Linear discriminant analysis:

- **Data:** \((X^i, Y^i), \ i = 1, \ldots, n\), where \(X^i = (X_1^i, \ldots, X_p^i)\) and \(Y^i \in \{+1, -1\}\).

- **Model:**

\[
X \mid Y = y \sim N(\mu_y, \Sigma).
\]

**Challenges:**

- Cannot be applied to high-dimensional data;
- Is based on rigid assumptions.
A Semiparametric Method

Model:

$$h(X) \mid Y = y \sim N(\mu_y, \Sigma)$$

1. Estimation of $h$;
2. Estimation of a sparse classification rule;
3. Theoretical studies: consistent for ultra-high-dimensional data;
4. Numerical studies.