***Simulation***

**Step 1:** Generating a scale-free feature graph of 1000 nodes (1000 nodes represented 1000 features).

**Step 2:** Calculating the distance matrix D recording pairwise distances among all nodes.

**Step 3:** We derived the covariance matrix  by transforming the distances matrix D between nodes according to the .

**Step 4:** 500 multivariate Gaussian samples were obtained as input matrix  followed by  (500 indicated the number of samples).

**Step 5:** Generating the outcome variable y based on .  represented the link function. Parameters  and an intercept  were sampled in range (1, 1.5). We then turned outcome variable into binary variable according to the median of y.