U	0.0010	0.0000	0.1000	0.0050	0.0070	0.0025	0.0030	0.0069	0.0081	0.0043
~A	0.0717	0.0262	0.0717	0.0211	0.0346	0.0260	0.0465	0.0107	0.0336	0.0138
	0.0217	0.0297	0.0077	0.0025	0.1007	0.0016	0.0173	0.0244	0.0307	0.0037
	0.0587	0.0086	0.0140	0.0274	0.0086	0.0071	0.0541	0.0092	0.0086	0.0811
	0.0178	0.0024	0.0271	0.0676	0.0125	0.0049	0.0172	0.0326	0.0061	0.0047
	0.0262	0.0703	0.0065	0.0261	0.0204	0.0059	0.0380	0.0143	0.0236	0.0079
	0.0155	0.0032	0.0053	0.0028	0.0043	0.0616	0.0385	0.0373	0.0130	0.0026
	0.0729	0.0158	0.0584	0.0276	0.0398	0.0407	0.0202	0.0192	0.0340	0.0312
	0.0075	0.0226	0.0091	0.0144	0.0101	0.0443	0.0146	0.1280	0.0204	0.0068
	0.0557	0.0610	0.0055	0.0082	0.0223	0.0249	0.0207	0.0317	0.0727	0.0185
	0.0155	0.0069	0.0867	0.0067	0.0040	0.0048	0.0489	0.0064	0.0319	0.0917
A	0.1000	0.0720	0.0044	0.0000	0.0023	0.0000	0.0900	0.0000	0.0700	0.0250
	0.0000	0.0500	0.0680	0.0000	0.0270	0.0650	0.0000	0.0000	0.0970	0.0000
	0.0930	0.0000	0.0062	0.0450	0.0000	0.0000	0.0530	0.0095	0.0000	0.0830
	0.0190	0.0033	0.0000	0.0730	0.0580	0.0000	0.0560	0.0000	0.0000	0.0000
	0.0450	0.0910	0.0000	0.0000	0.0660	0.0000	0.0000	0.0330	0.0058	0.0000
	0.0670	0.0000	0.0000	0.0000	0.0000	0.0550	0.0630	0.0780	0.0850	0.0095
	0.0000	0.0220	0.0013	0.0000	0.0570	0.0910	0.0088	0.0650	0.0000	0.0730
	0.0000	0.0900	0.0000	0.0880	0.0000	0.0780	0.0000	0.0900	0.0680	0.0000
	0.0000	0.0000	0.0930	0.0000	0.0330	0.0000	0.0690	0.0000	0.0820	0.0330
	0.0010	0.0000	0.0890	0.0000	0.0080	0.0000	0.0069	0.0000	0.0000	0.0720

The mean relative error is: 1.15
I find that the variance of mean relative error is very big among different sequences. (I think it is unreasonable to define the error of this assignment, which mix up the relative error and absolute error)