\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Training data info \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Variables: 11

Sample size: 43400

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Knowledge-based constraints \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Temporal constraints specified: 0

Directed constraints specified: 0

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Structure learning \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Running SaiyanH with settings:

a) Associational score: MeanMax [Absolute]

b) Conditional independence pruning: true

c) Faithfulness condition pruning: true

d) TABU search max escape attempts: V(V-1)

Entering Phase 1 [EMST graph]...

marginalDep.csv saved.

Phase 1 completed.

Entering Phase 2 [constraint-based learning]...

conditionalDep.csv saved.

conditionalIndep.csv saved.

conditionalInsignificance.csv saved.

Phase 2 completed.

Entering Phase 3 [score-based learning]...

age->hypertension[label="0.102"];age->heartdisease[label="0.117"];age->marriage[label="0.253"];age->work[label="0.236"];age->glucose[label="0.084"];age->smoking[label="0.106"];heartdisease->gender[label="0.054"];marriage->work[label="0.241"];work->hypertension[label="0.054"];work->glucose[label="0.066"];work->bmi[label="0.127"];work->smoking[label="0.099"];glucose->heartdisease[label="0.063"];glucose->residence[label="0.063"];bmi->gender[label="0.077"];stroke->age[label="0.093"];graph[fontname=Arial, fontsize = 10, label="SaiyanH\_Phase\_3 graph (final). \lTotal arcs: 16 \l"]

Phase 3 completed.

Arcs randomised during phase 2 constraint-based learning: 0

Structure learning elapsed time: 11 seconds total (Phase 1 = 2 secs, Phase 2 = 6 secs).

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Evaluation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Nodes: 11

Sample size: 43400

TrueDAG arcs: 16

TrueDAG independencies: 39

LearnedDAG arcs: 16

LearnedDAG independencies: 39

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Confusion matrix stats \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Arcs discovered (TP): 3.0

Partial arcs discovered (TP\*0.5): 1.0

False dependencies discovered (FP): 12.0

Independencies discovered (TN): 27.0

Dependencies not discovered (FN): 12.5. [NOTE: # of edges missed is 12.0]

\_\_\_\_\_\_\_\_\_\_\_\_\_ Stats from metrics and scoring functions \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Precision score: 0.219

Recall score: 0.219

F1 score: 0.219

SHD score: 24.500

DDM score: -1.313

BSF score: -0.089

# of independent graphical fragments: 1

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Inference-based evaluation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

BIC/MDL score -414452.377

# of free parameters 250

BUILD SUCCESSFUL (total time: 29 seconds)