

SIPI SAS Macro (%SIPI) Manual

- SAS macro name : **SIPI**
- Version : **v0.2**
- Contents : **SNP Interaction Pattern Identifier (SIPI) for the binary outcome**

SIPI is used to evaluate pairwise SNP-SNP interactions associated with a binary outcome. For each SNP pair, the SIPI evaluates 45 logistic interaction models which take inheritance modes [additive, dominant, and recessive mode with the original (based on the minor allele) and reverse coding], and risk category grouping (model structure: hierarchical and non-hierarchical models) into consideration. The best interaction pattern is the one with the lowest value of the Bayesian information criterion (BIC). The significant test of the interaction is based on the Wald test of the interaction term in a model. There are two sub-functions of this SIPI macro: (1) one-pair only and (2) pairwise interaction analyses. The details of the 45 models/patterns are listed in the SIPI paper.

There are two sub-functions of this SIPI macro:

- (1) For testing interaction for only one SNP pair, the outputs include (a) SNP description statistics table and (b) a list of all 45 model results for the specific SNP pair.
- (2) For pairwise SNP interactions, the outputs include (a) SNP description statistics table and (b) a list of the best interaction pattern for each SNP pair.

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- **Reference**

HY Lin, DT Chen, PY Huang et al. SNP Interaction Pattern Identifier (SIPI): An Intensive Search for SNP-SNP Interaction Patterns. (under review).

- **Macro parameters:**

Parameters	Contents
INdata	Input dataset for analyses
OUTvar	Binary outcome variable
Covariate_C	<u>Categorical</u> covariance(s) to be adjusted in the model. For more than one covariates, there is no splitters between variables. If there is no categorical covariates, then keep it blank.
Covariate_N	<u>Numeric</u> covariance(s) to be adjusted in the model. For more than one covariates, there is no splitters between variables. If there is no numeric covariates, then keep it blank.
OTHvar	List of variables other than SNPs, outcome variables, and covariates in the input dataset (blank between variables)
OUTdt1	Output dataset with SNP descriptive statistics

OUTdt2	Output dataset with the 45-model results
SPvar1 & SPvar2	Names of the first and second SNPs in a pair for ONE-pair analyses. For pairwise interactions, keep these two parameters blank.

- **Input data format (example data: simData_cov.csv) :**

- (1) For the one-pair analysis, a pair of variable names provided in SPvar1 & SPvar2 must be correct. If anyone is missing or misspelled, the program will run through all possible pairs of all SNP variables.
- (2) For program efficiency, it is suggested to keep needed variables in the input dataset.
- (3) The binary outcome variable should be in numerical format with '1' as the event of interest and '0' as the reference.
- (4) All SNP variables should have a character format and contain two of four letters (C, T, A, and G). No other letters or numbers should be used. For missing SNP values, keep the field blank.
- (5) All character variables, except the variables specified in OTHvar, are considered as SNP variables by default.

- **Output datasets**

Suffix to the given name of the output dataset

'_1' = results of one-pair SNP interaction analyses with a list of all 45 models sorted by BIC (smallest to largest)

'_1u' = results of one-pair SNP interaction analyses with a list of all 45 models (unsorted version)

'_all' = results of pairwise SNP interaction analyses with a list of best interaction patterns for each SNP pair

- **Example:**

<<1>> One-pair interaction analyses

** indicate project folder (one or two project folders: one for input data and one for the output files)

libname p "c:\project";

**** activate SIPI macro (specify SIPI macro data directory)

%include "c:\...\SIPI_macro_v0_2.sas";

***** Macro parameters *****;

%let INdata = p.studpdata;

%let OUTdt1 = p.AlleleMAF;

%let OUTdt2 = p.BestInteract;

%let SPvar1 = SNP2;

%let SPvar2 = SNP8;

%let OUTvar = d; ** binary outcome ;

%let Covariate_C = gender group;

%let Covariate_N = age;

%let OTHvar = ID; ** List of non-SNP, non-outcome variables;

***** Actions *****;

%SIPI;

<<2>> Pairwise interaction analyses

***** Macro parameters *****;

%let INdata = p.studpdata;

%let OUTdt1 = p.AlleleMAF;

%let OUTdt2 = p.BestInteract;

%let SPvar1 = ;

%let SPvar2 = ;

%let OUTvar = d; ** binary outcome ;

%let Covariate_C = gender group;

%let Covariate_N = age;

%let OTHvar = ID; ** List of non-SNP, non-outcome variables;

***** Actions *****;

%***SIPi***;