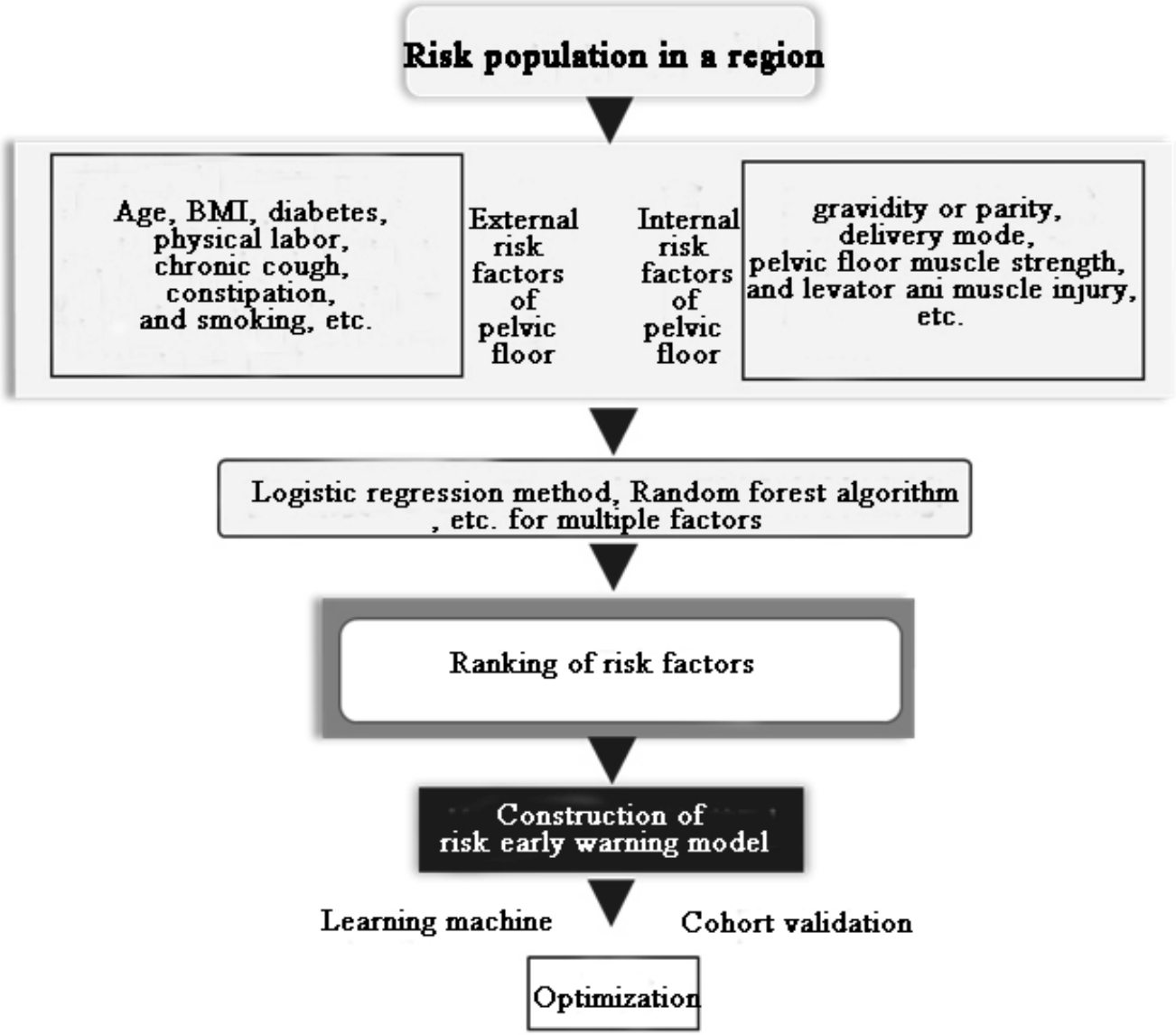

Risk population in a region
Age, BMI, diabetes, physical labor, chronic cough, constipation, and smoking, etc.
External risk factors of pelvic floor
Internal risk factors of pelvic floor
gravidity or parity, delivery mode, pelvic floor muscle strength, and levator ani muscle injury, etc.
Logistic regression method, Random forest algorithm , etc. for multiple factors
Ranking of risk factors
Construction of risk early warning model
Learning machine
Cohort validation
Optimization

Figure 1

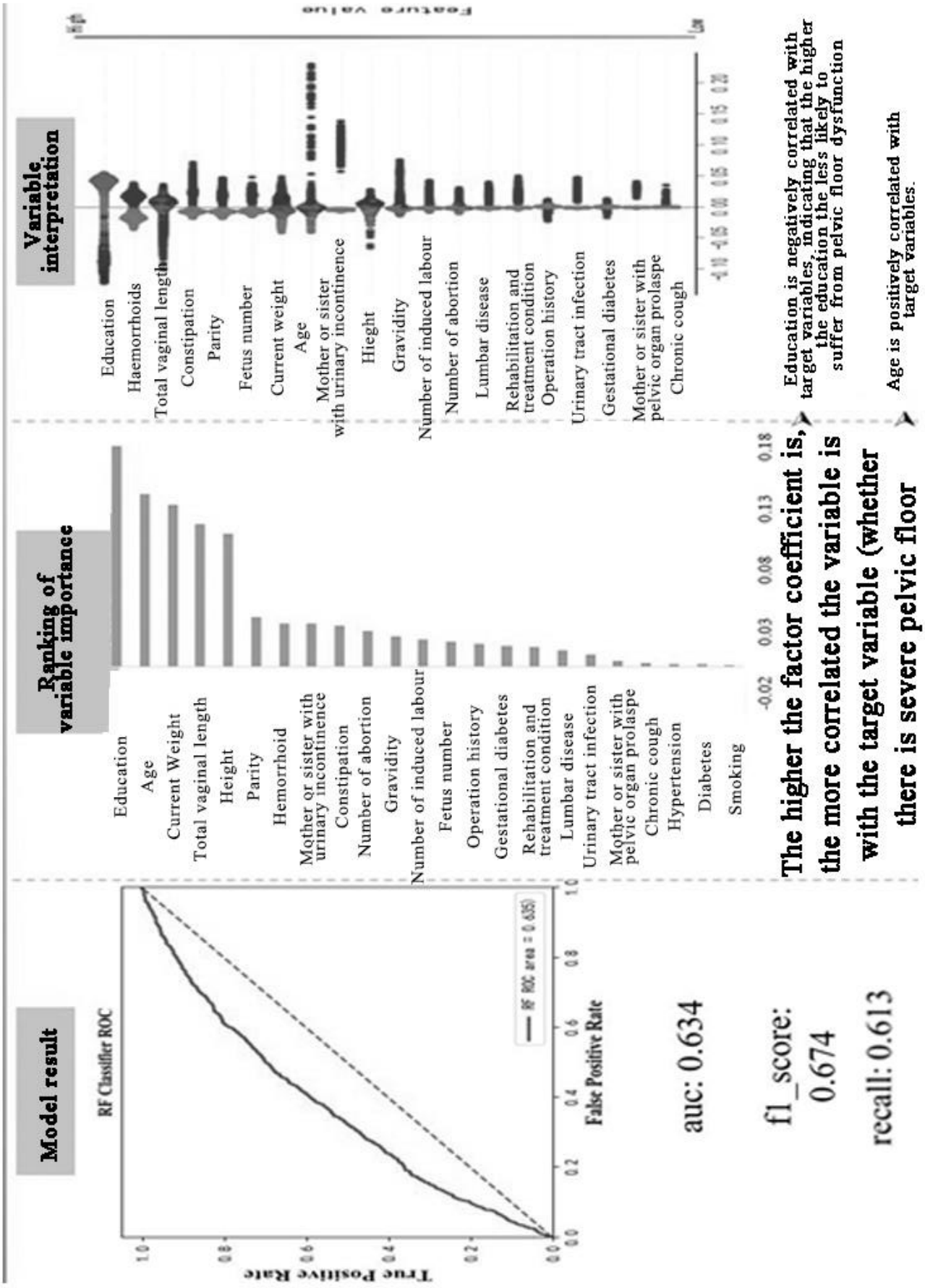

Model result
RF Classifier ROC
True Positive Rate
False Positive Rate
auc: 0.634
f1_score: 0.674
recall: 0.613
Ranking of variable importance
Education
Age
Current Weight
Total vaginal length
Height
Parity
Hemorrhoid
Mother or sister with urinary incontinence
Constipation
Number of abortion
Gravidity
Number of induced labour
Fetus number
Operation history
Gestational diabetes
Rehabilitation and treatment condition
Lumbar disease
Urinary tract infection
Mother or sister with pelvic organ prolaspe
Chronic cough
Hypertension
Diabetes
Smoking
-0.02 0.03 0.08 0.13 0.18
The higher the factor coefficient is, the more correlated the variable is with the target variable (whether there is severe pelvic floor dysfunction)
Variable interpretation
Education
Haemorrhoids
Total vaginal length
Constipation
Parity
Fetus number
Current weight
Age
Mother or sister with urinary incontinence
Hieght
Gravidity
Number of induced labour
Number of abortion
Lumbar disease
Rehabilitation and treatment condition
Operation history
Urinary tract infection
Gestational diabetes
Mother or sister with pelvic organ prolaspe
Chronic cough
Feature value
Education is negatively correlated with target variables, indicating that the higher the education the less likely to suffer from pelvic floor dysfunction
Age is positively correlated with target variables.

Figure 2

Diseases	Model	Accuracy
Anterior vaginal wall prolapse	Classical decision tree algorithm	0.72
Uterine/fornix prolapse	Classical decision tree algorithm	0.88
	Random forest	0.89
Posterior vaginal wall prolapse	Classical decision tree algorithm	0.81
	Conditional Inference Trees	0.82
	Random forest	0.81
	Support vector machine	0.84
Stress urinary incontinence	Classical decision tree algorithm	0.71
	Conditional Inference Trees	0.72
	Random forest	0.70
	Support vector machine	0.76
Vaginal relaxation degree	Classical decision tree algorithm	0.97
Pelvic floor muscle strength	Classical decision tree algorithm	0.83

Figure 3

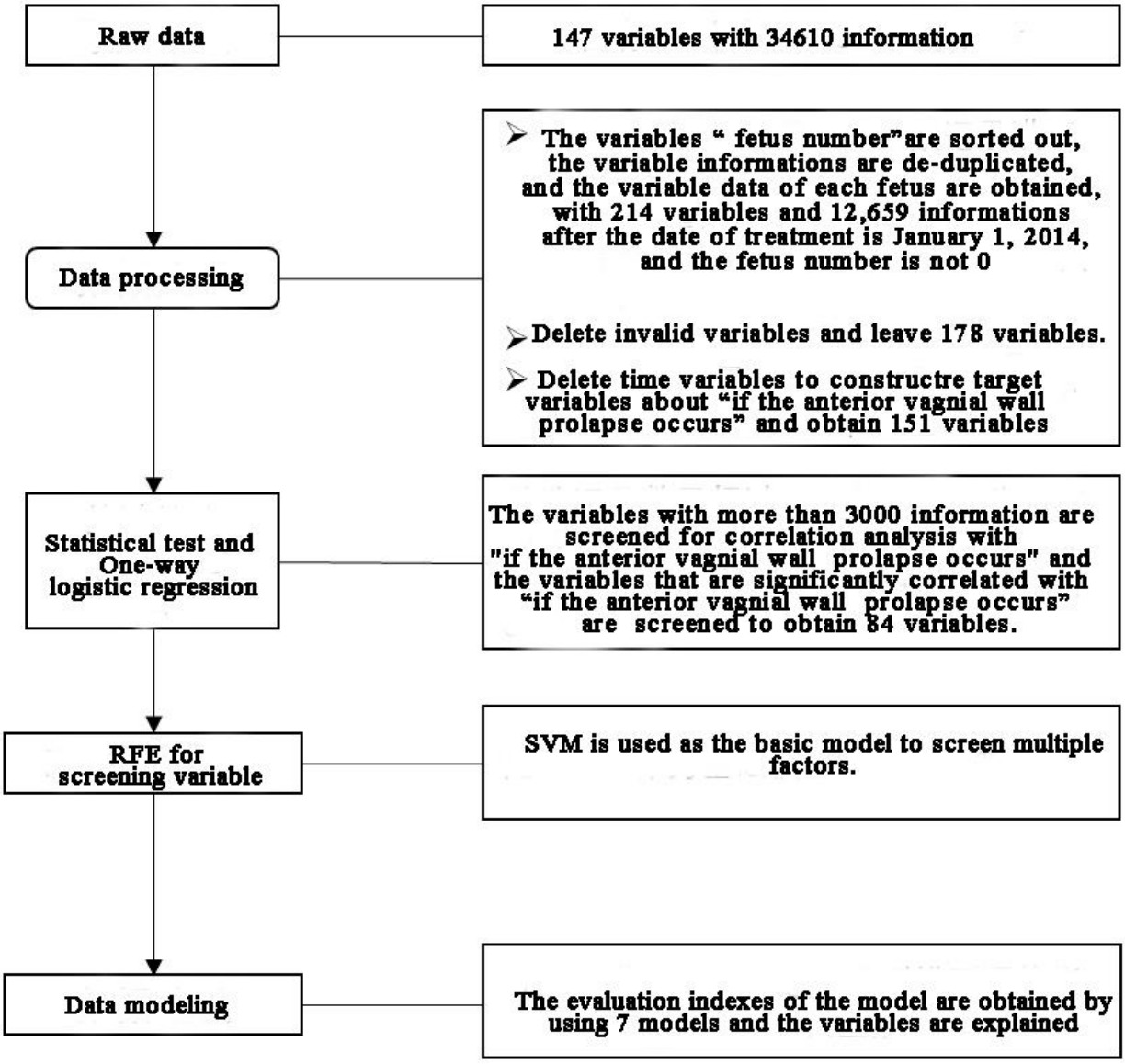


Figure 4

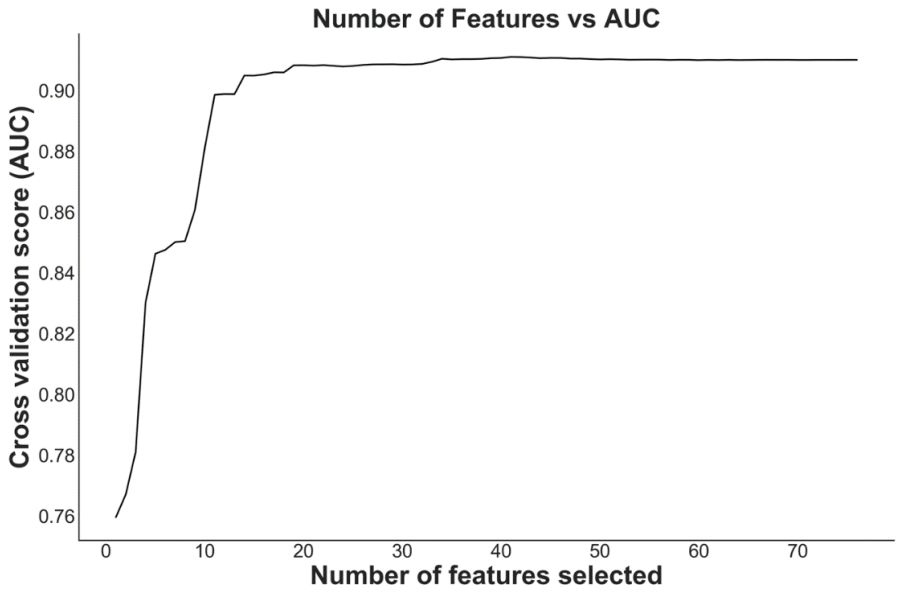


Figure 5

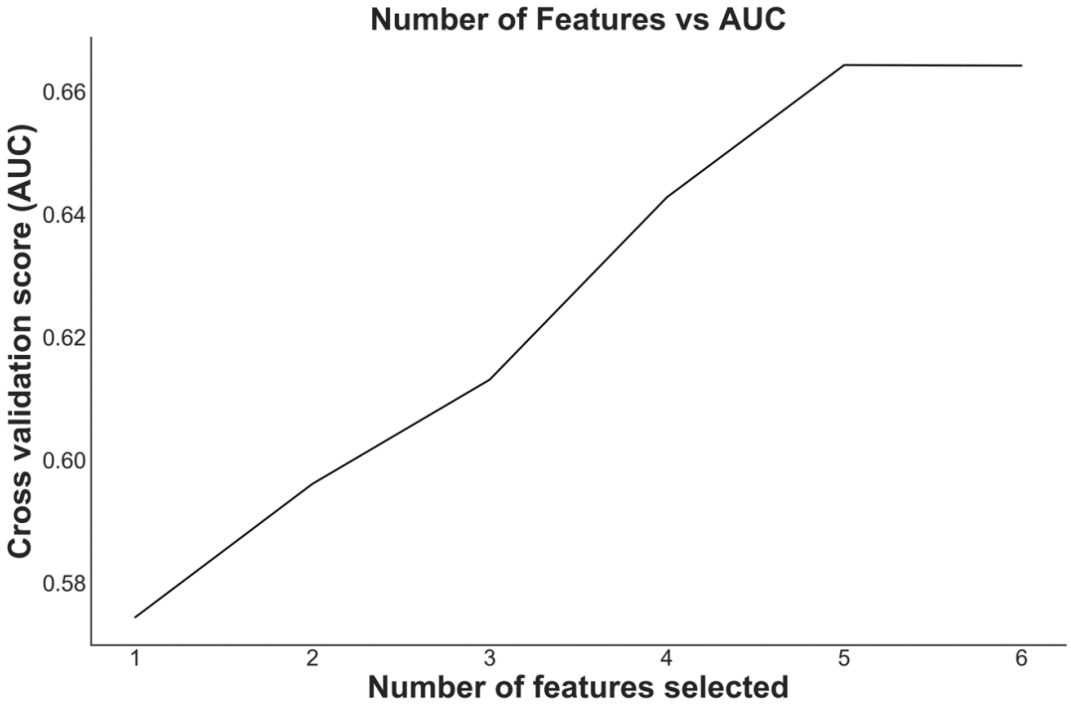


Figure 6

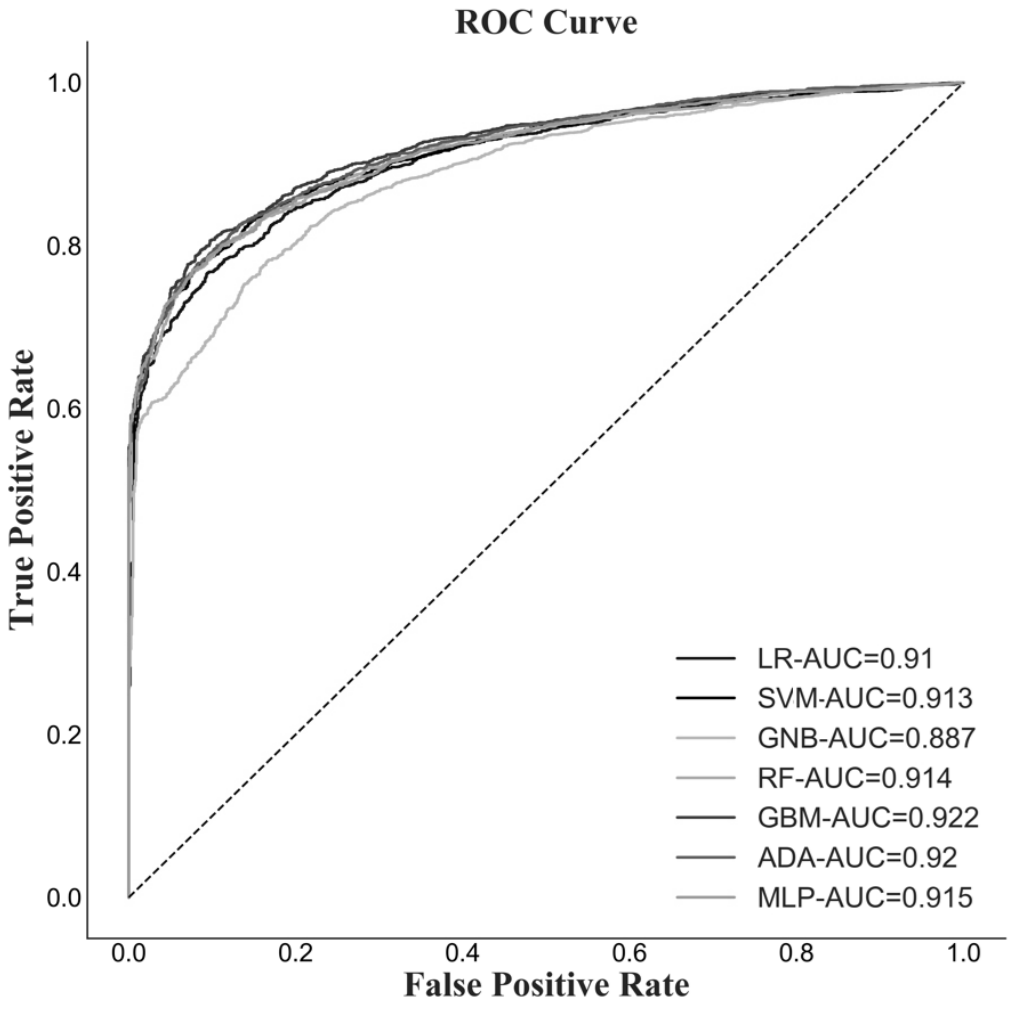


Figure 7

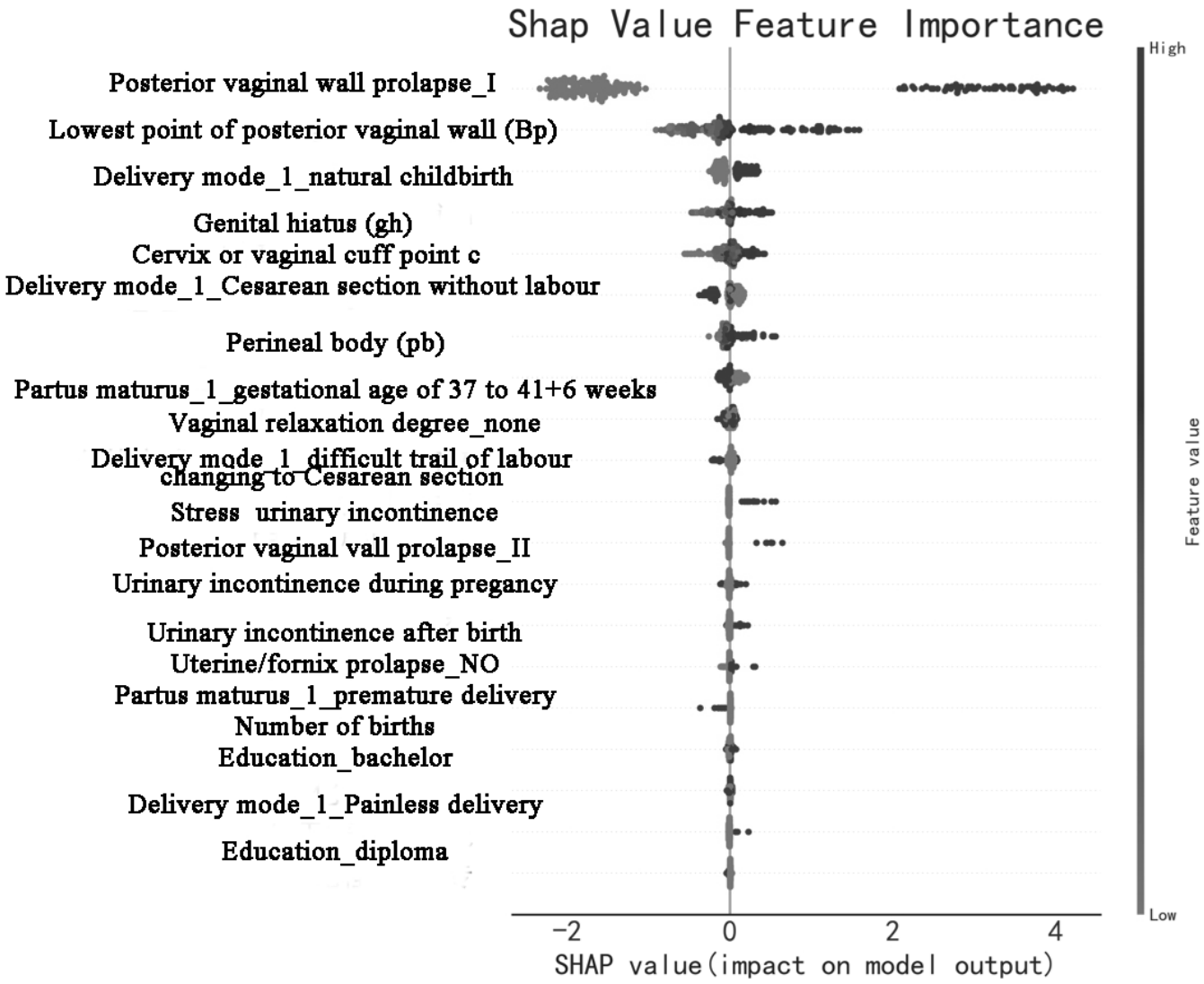

Shap Value Feature Importance
Posterior vaginal wall prolapse_I
Lowest point of posterior vaginal wall (Bp)
Delivery mode_1_natural childbirth
Genital hiatus (gh)
Cervix or vaginal cuff point c
Delivery mode_1_Cesarean section without labour
Perineal body (pb)
Partus maturus_1_gestational age of 37 to 41+6 weeks
Vaginal relaxation degree_none
Delivery mode_1_difficult trail of labour changing to Cesarean section
Stress urinary incontinence
Posterior vaginal vall prolapse_II
Urinary incontinence during pregancy
Urinary incontinence after birth
Uterine/fornix prolapse_NO
Partus maturus_1_premature delivery
Number of births
Education_bachelor
Delivery mode_1_Painless delivery
Education_diploma
−2
0
2
4
SHAP value(impact on model output)
High
Feature value
Low

Figure 8

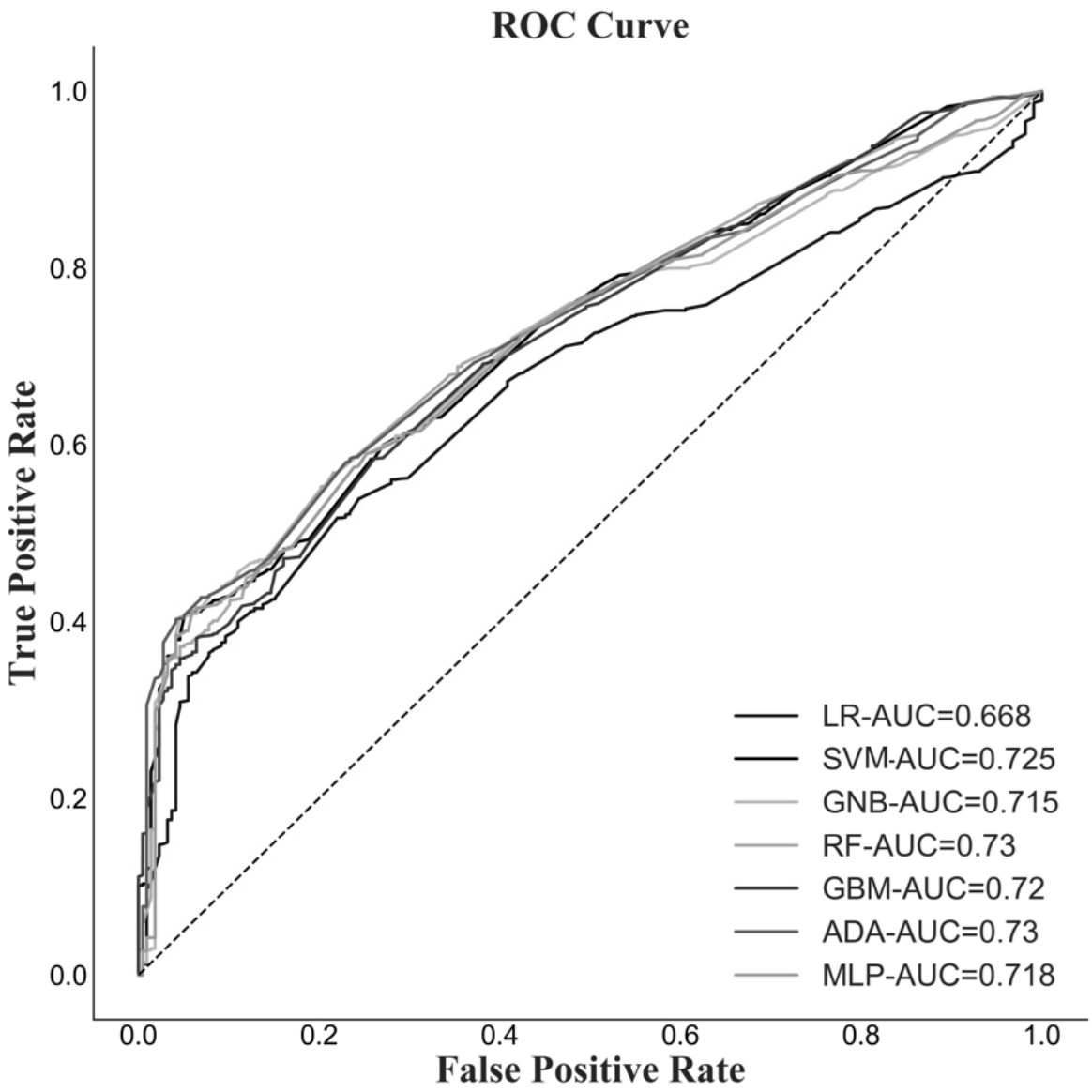


Figure 9

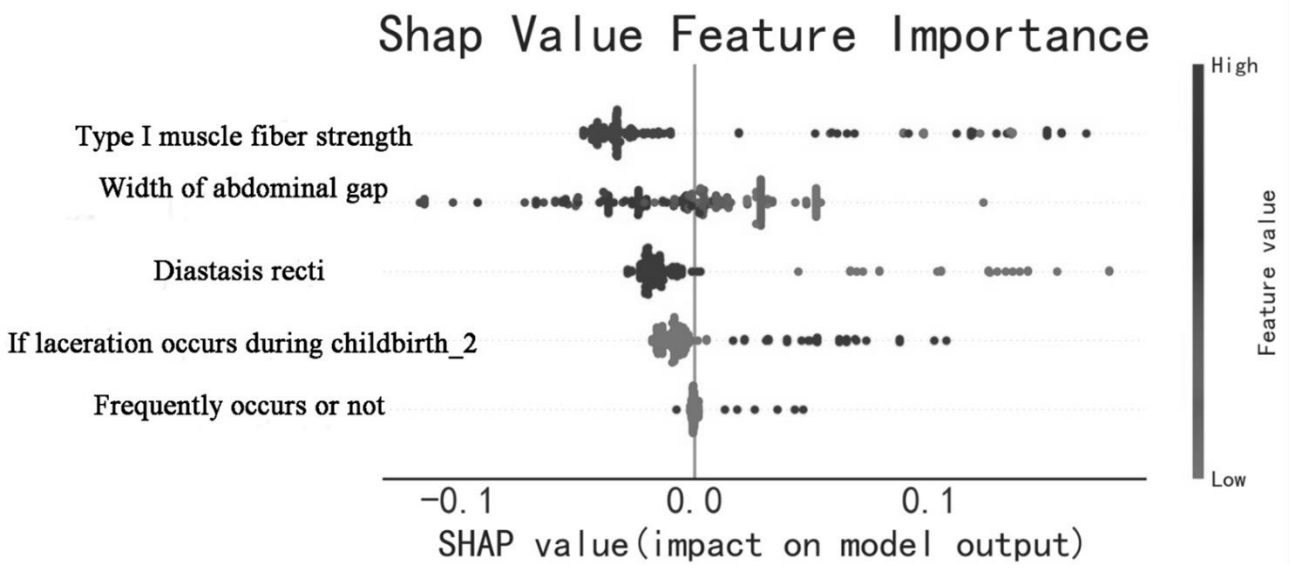


Figure 10