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INTERCRITERIA AND CORRELATION ANALYSES: SIMILARITIES, DIFFERENCES AND SIMULTANEOUS USE

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Abstract: Short remarks on intercriteria and correlation analyses are given. An example that their results do not coincide, is discussed. Results with simultaneous use and reuse of InterCriteria Analysis and a few types Correlation Analyses are presented.
Keywords: Intercriteria analysis, Intuitionistic fuzziness; Correlation analysis – Pearson, Spearman, Kendall; Confidence Interval for Correlation

1 Introduction

In this work we compare generally accepted Pearson, Spearman rank and Kendall rank correlations with ICA (InterCriteria Analysis) and some numerical experiments are provided for discussion. For more detailed considerations, some other statistical indicators are also calculated: average, confidence intervals, etc.

$CI-$ 95% Confidence Interval for correlation, Left and Right bounds of CI.

P_v- P-value indicates the risk of concluding that a correlation exists – when actually, no correlation exists – is 5%.

$Corr_X-$ X-correlation, $X \in \{P, S, K, K0\}$;

- $P-$ for Pearson correlation,
- $S-$ for Spearman rank correlation,
- $K-$ for Kendall rank correlation, taking into account the emergence of ties.
- $K0-$ for Kendall rank correlation w/o taking into account the emergence of ties

Av_n– Average (mean) of Objects for n-Criteria ($n \in \{k, l\}$;

k, l, Np– k, l - Criteria serial numbers and Np - Number of this pair (k, l);

$m(k, l)$– $\mu_{k,l}$ - is a measure of concordant for ICA

$n(k, l)$– $\nu_{k,l}$ - is a measure of discordant (negative concordant) for ICA

$p(k, l)$– $\pi_{k,l}$ - is a measure of uncertainty for ICA

2 Main results

2.1 Input/Output text files

Input file has header with info for number of criteria nC – first line, number of column for each of these criteria – second line; number of rows NnR, number of columns NnC and 'XXXXX'-name of experiment in 3-th line. Next NnR rows are with NnC comma separated values (CSV-format) are INPut data. This 'XXXXX'-name is important for next reuse of results or for comparisons of experiments.

For Input data with nC criteria the Output file has 16 columns and $\frac{nC(nC-1)}{2}$ rows. One coluns more has info about data file XXXXX-corr. The description of these columns is:

1. k – the number of first criterion in the pair (k, l),
2. l – the number of second criteron in the pair (k, l),
3. Np – the number in order of this pair (k, l) (from 1 to $\frac{nC(nC-1)}{2}$)
4. $\mu(k, l)$ – from ICA
5. $\nu(k, l)$ – from ICA
6. $\pi(k, l)$ – from ICA
7. Av_k – Average (mean) for k-th criterion
8. Av_l – Average (mean) for l-th criterion
9. Pv_P – P-value for Pearson Correlation
10. Pv_S – P-value for Spearman Correlation
11. CI_Left – Confidence Interval for P-corr, Left boundary
12. CI_right – Confidence Interval for P-corr, Right boundary
13. $corr - P$ – Pearson Correlation
14. $corr - S$ – Spearman rank Correlation
15. $corr - K$ – Kendall rank Correlation taking into account the emergence of ties
16. $corr - K0$ – Kendal rank Correlation w/o taking into account ...

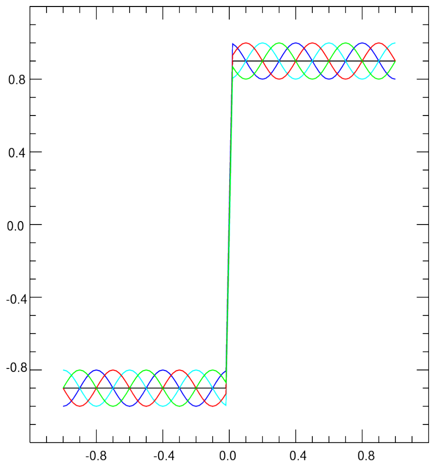

Fig.1-a: Visualization for a part of Input data (smooth case).

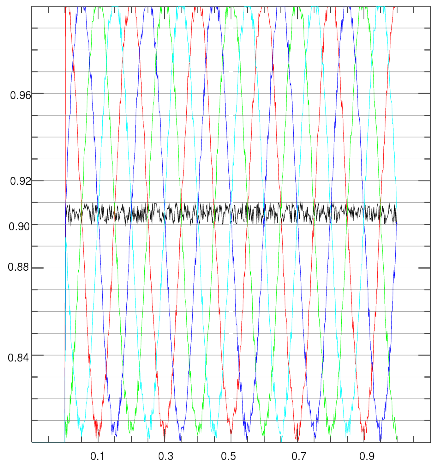

Fig.1-b: Visualization for zoomed part of Input data (noised case).

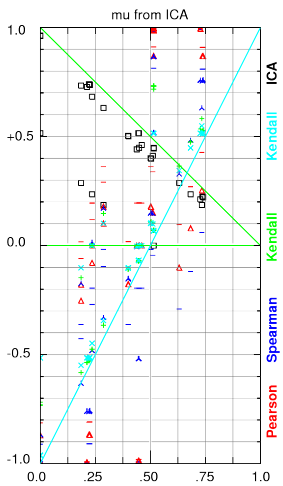

Fig.2-a: Visualization for a part of Output data from Table 2-a.

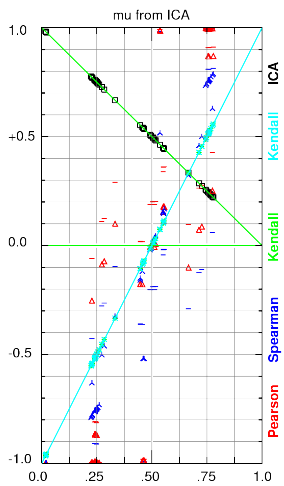

Fig.2-b: Visualization for a part of Output data from Table 2-b.

```
13
 1  2  3  4  5  6  7  8  9 10 11 12 13
 101  13 'art0b'
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 . . .
```

Table 1: Input data for example art0b. (13 columns, 101 rows)

k	l	Np	m(k,l)	n(k,l)	p(k,l)	Av_k	Av_l	Pv_P	Pv_S	CI_Left	CI_righ	Corr-P	Corr-S	Corr-K	Corr-K	AAAAA-corr
01	02	1	0.515	0.000	0.485	-0.000	0.000	0.000	0.000	0.813	0.911	0.870	0.866	0.718	0.515	art0a-corr
01	03	2	0.739	0.224	0.037	-0.000	-0.001	0.000	0.000	0.809	0.909	0.868	0.758	0.525	0.515	art0a-corr
01	04	3	0.739	0.224	0.037	-0.000	0.001	0.000	0.000	0.809	0.909	0.868	0.758	0.525	0.515	art0a-corr
01	05	4	0.736	0.225	0.039	-0.000	0.000	0.000	0.000	0.809	0.909	0.868	0.756	0.522	0.511	art0a-corr
01	06	5	0.740	0.221	0.039	-0.000	-0.000	0.000	0.000	0.810	0.909	0.868	0.761	0.529	0.518	art0a-corr
01	07	6	0.000	0.515	0.485	-0.000	-0.000	0.000	0.000	-0.911	-0.813	-0.870	-0.866	-0.718	-0.515	art0a-corr
01	08	7	0.224	0.739	0.037	-0.000	-0.001	0.000	0.000	-0.909	-0.809	-0.868	-0.758	-0.525	-0.515	art0a-corr
01	09	8	0.224	0.739	0.037	-0.000	0.001	0.000	0.000	-0.909	-0.809	-0.868	-0.758	-0.525	-0.515	art0a-corr
01	10	9	0.221	0.740	0.039	-0.000	0.000	0.000	0.000	-0.909	-0.810	-0.868	-0.761	-0.529	-0.518	art0a-corr
01	11	10	0.225	0.736	0.039	-0.000	-0.000	0.000	0.000	-0.909	-0.809	-0.868	-0.756	-0.522	-0.511	art0a-corr
01	12	11	0.511	0.412	0.076	-0.000	0.000	0.118	0.129	-0.044	0.338	0.152	0.148	0.103	0.099	art0a-corr
01	13	12	0.461	0.461	0.077	-0.000	-0.010	1.000	1.000	-0.195	0.195	0.000	0.000	0.000	0.000	art0a-corr
02	03	13	0.515	0.000	0.485	0.000	-0.001	0.000	0.000	0.995	0.998	0.997	0.868	0.731	0.515	art0a-corr
02	04	14	0.515	0.000	0.485	0.000	0.001	0.000	0.000	0.995	0.998	0.997	0.868	0.731	0.515	art0a-corr
02	05	15	0.515	0.000	0.485	0.000	0.000	0.000	0.000	0.996	0.998	0.997	0.868	0.732	0.515	art0a-corr
02	06	16	0.515	0.000	0.485	0.000	-0.000	0.000	0.000	0.995	0.998	0.997	0.868	0.732	0.515	art0a-corr
02	07	17	0.000	0.515	0.485	0.000	-0.000	0.000	0.000	-1.000	-1.000	-1.000	-0.982	-1.000	-0.515	art0a-corr
02	08	18	0.000	0.515	0.485	0.000	-0.001	0.000	0.000	-0.998	-0.995	-0.997	-0.867	-0.731	-0.515	art0a-corr
02	09	19	0.000	0.515	0.485	0.000	0.001	0.000	0.000	-0.998	-0.995	-0.997	-0.867	-0.731	-0.515	art0a-corr
02	10	20	0.000	0.515	0.485	0.000	0.000	0.000	0.000	-0.998	-0.995	-0.997	-0.867	-0.732	-0.515	art0a-corr
02	11	21	0.000	0.515	0.485	0.000	-0.000	0.000	0.000	-0.998	-0.996	-0.997	-0.867	-0.732	-0.515	art0a-corr
02	12	22	0.287	0.185	0.528	0.000	0.000	0.064	0.075	-0.017	0.361	0.179	0.172	0.148	0.102	art0a-corr
02	13	23	0.235	0.235	0.529	0.000	-0.010	1.000	0.880	-0.195	0.195	0.000	0.016	0.000	0.000	art0a-corr
03	04	24	0.515	0.448	0.037	-0.001	0.001	0.000	0.000	0.981	0.992	0.987	0.518	0.070	0.067	art0a-corr
03	05	25	0.727	0.212	0.060	-0.001	0.000	0.000	0.000	0.991	0.996	0.994	0.759	0.535	0.515	art0a-corr
03	06	26	0.727	0.212	0.060	-0.001	-0.000	0.000	0.000	0.991	0.996	0.994	0.759	0.535	0.515	art0a-corr
03	07	27	0.000	0.515	0.485	-0.001	-0.000	0.000	0.000	-0.998	-0.995	-0.997	-0.867	-0.731	-0.515	art0a-corr
03	08	28	0.448	0.515	0.037	-0.001	-0.001	0.000	0.000	-0.992	-0.981	-0.987	-0.518	-0.070	-0.067	art0a-corr
03	09	29	0.000	0.963	0.037	-0.001	0.001	0.000	0.000	-1.000	-1.000	-1.000	-1.000	-1.000	-0.963	art0a-corr
03	10	30	0.212	0.727	0.060	-0.001	0.000	0.000	0.000	-0.996	-0.991	-0.994	-0.759	-0.535	-0.515	art0a-corr
03	11	31	0.212	0.727	0.060	-0.001	-0.000	0.000	0.000	-0.996	-0.991	-0.994	-0.759	-0.535	-0.515	art0a-corr
03	12	32	0.501	0.400	0.099	-0.001	0.000	0.065	0.126	-0.018	0.361	0.178	0.149	0.107	0.101	art0a-corr
03	13	33	0.683	0.235	0.081	-0.001	-0.010	0.433	0.000	-0.118	0.270	0.079	0.484	0.475	0.448	art0a-corr
04	05	34	0.727	0.212	0.060	0.001	0.000	0.000	0.000	0.991	0.996	0.994	0.759	0.535	0.515	art0a-corr
04	06	35	0.727	0.212	0.060	0.001	-0.000	0.000	0.000	0.991	0.996	0.994	0.759	0.535	0.515	art0a-corr
04	07	36	0.000	0.515	0.485	0.001	-0.000	0.000	0.000	-0.998	-0.995	-0.997	-0.867	-0.731	-0.515	art0a-corr
04	08	37	0.000	0.963	0.037	0.001	-0.001	0.000	0.000	-1.000	-1.000	-1.000	-1.000	-1.000	-0.963	art0a-corr
04	09	38	0.448	0.515	0.037	0.001	0.001	0.000	0.000	-0.992	-0.981	-0.987	-0.518	-0.070	-0.067	art0a-corr
04	10	39	0.212	0.727	0.060	0.001	0.000	0.000	0.000	-0.996	-0.991	-0.994	-0.759	-0.535	-0.515	art0a-corr
04	11	40	0.212	0.727	0.060	0.001	-0.000	0.000	0.000	-0.996	-0.991	-0.994	-0.759	-0.535	-0.515	art0a-corr
04	12	41	0.503	0.399	0.099	0.001	0.000	0.065	0.117	-0.018	0.361	0.178	0.153	0.110	0.104	art0a-corr
04	13	42	0.235	0.683	0.081	0.001	-0.010	1.360	0.000	-0.270	0.118	-0.079	-0.481	-0.475	-0.448	art0a-corr
05	06	43	0.515	0.446	0.039	0.000	-0.000	0.000	0.000	0.982	0.992	0.988	0.519	0.071	0.069	art0a-corr
05	07	44	0.000	0.515	0.485	0.000	-0.000	0.000	0.000	-0.998	-0.996	-0.997	-0.867	-0.732	-0.515	art0a-corr
05	08	45	0.212	0.727	0.060	0.000	-0.001	0.000	0.000	-0.996	-0.991	-0.994	-0.759	-0.535	-0.515	art0a-corr
05	09	46	0.212	0.727	0.060	0.000	0.001	0.000	0.000	-0.996	-0.991	-0.994	-0.759	-0.535	-0.515	art0a-corr
05	10	47	0.446	0.515	0.039	0.000	0.000	0.000	0.000	-0.992	-0.982	-0.988	-0.518	-0.071	-0.069	art0a-corr
05	11	48	0.000	0.961	0.039	0.000	-0.000	0.000	0.000	-1.000	-1.000	-1.000	-0.999	-1.000	-0.961	art0a-corr
05	12	49	0.734	0.185	0.081	0.000	0.000	0.007	0.000	0.060	0.427	0.253	0.632	0.582	0.549	art0a-corr
05	13	50	0.449	0.449	0.101	0.000	-0.010	1.000	0.991	-0.195	0.195	0.000	0.001	0.000	0.000	art0a-corr
06	07	51	0.000	0.515	0.485	-0.000	-0.000	0.000	0.000	-0.998	-0.995	-0.997	-0.867	-0.732	-0.515	art0a-corr
06	08	52	0.212	0.727	0.060	-0.000	-0.001	0.000	0.000	-0.996	-0.991	-0.994	-0.759	-0.535	-0.515	art0a-corr
06	09	53	0.212	0.727	0.060	-0.000	0.001	0.000	0.000	-0.996	-0.991	-0.994	-0.759	-0.535	-0.515	art0a-corr
06	10	54	0.000	0.961	0.039	-0.000	0.000	0.000	0.000	-1.000	-1.000	-1.000	-0.999	-1.000	-0.961	art0a-corr
06	11	55	0.446	0.515	0.039	-0.000	-0.000	0.000	0.000	-0.992	-0.982	-0.988	-0.518	-0.071	-0.069	art0a-corr
06	12	56	0.287	0.631	0.081	-0.000	0.000	0.310	0.050	-0.096	0.291	0.101	-0.329	-0.365	-0.344	art0a-corr
06	13	57	0.449	0.449	0.101	-0.000	-0.010	1.000	0.991	-0.195	0.195	0.000	0.001	0.000	0.000	art0a-corr
07	08	58	0.515	0.000	0.485	-0.000	-0.001	0.000	0.000	0.995	0.998	0.997	0.868	0.731	0.515	art0a-corr
07	09	59	0.515	0.000	0.485	-0.000	0.001	0.000	0.000	0.995	0.998	0.997	0.868	0.731	0.515	art0a-corr
07	10	60	0.515	0.000	0.485	-0.000	0.000	0.000	0.000	0.995	0.998	0.997	0.868	0.732	0.515	art0a-corr
07	11	61	0.515	0.000	0.485	-0.000	-0.000	0.000	0.000	0.996	0.998	0.997	0.868	0.732	0.515	art0a-corr
07	12	62	0.185	0.287	0.528	-0.000	0.000	0.909	0.952	-0.361	0.017	-0.179	-0.173	-0.148	-0.102	art0a-corr
07	13	63	0.235	0.235	0.529	-0.000	-0.010	1.000	0.880	-0.195	0.195	-0.000	0.016	0.000	0.000	art0a-corr
08	09	64	0.515	0.448	0.037	-0.001	0.001	0.000	0.000	0.981	0.992	0.987	0.518	0.070	0.067	art0a-corr
08	10	65	0.727	0.212	0.060	-0.001	0.000	0.000	0.000	0.991	0.996	0.994	0.759	0.535	0.515	art0a-corr
08	11	66	0.727	0.212	0.060	-0.001	-0.000	0.000	0.000	0.991	0.996	0.994	0.759	0.535	0.515	art0a-corr
08	12	67	0.399	0.503	0.099	-0.001	0.000	0.914	1.105	-0.361	0.018	-0.178	-0.153	-0.110	-0.104	art0a-corr
08	13	68	0.683	0.235	0.081	-0.001	-0.010	0.433	0.000	-0.118	0.270	0.079	0.484	0.475	0.448	art0a-corr
09	10	69	0.727	0.212	0.060	0.001	0.000	0.000	0.000	0.991	0.996	0.994	0.759	0.535	0.515	art0a-corr
09	11	70	0.727	0.212	0.060	0.001	-0.000	0.000	0.000	0.991	0.996	0.994	0.759	0.535	0.515	art0a-corr
09	12	71	0.400	0.501	0.099	0.001	0.000	0.914	1.127	-0.361	0.018	-0.178	-0.150	-0.107	-0.101	art0a-corr
09	13	72	0.235	0.683	0.081	0.001	-0.010	1.360	0.000	-0.270	0.118	-0.079	-0.481	-0.475	-0.448	art0a-corr
10	11	73	0.515	0.446	0.039	0.000	-0.000	0.000	0.000	0.982	0.992	0.988	0.519	0.071	0.069	art0a-corr
10	12	74	0.631	0.287	0.081	0.000	0.000	1.347	0.000	-0.291	0.096	-0.101	0.329	0.365	0.344	art0a-corr
10	13	75	0.449	0.449	0.101	0.000	-0.010	1.000	0.991	-0.195	0.195	-0.000	0.001	0.000	0.000	art0a-corr
11	12	76	0.185	0.734	0.081	-0.000	0.000	0.333	0.000	-0.427	-0.060	-0.253	-0.631	-0.582	-0.549	art0a-corr
11	13	77	0.449	0.449	0.101	-0.000	-0.010	1.000	0.991	-0.195	0.195	-0.000	0.001	0.000	0.000	art0a-corr
12	13	78	0.438	0.441	0.121	0.000	-0.010	1.000	1.032	-0.195	0.195	-0.000	-0.005	-0.003	-0.003	art0a-corr

Table 2-a: Output data for example art0a. (78 rows = 13*12/2)

k	l	Np	m(k,l)	n(k,l)	p(k,l)	Av_k	Av_l	Pv_P	Pv_S	CI_Left	CI_righ	Corr-P	Corr-S	Corr-K	Corr-K	AAAAA-corr
01	02	1	0.779	0.221	0.000	-0.000	0.004	0.000	0.000	0.813	0.911	0.870	0.789	0.558	0.558	art0b-corr
01	03	2	0.759	0.241	0.000	-0.000	0.004	0.000	0.000	0.809	0.909	0.868	0.759	0.519	0.519	art0b-corr
01	04	3	0.758	0.242	0.000	-0.000	0.006	0.000	0.000	0.810	0.909	0.868	0.759	0.517	0.517	art0b-corr
01	05	4	0.755	0.245	0.000	-0.000	0.005	0.000	0.000	0.809	0.909	0.868	0.756	0.511	0.511	art0b-corr
01	06	5	0.756	0.244	0.000	-0.000	0.005	0.000	0.000	0.810	0.909	0.868	0.758	0.513	0.513	art0b-corr
01	07	6	0.250	0.749	0.000	-0.000	0.004	0.000	0.000	-0.911	-0.813	-0.870	-0.746	-0.499	-0.499	art0b-corr
01	08	7	0.243	0.757	0.000	-0.000	0.005	0.000	0.000	-0.909	-0.809	-0.868	-0.758	-0.514	-0.514	art0b-corr
01	09	8	0.246	0.754	0.000	-0.000	0.006	0.000	0.000	-0.909	-0.809	-0.867	-0.752	-0.507	-0.507	art0b-corr
01	10	9	0.240	0.760	0.000	-0.000	0.005	0.000	0.000	-0.909	-0.810	-0.868	-0.761	-0.521	-0.521	art0b-corr
01	11	10	0.245	0.755	0.000	-0.000	0.005	0.000	0.000	-0.909	-0.809	-0.867	-0.753	-0.511	-0.511	art0b-corr
01	12	11	0.551	0.449	-0.000	-0.000	0.048	0.116	0.114	-0.043	0.339	0.153	0.154	0.103	0.103	art0b-corr
01	13	12	0.507	0.493	0.000	-0.000	0.041	0.953	0.852	-0.189	0.202	0.006	0.020	0.015	0.015	art0b-corr
02	03	13	0.762	0.238	0.000	0.004	0.004	0.000	0.000	0.995	0.998	0.997	0.763	0.523	0.523	art0b-corr
02	04	14	0.748	0.252	0.000	0.004	0.006	0.000	0.000	0.995	0.998	0.997	0.744	0.496	0.496	art0b-corr
02	05	15	0.763	0.236	0.000	0.004	0.005	0.000	0.000	0.996	0.998	0.997	0.762	0.527	0.527	art0b-corr
02	06	16	0.756	0.244	0.000	0.004	0.005	0.000	0.000	0.995	0.998	0.997	0.760	0.513	0.513	art0b-corr
02	07	17	0.224	0.776	0.001	0.004	0.004	0.000	0.000	-1.000	-1.000	-1.000	-0.789	-0.552	-0.552	art0b-corr
02	08	18	0.255	0.744	0.000	0.004	0.005	0.000	0.000	-0.998	-0.995	-0.997	-0.742	-0.489	-0.489	art0b-corr
02	09	19	0.229	0.771	0.000	0.004	0.006	0.000	0.000	-0.998	-0.995	-0.997	-0.775	-0.542	-0.542	art0b-corr
02	10	20	0.250	0.749	0.000	0.004	0.005	0.000	0.000	-0.998	-0.995	-0.997	-0.750	-0.499	-0.499	art0b-corr
02	11	21	0.239	0.761	0.000	0.004	0.005	0.000	0.000	-0.998	-0.996	-0.997	-0.759	-0.522	-0.522	art0b-corr
02	12	22	0.556	0.443	0.000	0.004	0.048	0.065	0.082	-0.018	0.361	0.178	0.169	0.113	0.113	art0b-corr
02	13	23	0.517	0.483	0.000	0.004	0.041	0.946	0.667	-0.188	0.203	0.007	0.045	0.033	0.033	art0b-corr
03	04	24	0.537	0.463	-0.000	0.004	0.006	0.000	0.000	0.981	0.991	0.987	0.518	0.074	0.074	art0b-corr
03	05	25	0.756	0.244	0.000	0.004	0.005	0.000	0.000	0.991	0.996	0.994	0.753	0.512	0.512	art0b-corr
03	06	26	0.758	0.242	0.000	0.004	0.005	0.000	0.000	0.991	0.996	0.994	0.761	0.516	0.516	art0b-corr
03	07	27	0.261	0.739	0.000	0.004	0.004	0.000	0.000	-0.998	-0.995	-0.997	-0.730	-0.479	-0.478	art0b-corr
03	08	28	0.460	0.540	0.000	0.004	0.005	0.000	0.000	-0.992	-0.981	-0.987	-0.518	-0.080	-0.080	art0b-corr
03	09	29	0.020	0.980	0.000	0.004	0.006	0.000	0.000	-1.000	-1.000	-1.000	-0.997	-0.959	-0.959	art0b-corr
03	10	30	0.244	0.756	0.000	0.004	0.005	0.000	0.000	-0.996	-0.991	-0.994	-0.757	-0.513	-0.513	art0b-corr
03	11	31	0.242	0.758	0.000	0.004	0.005	0.000	0.000	-0.996	-0.991	-0.994	-0.753	-0.516	-0.516	art0b-corr
03	12	32	0.553	0.447	-0.000	0.004	0.048	0.066	0.130	-0.019	0.360	0.177	0.148	0.107	0.107	art0b-corr
03	13	33	0.727	0.273	0.000	0.004	0.041	0.389	0.000	-0.111	0.277	0.087	0.502	0.455	0.455	art0b-corr
04	05	34	0.758	0.242	0.000	0.006	0.005	0.000	0.000	0.991	0.996	0.994	0.761	0.515	0.515	art0b-corr
04	06	35	0.755	0.245	0.000	0.006	0.005	0.000	0.000	0.991	0.996	0.994	0.754	0.510	0.510	art0b-corr
04	07	36	0.226	0.774	0.000	0.006	0.004	0.000	0.000	-0.998	-0.995	-0.997	-0.784	-0.549	-0.549	art0b-corr
04	08	37	0.017	0.982	0.000	0.006	0.005	0.000	0.000	-1.000	-1.000	-1.000	-0.998	-0.965	-0.965	art0b-corr
04	09	38	0.465	0.535	0.000	0.006	0.006	0.000	0.000	-0.991	-0.981	-0.987	-0.518	-0.070	-0.070	art0b-corr
04	10	39	0.241	0.759	0.000	0.006	0.005	0.000	0.000	-0.996	-0.991	-0.994	-0.758	-0.519	-0.519	art0b-corr
04	11	40	0.242	0.758	0.000	0.006	0.005	0.000	0.000	-0.996	-0.991	-0.994	-0.762	-0.516	-0.516	art0b-corr
04	12	41	0.552	0.448	-0.000	0.006	0.048	0.065	0.104	-0.018	0.361	0.178	0.158	0.104	0.104	art0b-corr
04	13	42	0.284	0.716	0.000	0.006	0.041	1.352	0.000	-0.264	0.125	-0.072	-0.460	-0.431	-0.431	art0b-corr
05	06	43	0.537	0.463	0.000	0.005	0.005	0.000	0.000	0.982	0.992	0.988	0.518	0.074	0.074	art0b-corr
05	07	44	0.250	0.750	0.001	0.005	0.004	0.000	0.000	-0.998	-0.996	-0.997	-0.743	-0.500	-0.500	art0b-corr
05	08	45	0.239	0.761	0.000	0.005	0.005	0.000	0.000	-0.996	-0.991	-0.994	-0.761	-0.522	-0.522	art0b-corr
05	09	46	0.243	0.757	0.000	0.005	0.006	0.000	0.000	-0.996	-0.991	-0.994	-0.754	-0.514	-0.513	art0b-corr
05	10	47	0.463	0.537	0.000	0.005	0.005	0.000	0.000	-0.992	-0.982	-0.988	-0.517	-0.074	-0.074	art0b-corr
05	11	48	0.021	0.978	0.000	0.005	0.005	0.000	0.000	-1.000	-1.000	-1.000	-0.997	-0.957	-0.957	art0b-corr
05	12	49	0.775	0.225	0.000	0.005	0.048	0.007	0.000	0.060	0.427	0.252	0.630	0.551	0.551	art0b-corr
05	13	50	0.506	0.494	0.000	0.005	0.041	0.945	0.850	-0.188	0.203	0.008	0.020	0.012	0.012	art0b-corr
06	07	51	0.230	0.770	0.000	0.005	0.004	0.000	0.000	-0.998	-0.995	-0.997	-0.779	-0.540	-0.540	art0b-corr
06	08	52	0.243	0.757	0.000	0.005	0.005	0.000	0.000	-0.996	-0.991	-0.994	-0.755	-0.514	-0.514	art0b-corr
06	09	53	0.240	0.760	0.000	0.005	0.006	0.000	0.000	-0.996	-0.991	-0.994	-0.761	-0.519	-0.519	art0b-corr
06	10	54	0.019	0.981	0.000	0.005	0.005	0.000	0.000	-1.000	-1.000	-1.000	-0.998	-0.961	-0.961	art0b-corr
06	11	55	0.463	0.537	0.000	0.005	0.005	0.000	0.000	-0.992	-0.982	-0.988	-0.518	-0.074	-0.074	art0b-corr
06	12	56	0.333	0.667	-0.000	0.005	0.048	0.314	0.060	-0.097	0.290	0.100	-0.323	-0.333	-0.333	art0b-corr
06	13	57	0.507	0.493	0.000	0.005	0.041	0.948	0.859	-0.189	0.202	0.007	0.019	0.013	0.013	art0b-corr
07	08	58	0.775	0.224	0.001	0.004	0.005	0.000	0.000	0.995	0.998	0.997	0.784	0.551	0.551	art0b-corr
07	09	59	0.744	0.256	0.000	0.004	0.006	0.000	0.000	0.995	0.998	0.997	0.736	0.488	0.488	art0b-corr
07	10	60	0.768	0.231	0.001	0.004	0.005	0.000	0.000	0.995	0.998	0.997	0.775	0.537	0.537	art0b-corr
07	11	61	0.748	0.252	0.001	0.004	0.005	0.000	0.000	0.996	0.998	0.997	0.742	0.496	0.496	art0b-corr
07	12	62	0.457	0.542	0.000	0.004	0.048	0.914	1.298	-0.361	0.018	-0.178	-0.118	-0.085	-0.085	art0b-corr
07	13	63	0.512	0.488	0.000	0.004	0.041	1.050	0.715	-0.202	0.189	-0.007	0.038	0.024	0.024	art0b-corr
08	09	64	0.537	0.463	0.000	0.005	0.006	0.000	0.000	0.981	0.992	0.987	0.518	0.075	0.075	art0b-corr
08	10	65	0.757	0.243	0.000	0.005	0.005	0.000	0.000	0.991	0.996	0.994	0.758	0.515	0.514	art0b-corr
08	11	66	0.757	0.243	0.000	0.005	0.005	0.000	0.000	0.991	0.996	0.994	0.762	0.515	0.514	art0b-corr
08	12	67	0.447	0.553	0.000	0.005	0.048	0.916	1.070	-0.361	0.018	-0.178	-0.158	-0.106	-0.106	art0b-corr
08	13	68	0.714	0.286	0.000	0.005	0.041	0.478	0.000	-0.125	0.264	0.072	0.460	0.428	0.428	art0b-corr
09	10	69	0.757	0.243	0.000	0.006	0.005	0.000	0.000	0.991	0.996	0.994	0.757	0.514	0.514	art0b-corr
09	11	70	0.758	0.242	0.000	0.006	0.005	0.000	0.000	0.991	0.996	0.994	0.753	0.516	0.516	art0b-corr
09	12	71	0.447	0.553	0.000	0.006	0.048	0.919	1.136	-0.360	0.019	-0.177	-0.149	-0.106	-0.106	art0b-corr
09	13	72	0.273	0.727	0.000	0.006	0.041	1.362	0.000	-0.277	0.111	-0.087	-0.501	-0.454	-0.454	art0b-corr
10	11	73	0.537	0.463	0.000	0.005	0.005	0.000	0.000	0.982	0.992	0.988	0.518	0.074	0.074	art0b-corr
10	12	74	0.666	0.334	0.000	0.005	0.048	1.348	0.000	-0.290	0.097	-0.101	0.323	0.333	0.332	art0b-corr
10	13	75	0.496	0.504	0.000	0.005	0.041	1.046	1.082	-0.202	0.189	-0.006	-0.012	-0.008	-0.008	art0b-corr
11	12	76	0.228	0.771	0.000	0.005	0.048	0.334	0.000	-0.427	-0.060	-0.253	-0.630	-0.543	-0.543	art0b-corr
11	13	77	0.492	0.508	0.000	0.005	0.041	1.051	1.127	-0.202	0.188	-0.007	-0.019	-0.015	-0.015	art0b-corr
12	13	78	0.504	0.496	0.000	0.048	0.041	0.957	0.909	-0.190	0.201	0.006	0.012	0.008	0.008	art0b-corr

Table 2-b: Output data for example art0b

```
 k,  l,   Np,  m(k.l),  n(k.l),  p(k.l),    Av_k,    Av_l,    Pv_P,    Pv_S, CI_Left, CI_righ,  Corr-P,  Corr-S,  Corr-K,  Corr-K,AAAAA-cor2
04, 05,    1,  0.175,   0.727,   0.098,   0.378,   0.432,   0.000,   0.000,  -0.793,  -0.555,  -0.692,  -0.715,  -0.597,  -0.552,art0a-cor2
04, 06,    2,  0.346,   0.484,   0.171,   0.378,   0.189,   0.086,   0.941,  -0.528,  -0.134,  -0.346,  -0.197,  -0.155,  -0.138,art0a-cor2
04, 13,    3,  0.789,   0.119,   0.092,   0.378,  -0.062,   0.000,   0.000,   0.731,   0.882,   0.820,   0.862,   0.719,   0.669,art0a-cor2
04, 14,    4,  0.818,   0.099,   0.083,   0.378,  -0.061,   0.000,   0.000,   0.839,   0.932,   0.895,   0.901,   0.767,   0.719,art0a-cor2
04, 15,    5,  0.832,   0.083,   0.086,   0.378,  -0.063,   0.000,   0.000,   0.865,   0.943,   0.912,   0.903,   0.797,   0.749,art0a-cor2
04, 16,    6,  0.792,   0.048,   0.160,   0.378,  -0.055,   0.000,   0.000,   0.871,   0.946,   0.916,   0.933,   0.832,   0.744,art0a-cor2
05, 06,    7,  0.292,   0.550,   0.158,   0.432,   0.189,   0.003,   0.023,  -0.602,  -0.238,  -0.438,  -0.388,  -0.289,  -0.258,art0a-cor2
05, 13,    8,  0.126,   0.793,   0.082,   0.432,  -0.062,   0.000,   0.000,  -0.871,  -0.708,  -0.804,  -0.827,  -0.711,  -0.667,art0a-cor2
05, 14,    9,  0.102,   0.830,   0.068,   0.432,  -0.061,   0.000,   0.000,  -0.922,  -0.817,  -0.880,  -0.867,  -0.771,  -0.728,art0a-cor2
05, 15,   10,  0.088,   0.837,   0.075,   0.432,  -0.063,   0.000,   0.000,  -0.936,  -0.849,  -0.902,  -0.884,  -0.792,  -0.750,art0a-cor2
05, 16,   11,  0.048,   0.805,   0.147,   0.432,  -0.055,   0.000,   0.000,  -0.951,  -0.882,  -0.923,  -0.870,  -0.840,  -0.757,art0a-cor2
06, 13,   12,  0.451,   0.396,   0.153,   0.189,  -0.062,   0.848,   0.513,  -0.200,   0.245,   0.023,   0.076,   0.062,   0.056,art0a-cor2
06, 14,   13,  0.462,   0.396,   0.142,   0.189,  -0.061,   0.807,   0.432,  -0.194,   0.250,   0.030,   0.090,   0.072,   0.065,art0a-cor2
06, 15,   14,  0.456,   0.396,   0.148,   0.189,  -0.063,   0.766,   0.408,  -0.188,   0.256,   0.036,   0.095,   0.065,   0.059,art0a-cor2
06, 16,   15,  0.424,   0.357,   0.219,   0.189,  -0.055,   0.614,   0.507,  -0.166,   0.278,   0.059,   0.077,   0.077,   0.067,art0a-cor2
13, 14,   16,  0.901,   0.041,   0.058,  -0.062,  -0.061,   0.000,   0.000,   0.948,   0.979,   0.967,   0.978,   0.907,   0.861,art0a-cor2
13, 15,   17,  0.883,   0.061,   0.057,  -0.062,  -0.063,   0.000,   0.000,   0.832,   0.928,   0.890,   0.958,   0.864,   0.822,art0a-cor2
13, 16,   18,  0.787,   0.074,   0.139,  -0.062,  -0.055,   0.000,   0.000,   0.821,   0.924,   0.883,   0.910,   0.787,   0.713,art0a-cor2
14, 15,   19,  0.918,   0.031,   0.052,  -0.061,  -0.063,   0.000,   0.000,   0.954,   0.981,   0.971,   0.984,   0.926,   0.887,art0a-cor2
14, 16,   20,  0.830,   0.039,   0.131,  -0.061,  -0.055,   0.000,   0.000,   0.944,   0.977,   0.964,   0.952,   0.868,   0.792,art0a-cor2
15, 16,   21,  0.849,   0.019,   0.133,  -0.063,  -0.055,   0.000,   0.000,   0.978,   0.991,   0.986,   0.958,   0.908,   0.830,art0a-cor2
```

Table 3-a: Output data after reuse Table 2-a. (experiment art0a_2)

3 Reuse OUTput files as INPut files

Now we reuse the output data (results) as new input. In two versions - alone and in combination of two such sets.

First variant. Let we look at just seven indicators (from all 16): μ, ν, π, $corr\_P$, $corr\_S$, $corr\_K$, $corr\_K0$ in output files (like these from Table 2-a and 2-b) as at 7 criteria, we can use 78 rows (pairs criteria) as objects, and reuse calculations as described above. We'll get a new table with 16 columns and 21 rows ($21 = 7 \times 6/2$). (see Tables 3-a and 3-b). Before that let see the description of these 21 rows (see Table 3-o).

XX	col-1	col-2	XX	col-1	col-2	XX	col-1	col-2
01	μ	ν	08	ν	Corr_P	15	π	Corr_K0
02	μ	π	09	ν	Corr_S	16	Corr_P	Corr_S
03	μ	Corr_p	10	ν	Corr_K	17	Corr_P	Corr_K
04	μ	Corr_S	11	ν	Corr_K0	18	Corr_P	Corr_K0
05	μ	Corr_K	12	π	Corr_P	19	Corr_S	Corr_K
06	μ	Corr_K0	13	π	Corr_S	20	Corr_S	Corr_K0
07	ν	π	14	π	Corr_K	21	Corr_K	Corr_K0

Table 3-o: Description of rows in Tables 3-a and 3-b

Second variant. Let we merge two output files (like these from Tables 2-a and 2-b) but only these 7 columns as above. The new INPut files are with 14 columns and 78 rows. All pairs with criteria are $91 = 14 \times 13/2$. Interesting for us are the same 7 indicators μ, ν, π, $corr\_P$, $corr\_S$, $corr\_K$, $corr\_K0$ and these pairs columns (1,8), (2,9), (3,10), …, (7,14) which are numbered in sequence 7, 20, 32, 43, 53, 62, 70 (see column 2 in Table 4).

k	l	Np	m(k.l)	n(k.l)	p(k.l)	Av_k	Av_l	Pv_P	Pv_S	CI_Left	CI_righ	Corr-P	Corr-S	Corr-K	Corr-K	AAAAA-cor2
04	05	1	0.000	0.989	0.011	0.473	0.526	0.000	0.000	-1.000	-1.000	-1.000	-0.999	-0.999	-0.989	art0b-cor2
04	06	2	0.074	0.046	0.880	0.473	0.000	0.432	0.394	-0.135	0.306	0.090	0.097	0.080	0.028	art0b-cor2
04	13	3	0.838	0.109	0.053	0.473	-0.062	0.000	0.000	0.825	0.925	0.885	0.908	0.750	0.729	art0b-cor2
04	14	4	0.941	0.043	0.016	0.473	-0.056	0.000	0.000	0.951	0.980	0.969	0.978	0.906	0.898	art0b-cor2
04	15	5	0.988	0.000	0.012	0.473	-0.053	0.000	0.000	1.000	1.000	1.000	1.000	0.997	0.988	art0b-cor2
04	16	6	0.988	0.000	0.012	0.473	-0.053	0.000	0.000	1.000	1.000	1.000	1.000	0.997	0.988	art0b-cor2
05	06	7	0.047	0.074	0.879	0.526	0.000	1.360	1.361	-0.307	0.135	-0.090	-0.091	-0.079	-0.027	art0b-cor2
05	13	8	0.109	0.838	0.053	0.526	-0.062	0.000	0.000	-0.925	-0.825	-0.885	-0.913	-0.751	-0.730	art0b-cor2
05	14	9	0.044	0.941	0.015	0.526	-0.056	0.000	0.000	-0.980	-0.951	-0.969	-0.980	-0.906	-0.898	art0b-cor2
05	15	10	0.000	0.988	0.012	0.526	-0.053	0.000	0.000	-1.000	-1.000	-1.000	-0.999	-0.997	-0.988	art0b-cor2
05	16	11	0.000	0.989	0.011	0.526	-0.053	0.000	0.000	-1.000	-1.000	-1.000	-0.999	-0.997	-0.989	art0b-cor2
06	13	12	0.069	0.044	0.887	0.000	-0.062	0.468	0.529	-0.142	0.300	0.083	0.073	0.075	0.026	art0b-cor2
06	14	13	0.075	0.046	0.878	0.000	-0.056	0.460	0.359	-0.140	0.302	0.085	0.104	0.083	0.029	art0b-cor2
06	15	14	0.074	0.047	0.879	0.000	-0.053	0.432	0.407	-0.135	0.306	0.090	0.095	0.078	0.027	art0b-cor2
06	16	15	0.074	0.047	0.879	0.000	-0.053	0.432	0.408	-0.135	0.306	0.090	0.095	0.078	0.027	art0b-cor2
13	14	16	0.869	0.080	0.051	-0.062	-0.056	0.000	0.000	0.947	0.978	0.966	0.939	0.811	0.789	art0b-cor2
13	15	17	0.838	0.112	0.049	-0.062	-0.053	0.000	0.000	0.825	0.925	0.885	0.908	0.746	0.726	art0b-cor2
13	16	18	0.838	0.113	0.049	-0.062	-0.053	0.000	0.000	0.825	0.925	0.885	0.908	0.746	0.726	art0b-cor2
14	15	19	0.943	0.045	0.013	-0.056	-0.053	0.000	0.000	0.951	0.980	0.969	0.978	0.904	0.898	art0b-cor2
14	16	20	0.943	0.045	0.012	-0.056	-0.053	0.000	0.000	0.951	0.980	0.969	0.978	0.904	0.898	art0b-cor2
15	16	21	0.993	0.000	0.007	-0.053	-0.053	0.000	0.000	1.000	1.000	1.000	1.000	0.999	0.993	art0b-cor2

Table 3-b: Output data after reuse Table 2-b. (experiment art0b_2)

xx	N	mu	nu	pi	Cor-P	Cor-S	Cor-K	Cor-K	AAAAA-corr
mu	7	0.824	0.090	0.086	0.914	0.893	0.770	0.734	k0a0b-corr
nu	20	0.842	0.084	0.074	0.925	0.906	0.789	0.758	k0a0b-corr
pi	32	0.092	0.007	0.902	0.392	0.261	0.263	0.085	k0a0b-corr
P	43	0.943	0.000	0.057	1.000	0.998	0.994	0.943	k0a0b-corr
S	53	0.902	0.049	0.049	0.998	0.963	0.876	0.853	k0a0b-corr
K	62	0.896	0.061	0.043	0.986	0.959	0.856	0.836	k0a0b-corr
K0	70	0.854	0.014	0.132	1.000	0.954	0.904	0.840	k0a0b-corr

Table 4: Output data after merge Tables 2-a and 2-b. (experiments art0a, art0b)

4 Conclusion

About some cases of dependences: (see Tables 2-a, 2-b, 3, 3-a, 3-b and 4) We look at the seven indicators: μ, ν, π, $corr\_P$, $corr\_S$, $corr\_K$, $corr\_K0$.

- about μ_ICA and Correlations $P, S, K, K0$: (cases $Np \in \{3, 4, 5, 6\}$ from Table 3-a and 3-b) ν and π are relatively small ($< 16\%$), the rest indicators are relatively high. Especially for $corr\_P$ the following exceptions are interesting: $Np \in \{33, 49, 68\}$ from Tables 2-a and 2-b.

- about ν_ICA and Correlations $P, S, K, K0$: (cases $Np \in \{8, 9, 10, 11\}$ from Table 3-a and 3-b) μ and π are relatively small ($< 16\%$), the rest indicators are relatively high. Especially for $corr\_P$ the following exceptions are interesting: $Np \in \{42, 56, 72\}$ from Tables 2-a and 2-b.
- about π_ICA and Correlations $P, S, K, K0$: (cases $Np \in \{12, 13, 14, 15\}$ from Table 3-a and 3-b) All Correlations are small ($< 10\%$), the uncertainty is very high ($> 87\%$) for the case with silent data.

- about μ, ν, π from ICA: (cases $Np \in \{1, 2, 7\}$ from Table 3-a and 3-b) Between μ and ν anti-correlation for silent case is more pronounced than in smooth case of data. Between (μ,π) and (ν, π) uncertainty for silent case is more pronounced than in smooth case of data.
- about $corr\_P$, $corr\_S$: (case $Np = 16$ from Table 3-a and 3-b) ν and π are small ($< 10\%$), the rest indicators are high and in most cases $|corr\_P| > |corr\_S|$. Interesting exceptions are $Np \in \{33, 42, 49, 56, 68, 72, 76\}$ from Tables 2-a and 2-b.
- about the type of data - smooth, silent: /see Table 4/ For π: indicator π is very high ($> 90\%$) but all rest indicators are small. For all others indicators (the rest six) ν and pi are small ($< 10\%$) but the others are high.

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