Generalizing Factor Analysis and Canonical Correlation to Three-way Arrays Increases their Ability to Disentangle Information

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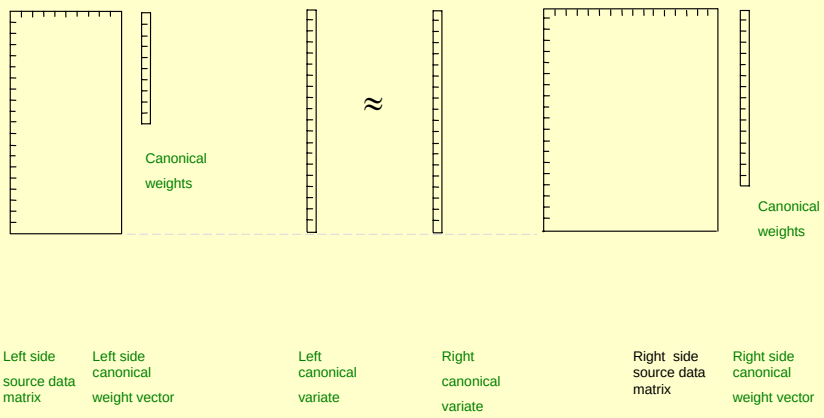
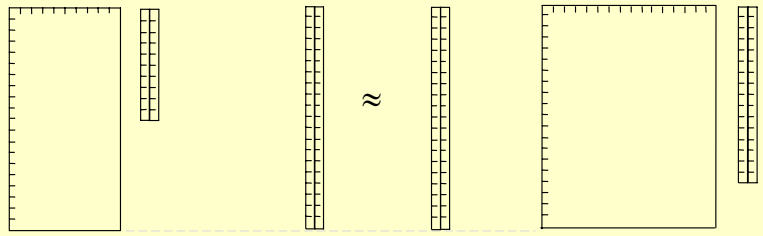
Due to time constraints, this poster focuses on the newest work: Generalization of canonical correlation to higher way arrays



"Level 0": Standard Canonical Correlation

2 matrices, 1 shared mode (index I), 1Canonical Correlation

A second canonical variate:



Left side source data matrix

Left side canonical weight matrix matrix

Left Canonical variates

Right Canonical variates

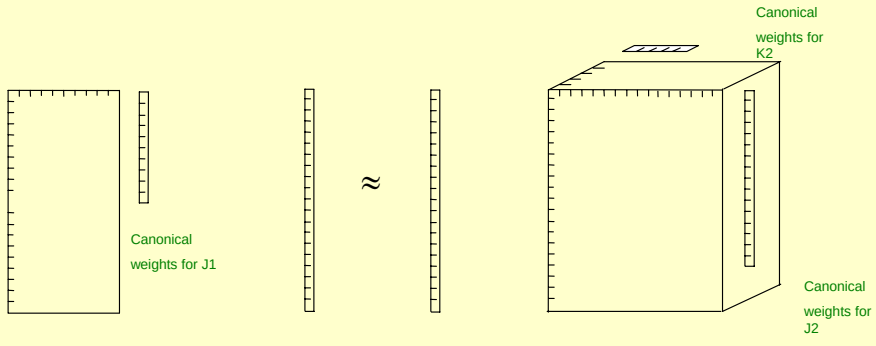
Right side source data matrix

Right side canonical weight matrix matrix

“Level 0”: Standard Canonical Correlation:

2 matrices, 1 shared mode, **2CCs**

A three-way array on one side of the canonical relation:



Left side Source data matrix

Left side canonical weights

Left canonical variate

Right canonical variate

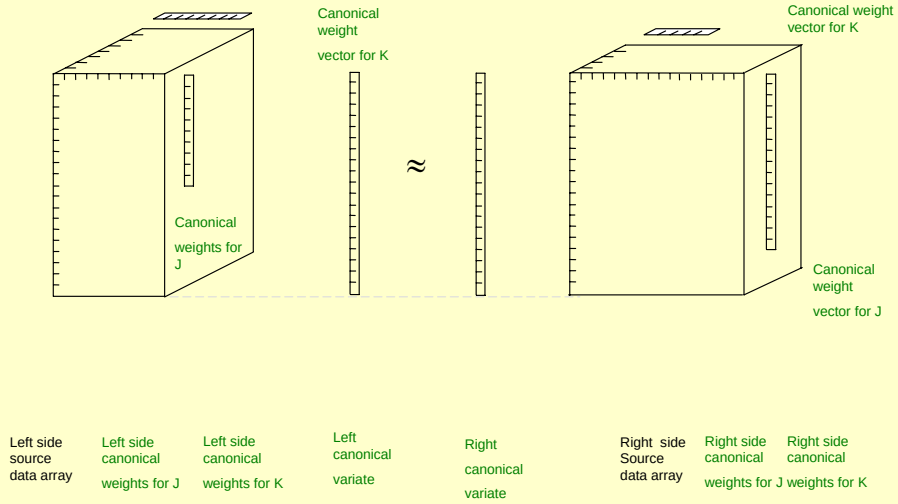
Right side Source data *array*

Right side Canonical weights for J

Right side Canonical weights for K

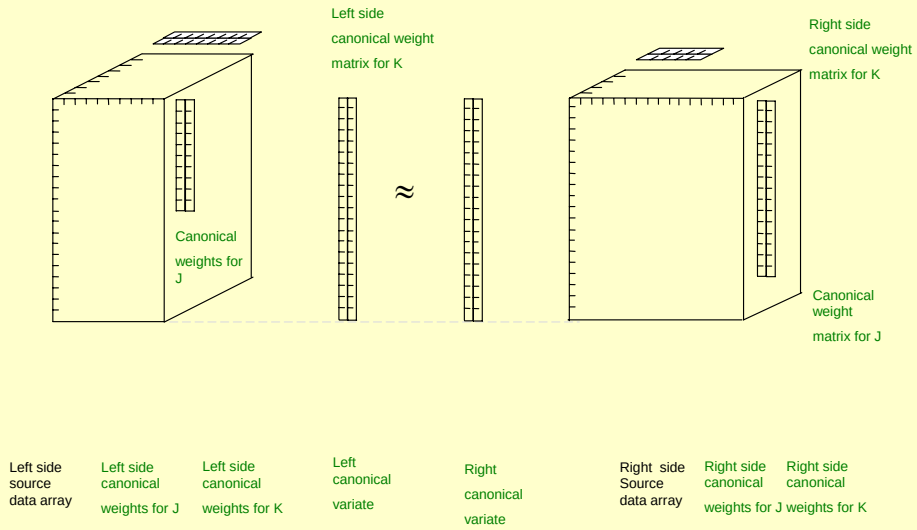
Multilinear CC: Level 1a. Multilinear weights and data source on one side (1CC)

Two Three-way Arrays -- 1 canonical variate

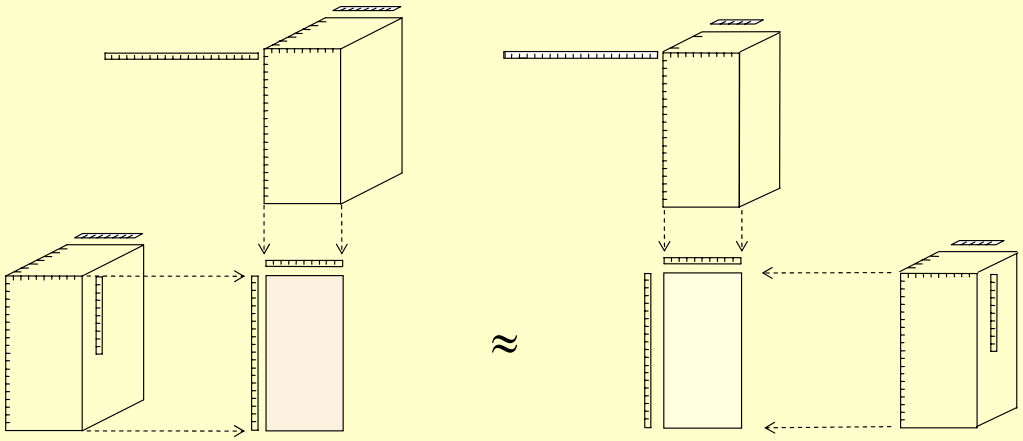


Multilinear CC: Level 1b. Multilinear Canonical weights and ML data source on both sides (1CC)

Two Three-Way Arrays -- 2 canonical variates



Multilinear CC: Level 1b. ML Canonical weights and ML data source on both sides (2CanonCors)

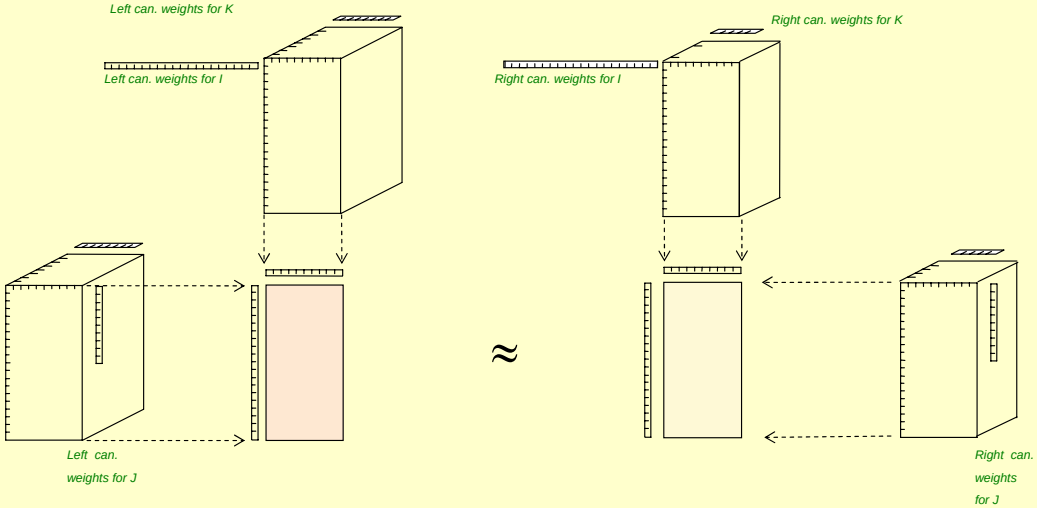


Left Canonical Matrix ***Right Canonical Matrix***

Multilinear –Canonical Correlation (Level 2b)

Left canonical row vectors are weighted combinations of rows of left source-data array

Right canonical row vectors are weighted combinations of rows of right source-data array



Left canonical column vectors are weighted combinations of columns of left source-data array

Right canonical column vectors are weighted combinations of columns of right source-data array

Left Canonical Matrix **is product of left can. rows and cols**

Right Canonical Matrix **is product of right can. rows and cols**

ML-CC Level 2b: ML canonical objects, ML canonical weights, and ML source data (1 CC)