

Canonical Correlation Analysis

Purpose: find paired linear combinations that maximize correlation between two variable sets.

Dataset overview:

complete_cases	x_set_variable_count	y_set_variable_count	x_set_variables	y_set_variables	analysis_note
649	6	3	age, Medu, Fedu, traveltime, studytime, failures	G1, G2, G3	Canonical correlation estimates paired linear composites between two numeric variable sets.

Canonical correlations:

function	canonical_correlation	squared_canonical_correlation	eigenvalue
Function 1	0.498347	0.248350	0.330407
Function 2	0.150186	0.022556	0.023076
Function 3	0.090379	0.008168	0.008236

Wilks Lambda tests:

test_of_functions	wilks_lambda	chi_square	approx	df	p_value	decision	alpha_0_05	method_note
1 to 3	0.728695	203.509836	18	1.988376e-33	Reject remaining functions	Bartlett chi-square approximation for Wilks Lambda		
2 to 3	0.969460	19.943190	10	2.979462e-02	Reject remaining functions	Bartlett chi-square approximation for Wilks Lambda		
3 to 3	0.991832	5.273783	4	2.603412e-01	Do not reject remaining functions	Bartlett chi-square approximation for Wilks Lambda		

Redundancy summary:

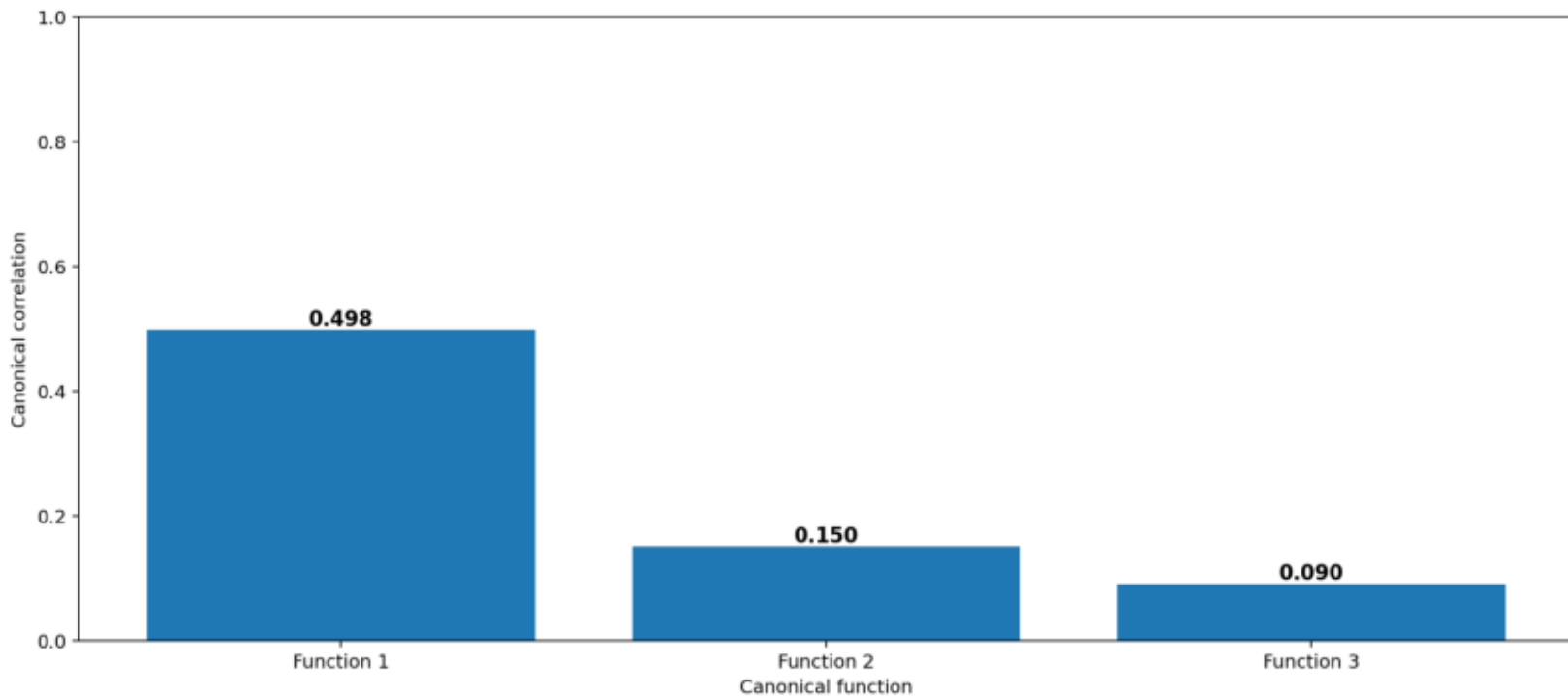
function	canonical_correlation	shared_variance_r_squared	x_set_variance_extracted_by_own_variate	y_set_variance_extracted_by_own_variate	x_set_redundancy_explained_by_y_set	y_set_redundancy_explained_by_x_set
Function 1	0.498347	0.248350	0.270460	0.906139	0.067169	0.225040
Function 2	0.150186	0.022556	0.131058	0.065319	0.002956	0.001473
Function 3	0.090379	0.008168	0.197768	0.028542	0.001615	0.000233

Assumption context:

complete_cases	x_condition_number	y_condition_number	recommended_minimum_cases_rule_of_thumb	sample_size_context	linearity_note	multicollinearity_note
649	5.641878	35.874746	90	OK	Inspect first canonical variate scatterplot and original bivariate plots for nonlinearity.	Very large condition numbers suggest unstable canonical coefficients.

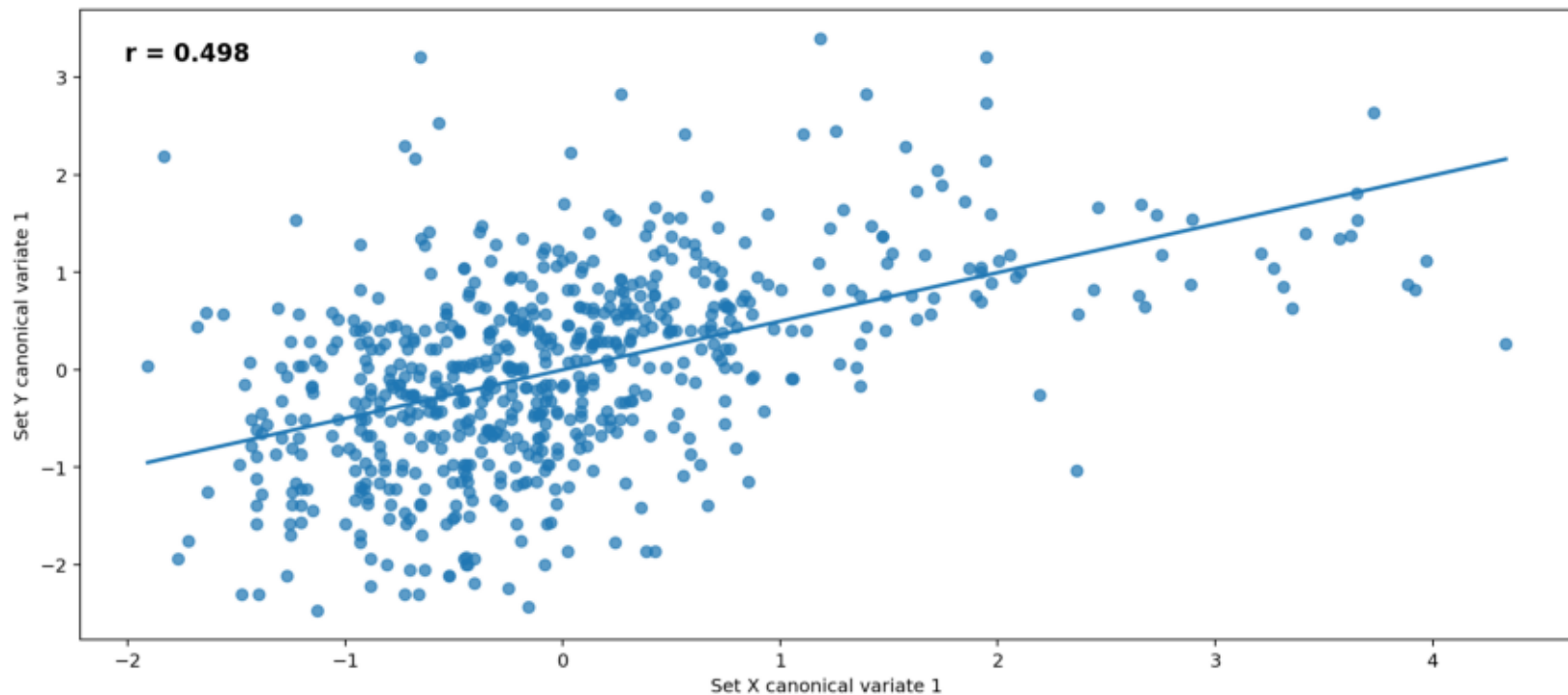
Canonical Correlation: Strength of Each Function

Higher canonical correlations show stronger association between the two variable sets.



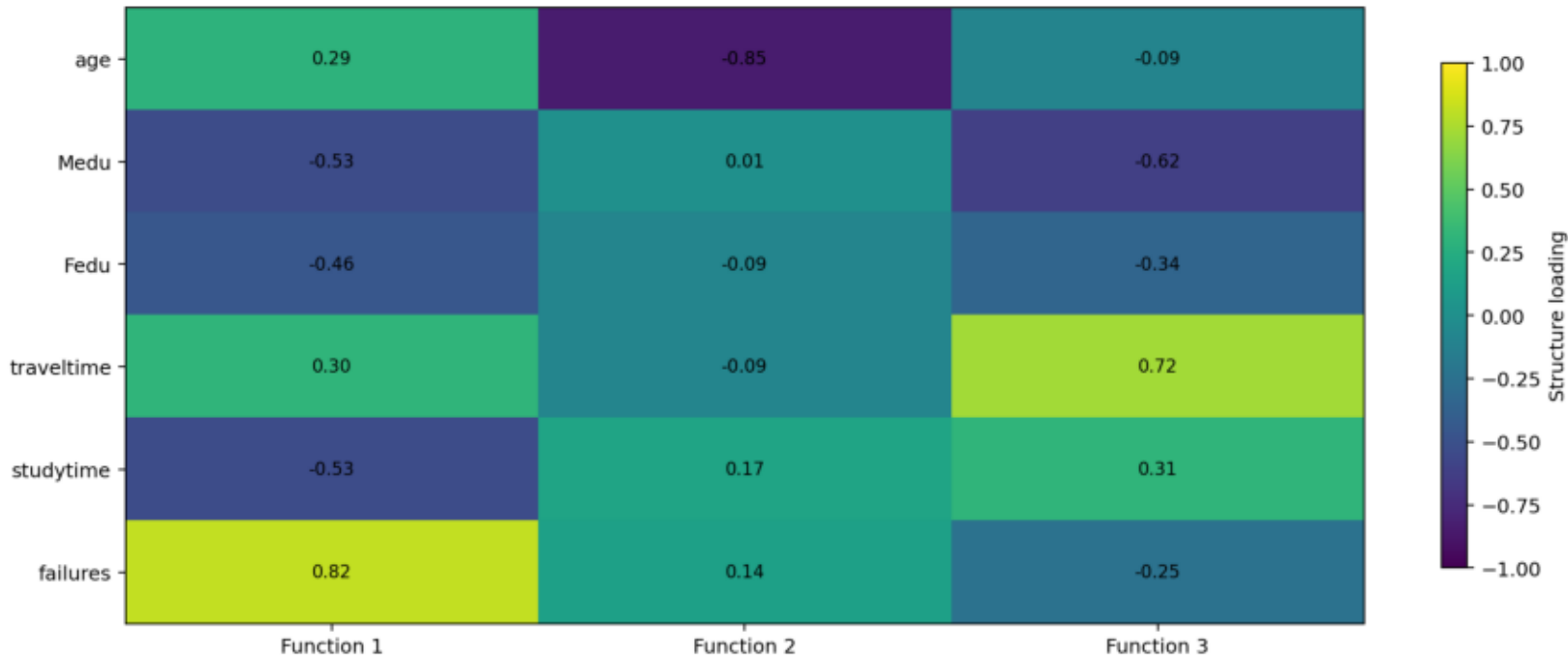
Canonical Correlation: First Canonical Variate Pair

The scatterplot validates the strongest paired linear composite from both variable sets.



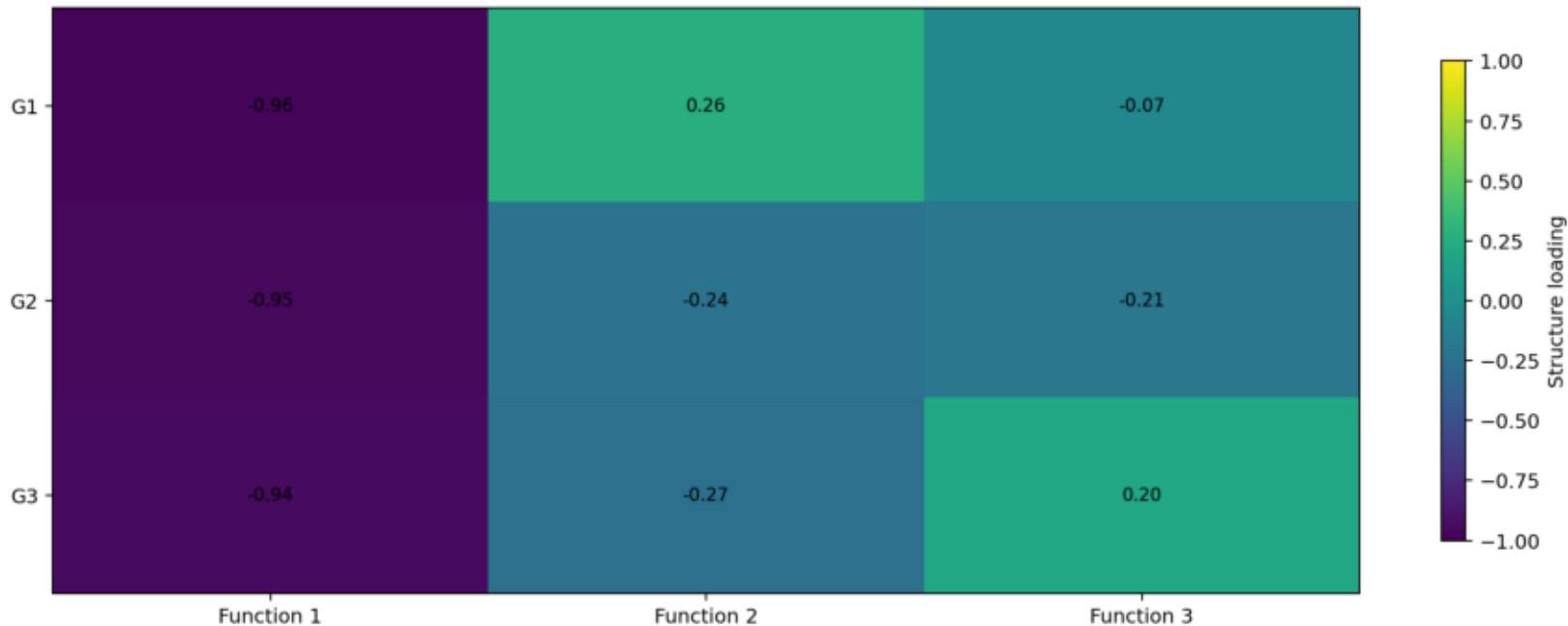
Canonical Correlation: Set X Structure Loadings

Loadings show how strongly each Set X variable relates to each X canonical variate.



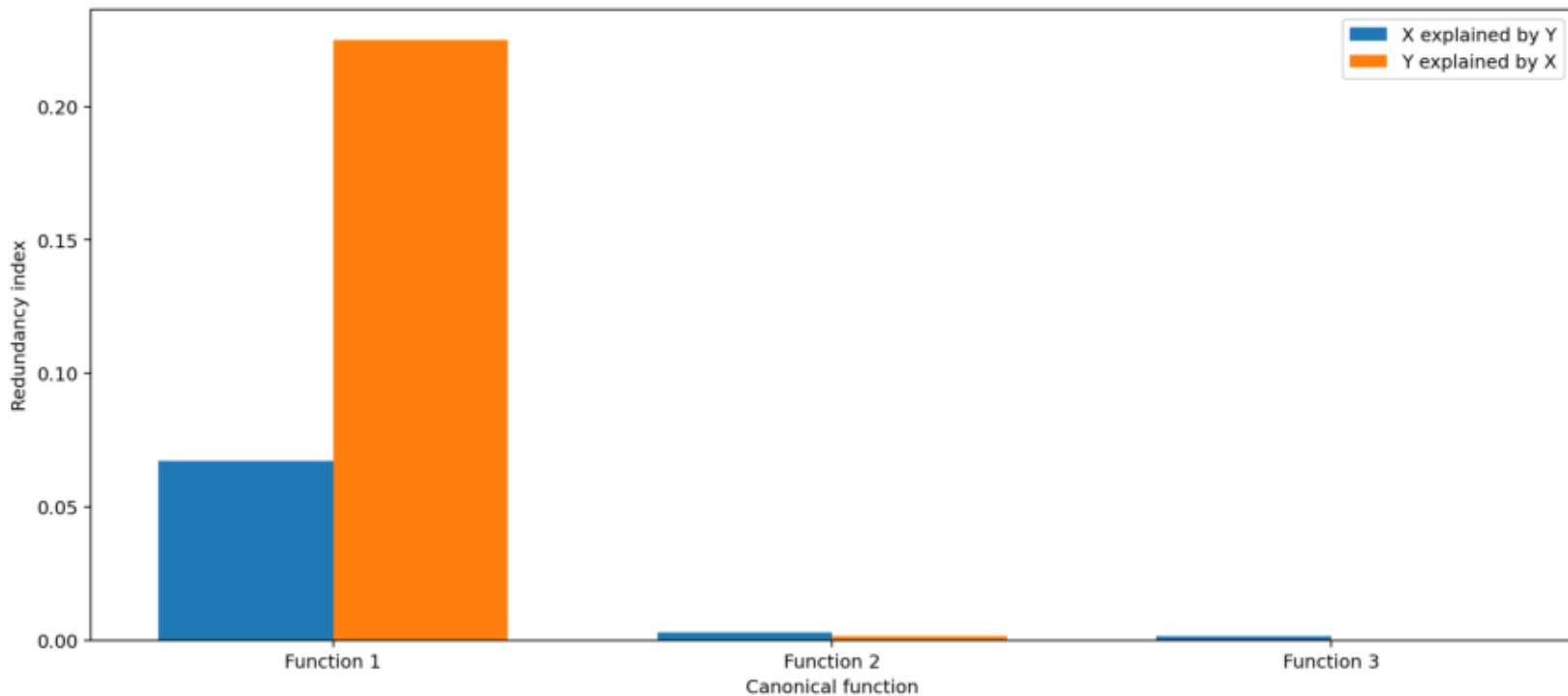
Canonical Correlation: Set Y Structure Loadings

Loadings show how strongly each Set Y variable relates to each Y canonical variate.



Canonical Correlation: Redundancy Summary

Redundancy shows practical variance explained across the opposite variable set.



Canonical Correlation: Input Correlation Matrix

The matrix shows bivariate relationships used to estimate the canonical functions.

