

JUDGING THE BALLROOM - THE SKATING SYSTEM

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GATSBY TEA

THE TASK

- Part I – Preliminary rounds
 - M couples, D dances
 - C – capacity of the ballroom
 - J – number of judges
 - Select $N \leq C$ couples for the final
- Part II – Finals
 - N couples, D dances
 - J – number of judges
 - Complete ordering 1... N, no ties!

PRELIMINARY ROUNDS SYSTEM

- J judges, D dances, M couples, K recalled
- For every $d = 1..d$
 - Each judge choose exactly K out of M
- Sum marks over dances $\rightarrow S_i$ for couple i
- Find threshold T such that $\#\{S_i \geq T\} \sim K$
- Issue: Sometimes hard to find good threshold, when couples are close due to binarisation

Round 5

CN	Cha Cha Cha					Tot	Jive					Tot	CN	Total	Recall
	A	B	C	D	E		A	B	C	D	E				
17		X			X	2	X	X	X			3	17	5	Y
159			X	X	X	3	X	X	X	X		4	159	7	Y
161	X	X	X			3			X	X		2	161	5	Y
164	X	X	X	X	X	5	X	X	X	X	X	5	164	10	Y
190	X		X	X		3	X	X	X			3	190	6	Y
246		X	X	X	X	4	X	X		X		3	246	7	Y
268	X					1	X					1	268	2	
293						0						0	293	0	
316	X	X			X	3	X	X	X	X		4	316	7	Y
362	X			X		2	X	X				2	362	4	
365		X				1			X			1	365	2	
387		X	X	X		3	X	X				2	387	5	Y

THE FINALS

- J judges, D dances, N couples
- Goal: Complete ordering 1... N, no ties
- Phase I – Order per dance
 - Each judge provides a subjective ordering 1... N
 - For final dance rank r, find a couple that has absolute **majority** for judges that placed them $\leq r$. If none, check $\leq r+1$ for rank r
 - If multiple -> **sum** the judge placements used for majority. If still eq, repeat for r+1

FINAL

Cha Cha Cha

CN	A	B	C	D	E	1	2+	3+	4+	5+	6+	7+	8+	Place
17	6	3	2	6	5		1	2	2	3				6
159	5	5	5	2	4		1	1	2	5				5
161	1	6	1	7	1	3								1
164	2	2	4	1	6	1	3							2
190	4	8	6	5	7				1	2	3			7
246	7	1	7	4	3	1	1	2	3					4
316	3	4	8	3	2		1	3						3
387	8	7	3	8	8			1	1	1	1	2	5	8

Jive

CN	A	B	C	D	E	1	2+	3+	4+	5+	6+	7+	8+	Place
17	5	3	3	8	6			2	2	3/11				5
159	7	7	7	4	5				1	2	2	5		8
161	1	5	1	7	1	3								1
164	6	2	2	1	4	1	3/05	3						3
190	3	8	5	5	7			1	1	3/13				6
246	2	1	4	2	3	1	3/05	4						2
316	4	4	8	3	2		1	2	4					4
387	8	6	6	6	8						3			7

THE FINALS

- J judges, D dances, N couples
- Complete ordering 1... N, no ties
- Phase 2 – Combine dances
 - Rule 9 – Sum placements, the lower the better
 - Rule 10 – If tie for rank r, order by: 1. # of dances ranked $\leq r$, then 2. Sum of ranks $\leq r$
 - Rule 11 – If still tied, repeat **majority** and **sum** rules (but now across dances, not judges) for $r+1, r+2, \dots$

SUMMARY

CN	Cha	Jiv	Total	Result	
17	6	5	11	5	
159	5	8	13	6	RULE 10
161	1	1	2	1	
164	2	3	5	2	
190	7	6	13	7	RULE 10
246	4	2	6	3	
316	3	4	7	4	
387	8	7	15	8	

ISSUES

- Integer ordering before combining dances affects the weight of individual dances

EXAMPLE 6

Nº	<i>Cha-cha-cha</i>					<i>Rumba</i>					<i>Samba</i>					<i>Paso Doble</i>					<i>Jive</i>					<i>Dances</i>					
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	C	R	S	P	J	L
61	1	1	1	1	1	1	1	1	1	1	1	1	3	3	2	1	1	3	3	2	1	1	3	3	2	1	1	2	2	2	2
62	6	3	3	3	3	2	3	3	6	6	2	2	2	2	6	2	2	2	2	6	2	2	2	2	6	2	2	1	1	1	1
63	4	4	2	5	4	5	5	5	3	3	5	4	5	4	4	5	5	5	5	5	5	5	6	4	5	3	5	4	5	6	5
64	3	5	6	6	6	6	6	6	2	2	6	5	6	6	1	6	6	6	4	1	6	4	5	5	1	6	6	6	6	5	6
65	5	2	4	2	5	3	2	4	4	4	3	3	1	1	3	3	3	1	1	3	3	3	1	1	3	4	3	3	3	3	3
66	2	6	5	4	2	4	4	2	5	5	4	6	4	5	5	4	4	4	6	4	4	6	4	6	4	5	4	5	4	4	4

ISSUES

- Create continuous rank-like number Y

$$Y = r + \left(1 - \frac{k_r}{J}\right) - \frac{1}{J} \left(1 - \frac{s_r}{r k_r}\right) + \frac{2}{J^3 N} \left((J - k_r) - \sum_{n>r} j_n (2/J)^{n-r-1} \right),$$

EXAMPLE 6

Nº	<i>Dances</i>						<i>L</i>
	<i>C</i>	<i>R</i>	<i>S</i>	<i>P</i>	<i>J</i>	<i>Z</i>	
61	1.00000	1.00000	2.33333	2.33333	2.33333	1.80000	1
62	3.20224	3.38226	2.20250	2.20250	2.20250	2.63840	2
63	4.17500	4.96800	4.40000	5.00000	5.19000	4.74660	5
64	5.97333	5.94667	5.96000	5.95333	5.15000	5.79667	6
65	4.33333	3.97000	2.94667	2.94667	2.94667	3.42867	3
66	4.33493	4.36667	5.18000	4.20160	4.40320	4.49728	4

Xavier Mora
Improving the skating system

FUTURE

- DanceSport (parts of) want to be an Olympic sport
- The current scoring system does not comply with IOC regulations
- Efforts to develop “Judging System 2.0”, stealing the current figure-skating system (again)
 - Fixed difficulty points for elements, fixed judging criteria, numerical scoring, solo performances
 - Community backlash – Takes away from artistic value + Group dance “fighting”