## Incomplete gene expression Gene (q) Gene (q) Samples (m) Samples (m) Imputation is done one time step at a time time step (t) t th time step SNP (p) **PCA** (No. of component=50) Imputation Model Samples (m) (DNN) 12 SNPs selected from literature Complete gene expression Mutation Samples (m) Samples (*m*) Family history Classifier (LSTM) Samples (m) HLA genotype time step (t) IA negative IA positive