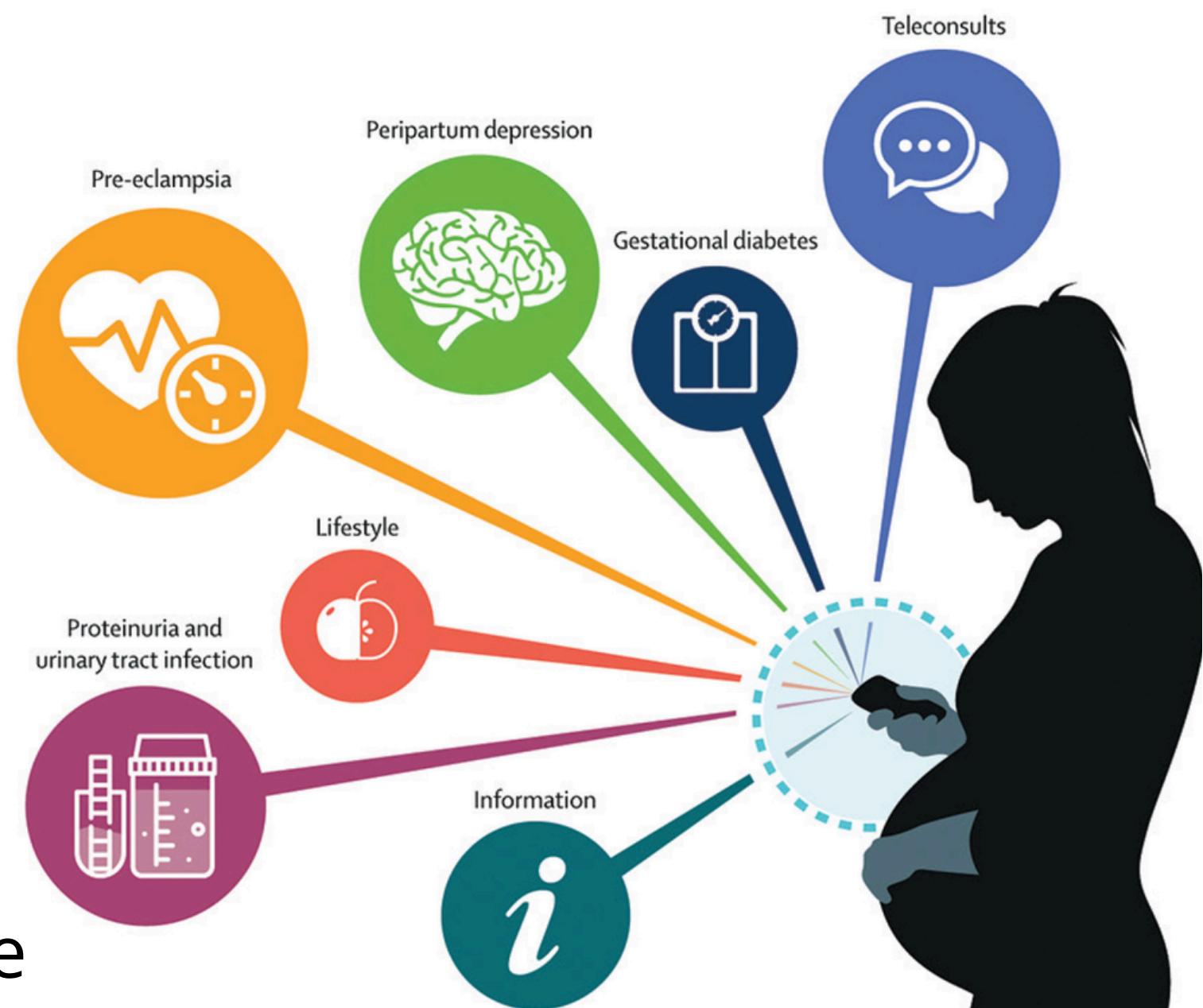
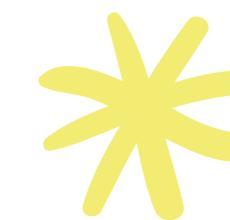


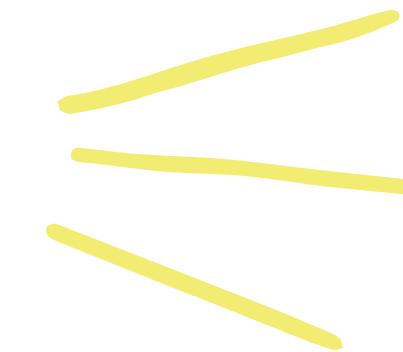
# Utilisation du Machine Learning pour prédire le risque de mortalité maternelle.



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## Contexte

Risques  
Complications  
médicales

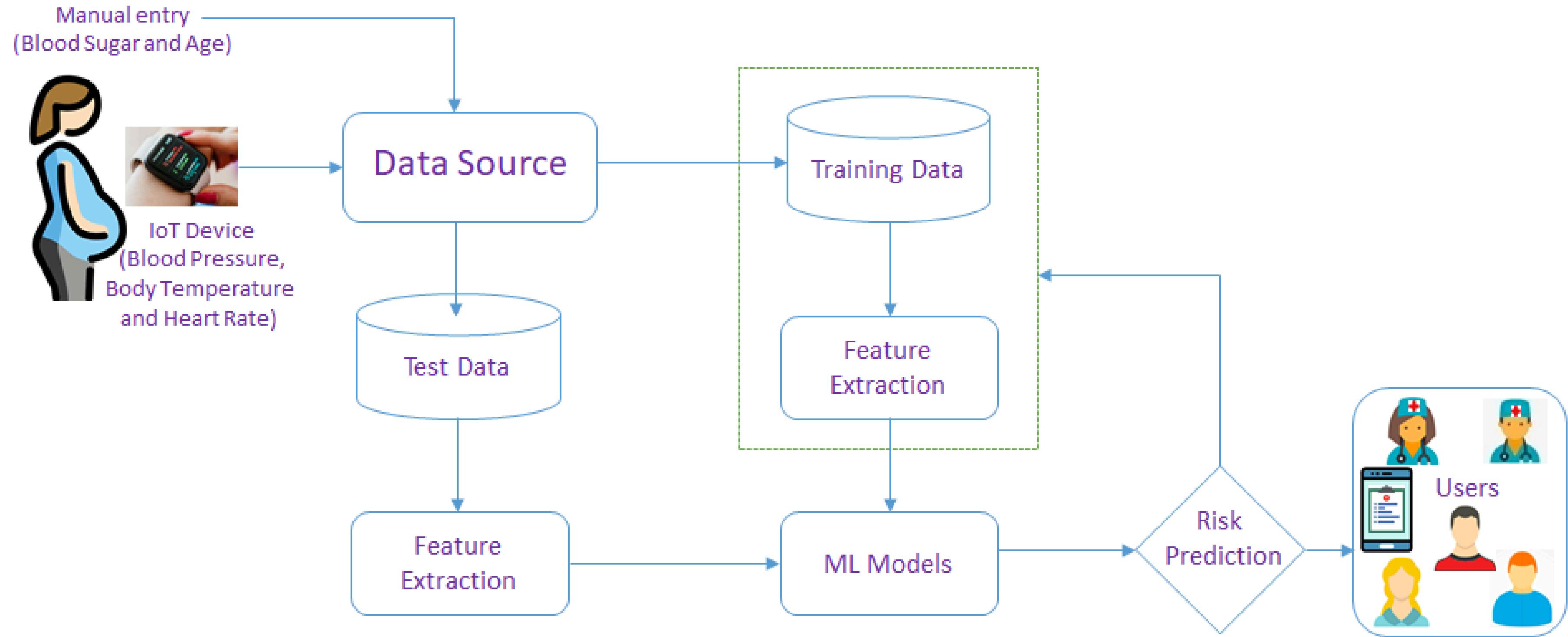


Mortalité  
maternelle  
(OMS)

Une meilleure **détection** et **prédiction** des facteurs de risque permettrait aux professionnels de santé d'intervenir de manière proactive et d'offrir des soins personnalisés.

Le **Machine Learning**, offre des outils puissants pour mieux analyser et interpréter les données médicales complexes afin de **prévenir** les risques de complications

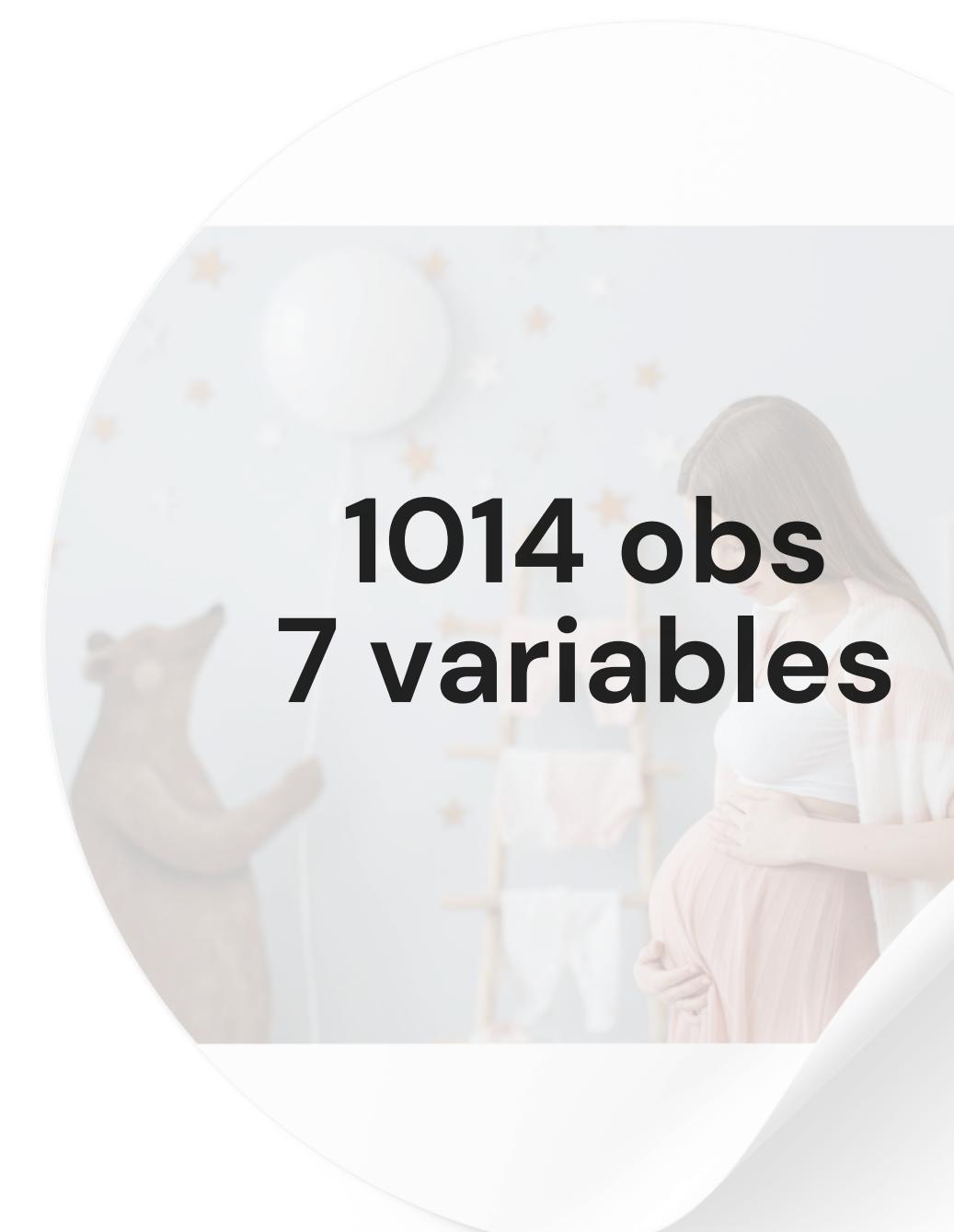
# Idée globale



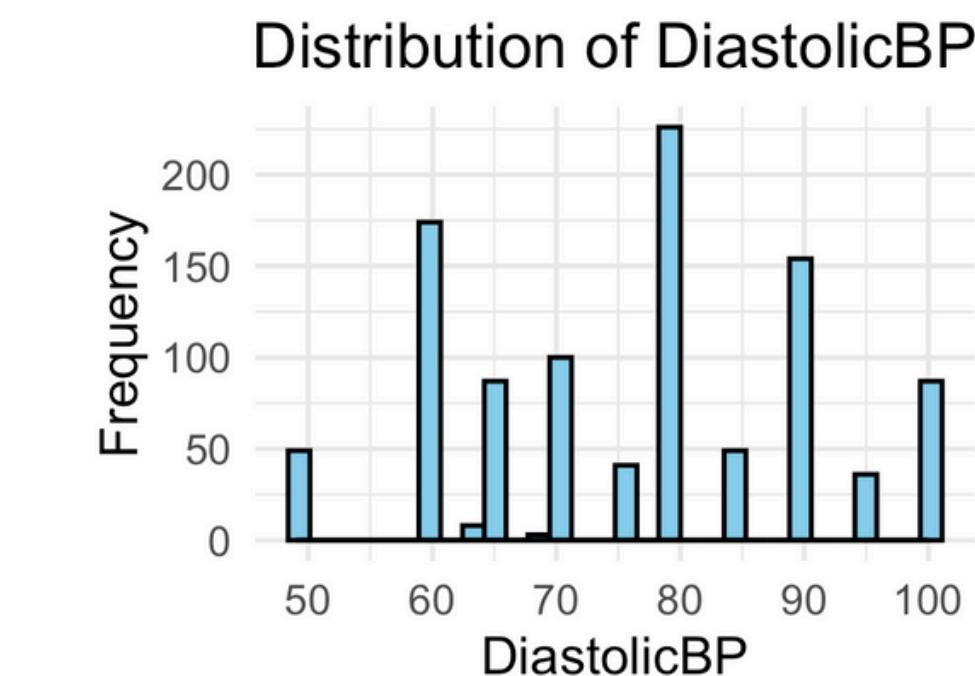
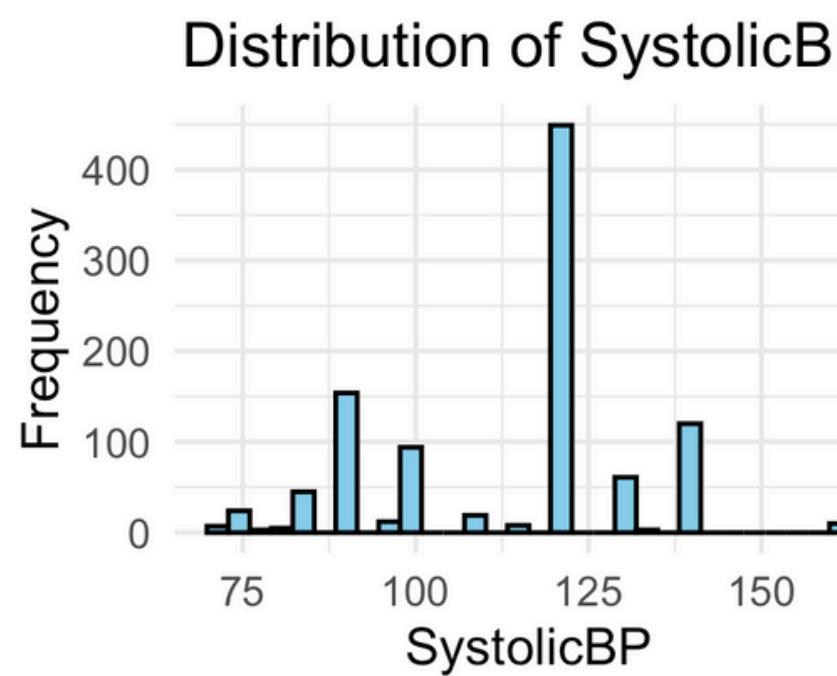
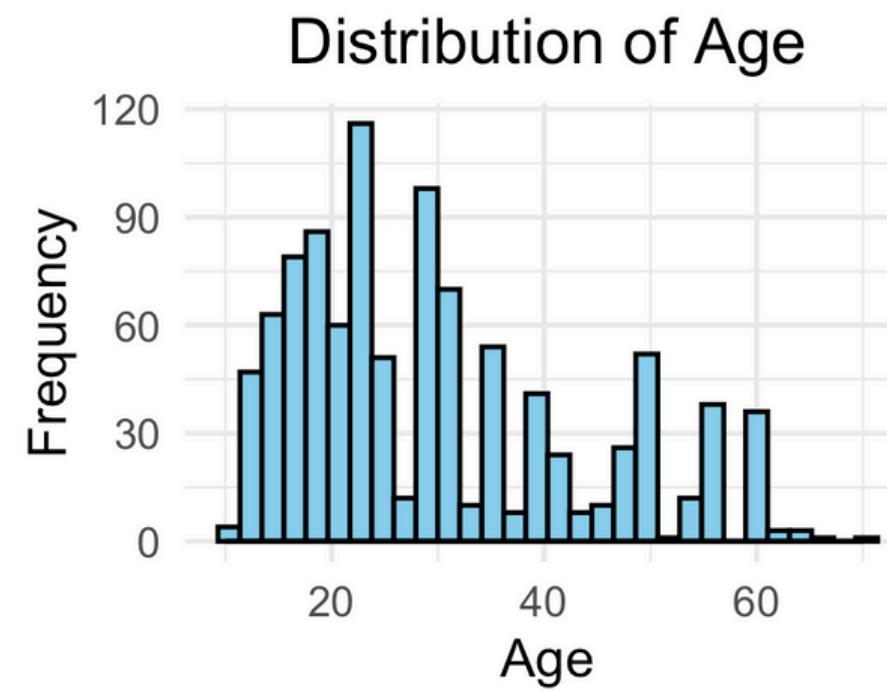
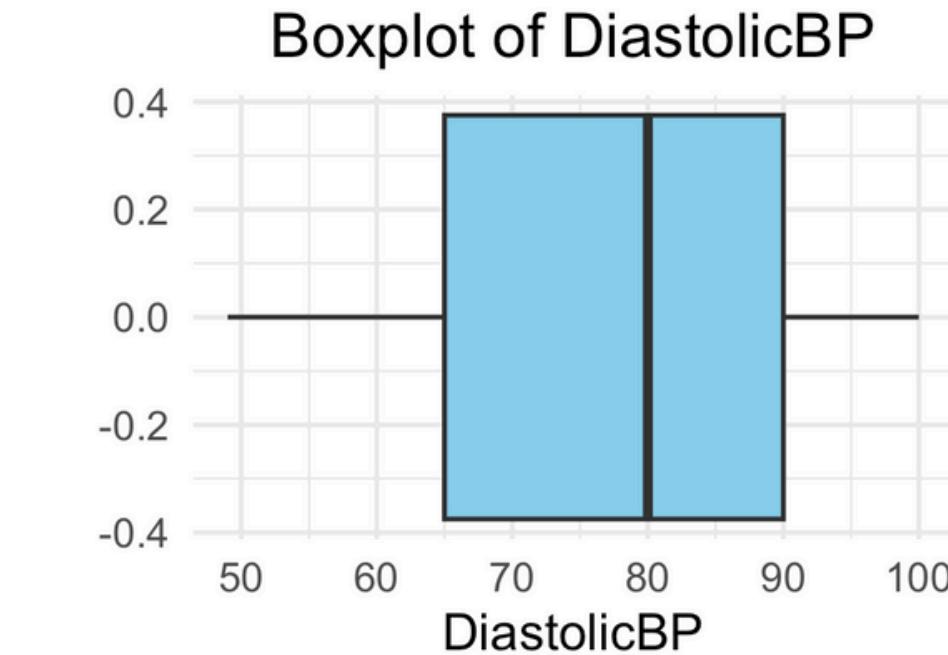
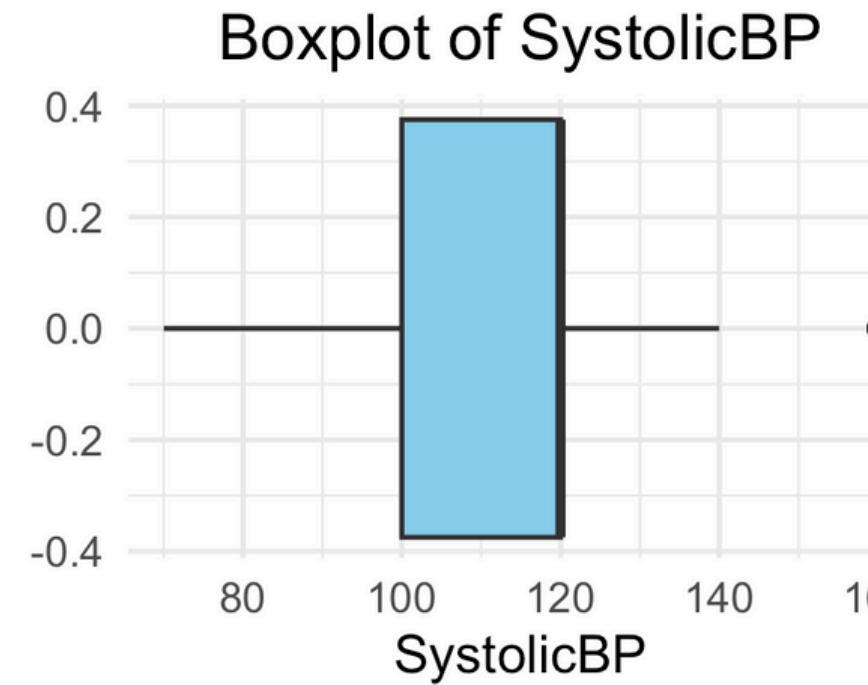
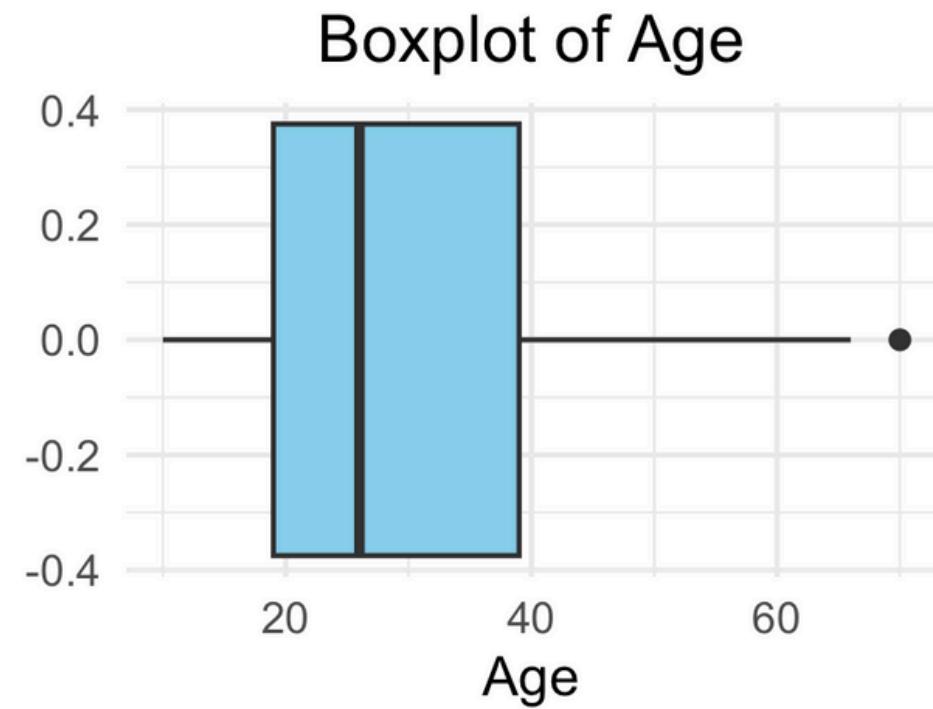
# Description des Données

Variable Name	Role	Type	Demographic	Description	Units	Missing Values
Age	Feature	Integer	Age	Any ages in years when a women during pregnant.		no
SystolicBP	Feature	Integer		Upper value of Blood Pressure in mmHg, another significant attribute during pregnancy.		no
DiastolicBP	Feature	Integer		Lower value of Blood Pressure in mmHg, another significant attribute during pregnancy.		no
BS	Feature	Integer		Blood glucose levels is in terms of a molar concentration	mmol/L	no
BodyTemp	Feature	Integer			F	no
HeartRate	Feature	Integer		A normal resting heart rate	bpm	no
RiskLevel	Target	Categorical		Predicted Risk Intensity Level during pregnancy considering the previous attribute.		no

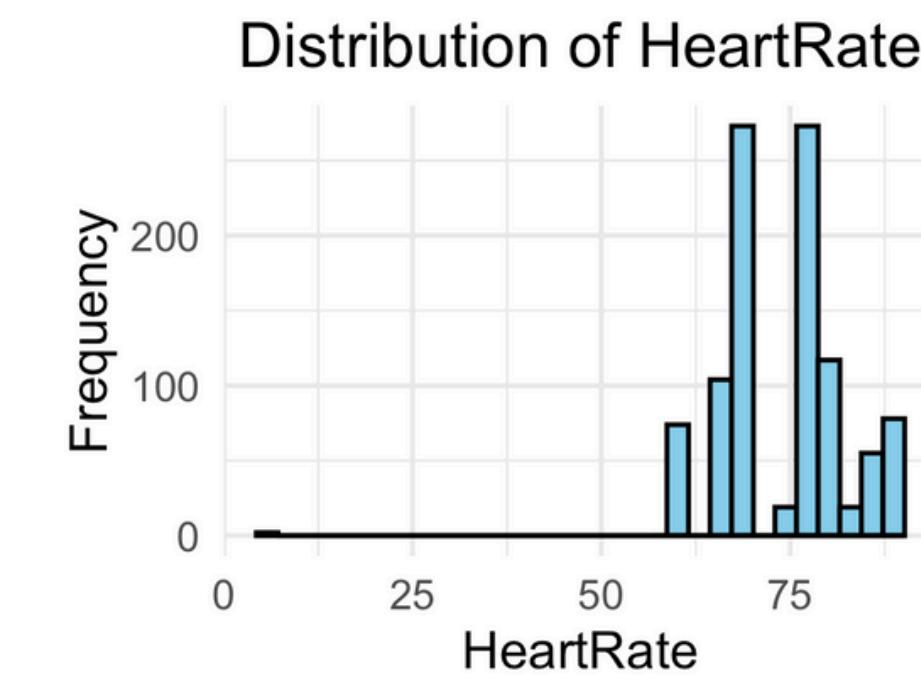
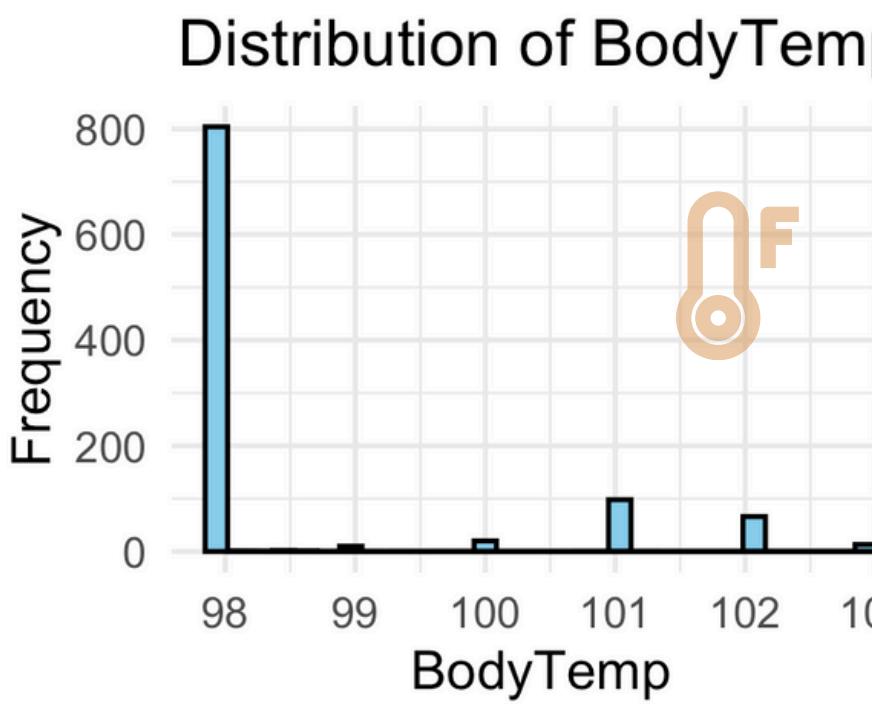
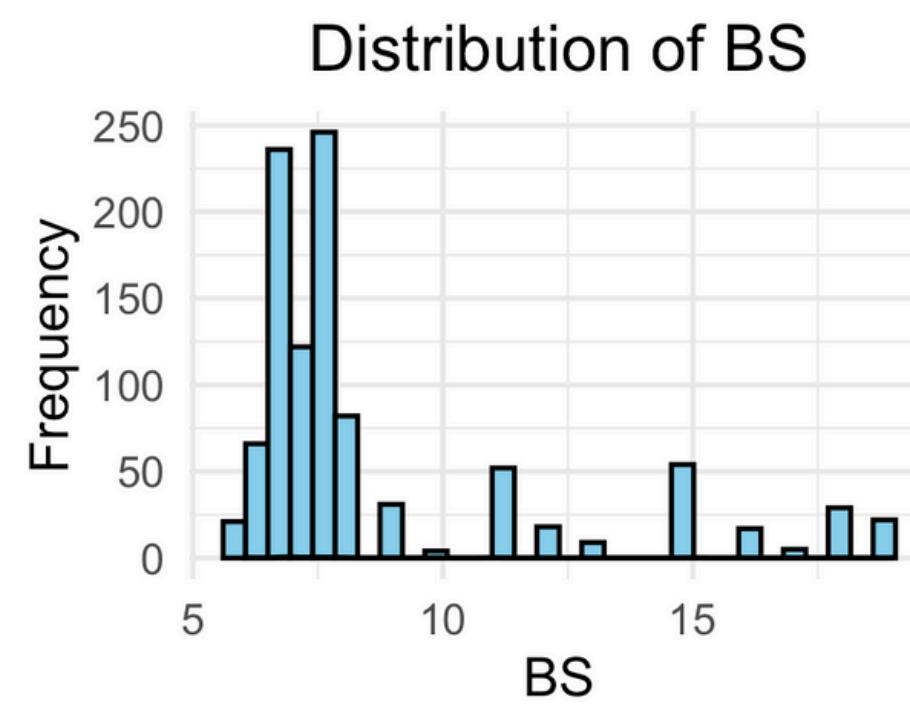
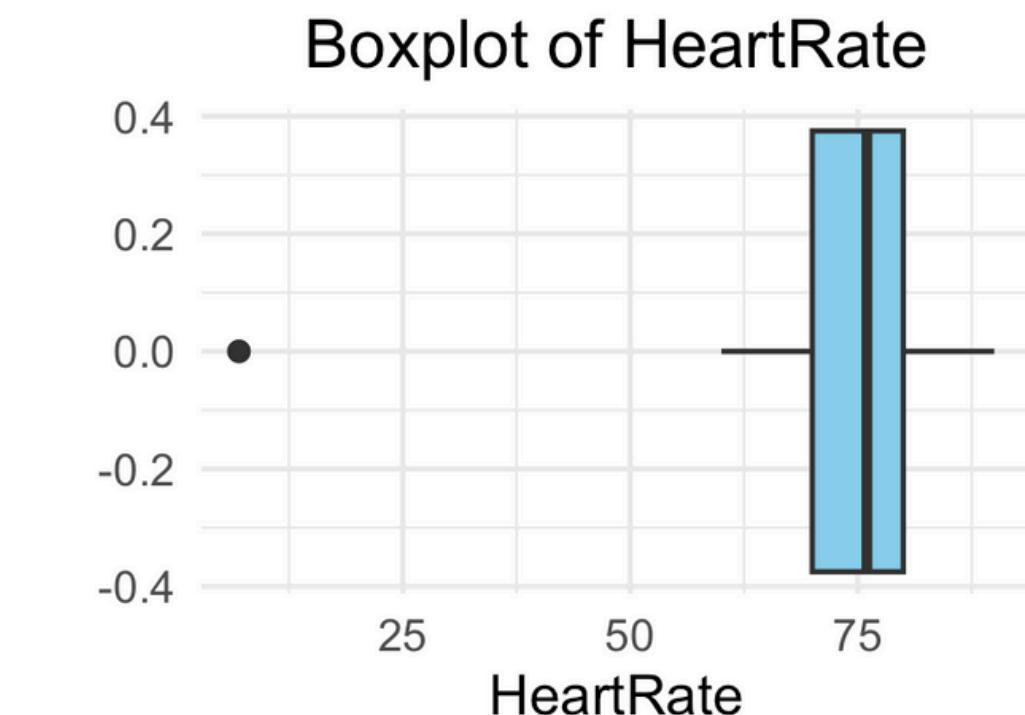
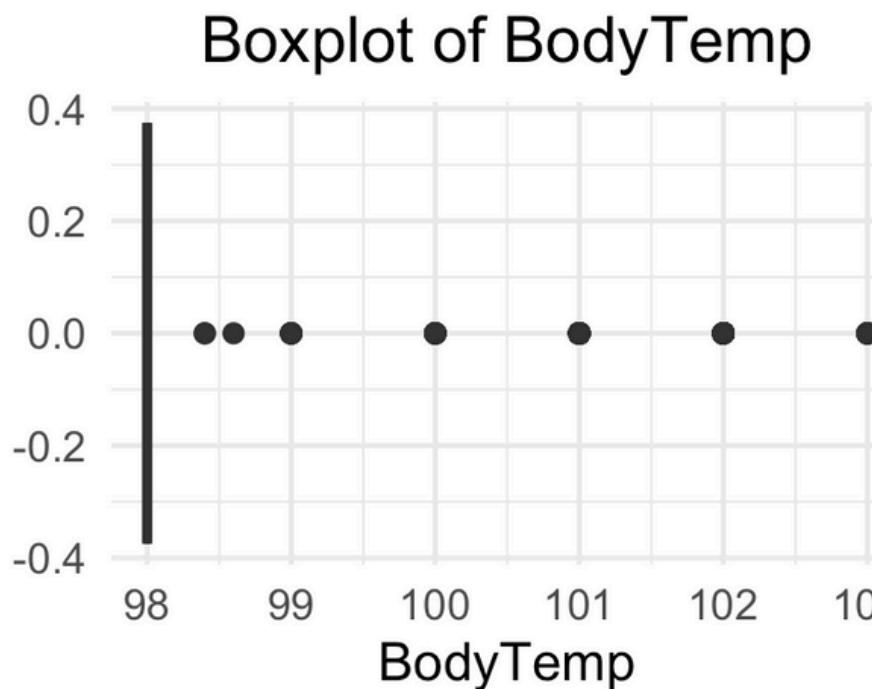
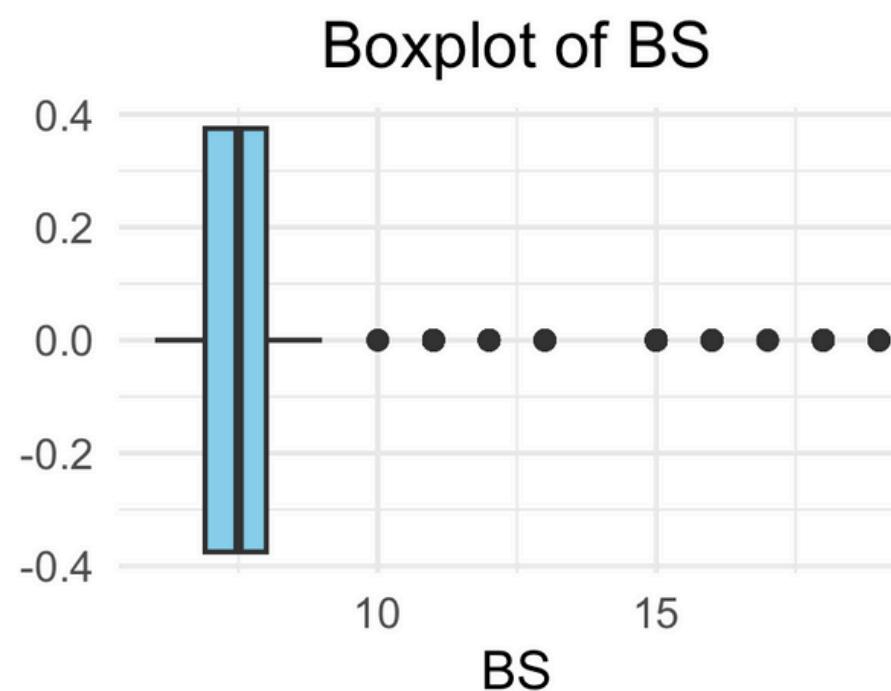
1014 obs  
7 variables



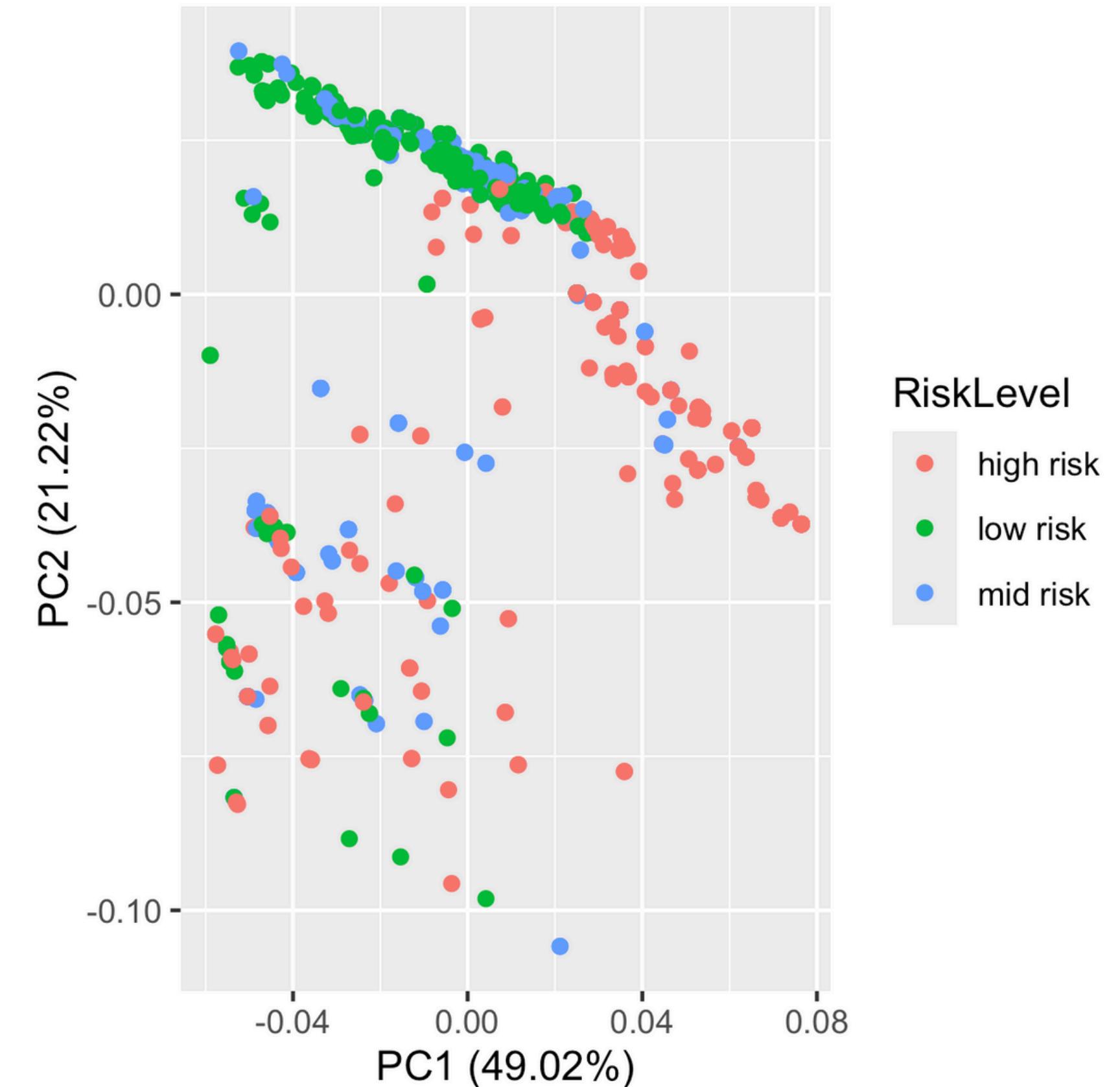
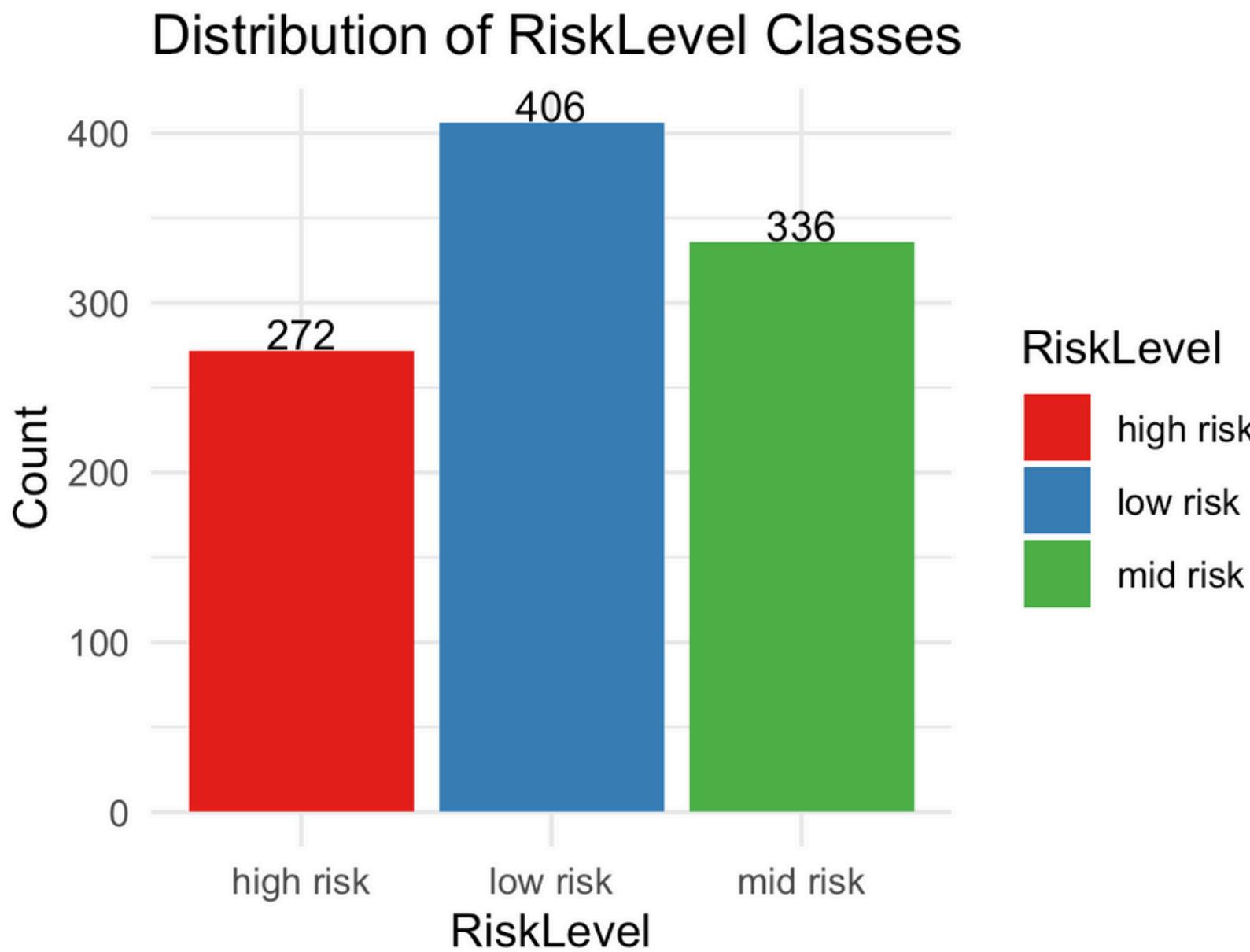
# Description des Données

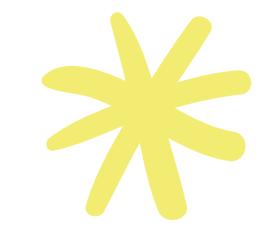


# Description des Données

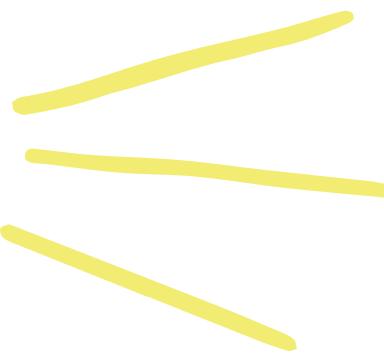


# Description des Données



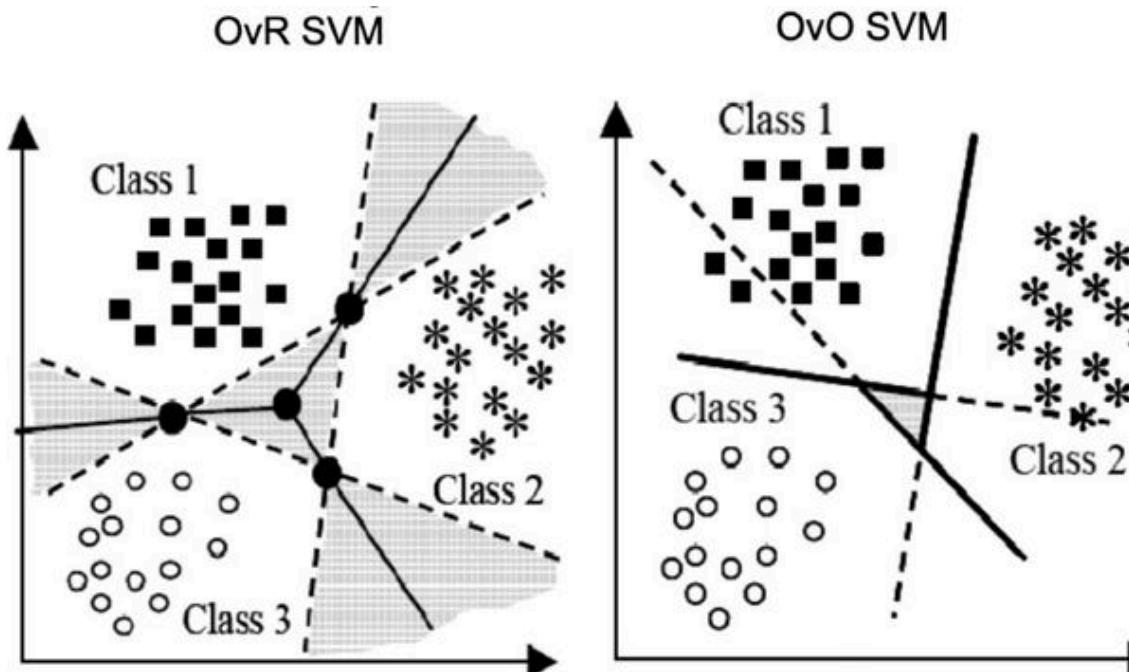


Méthodes

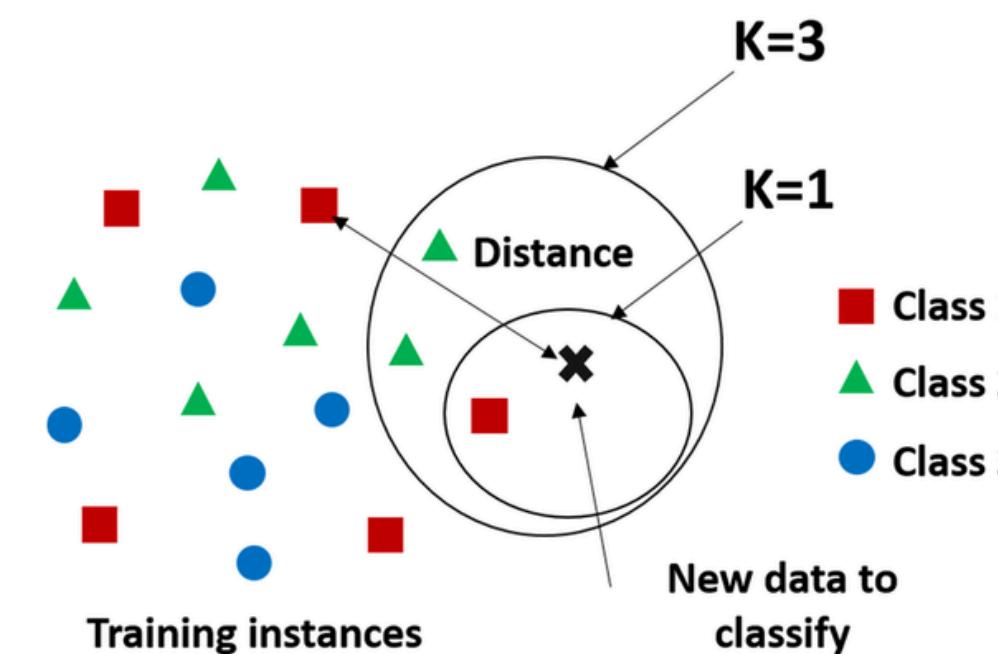


# Les différentes méthodes

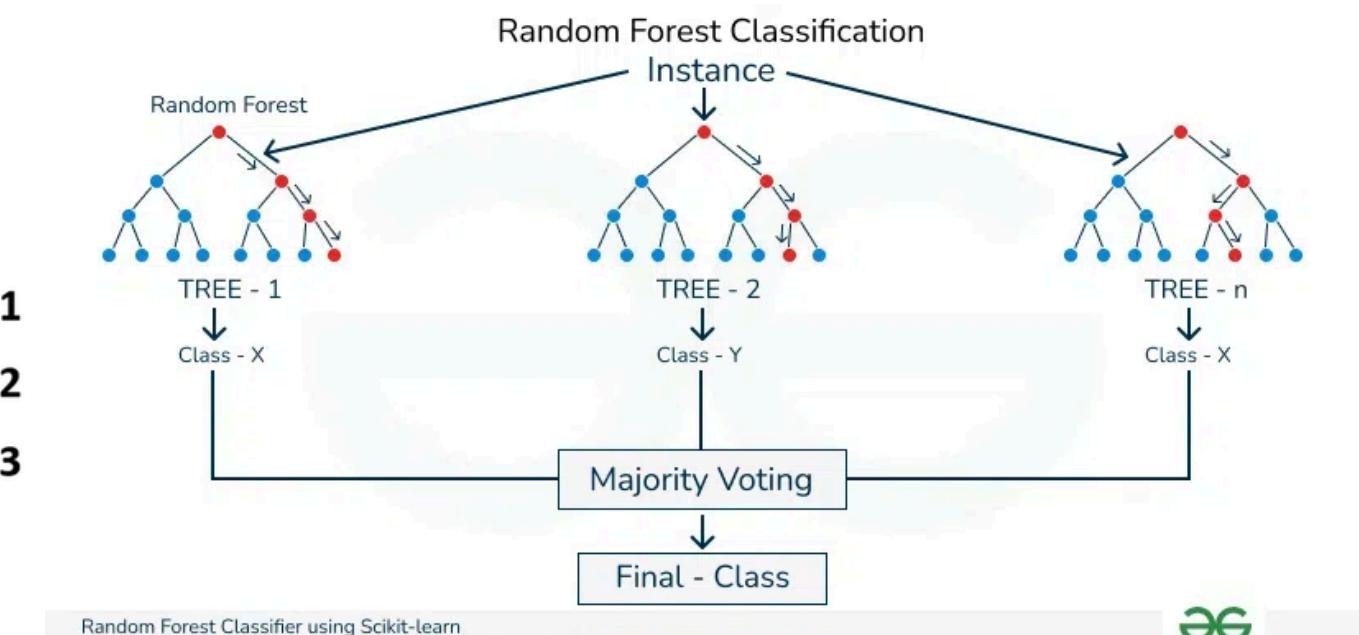
SVM



KNN



RandomForest

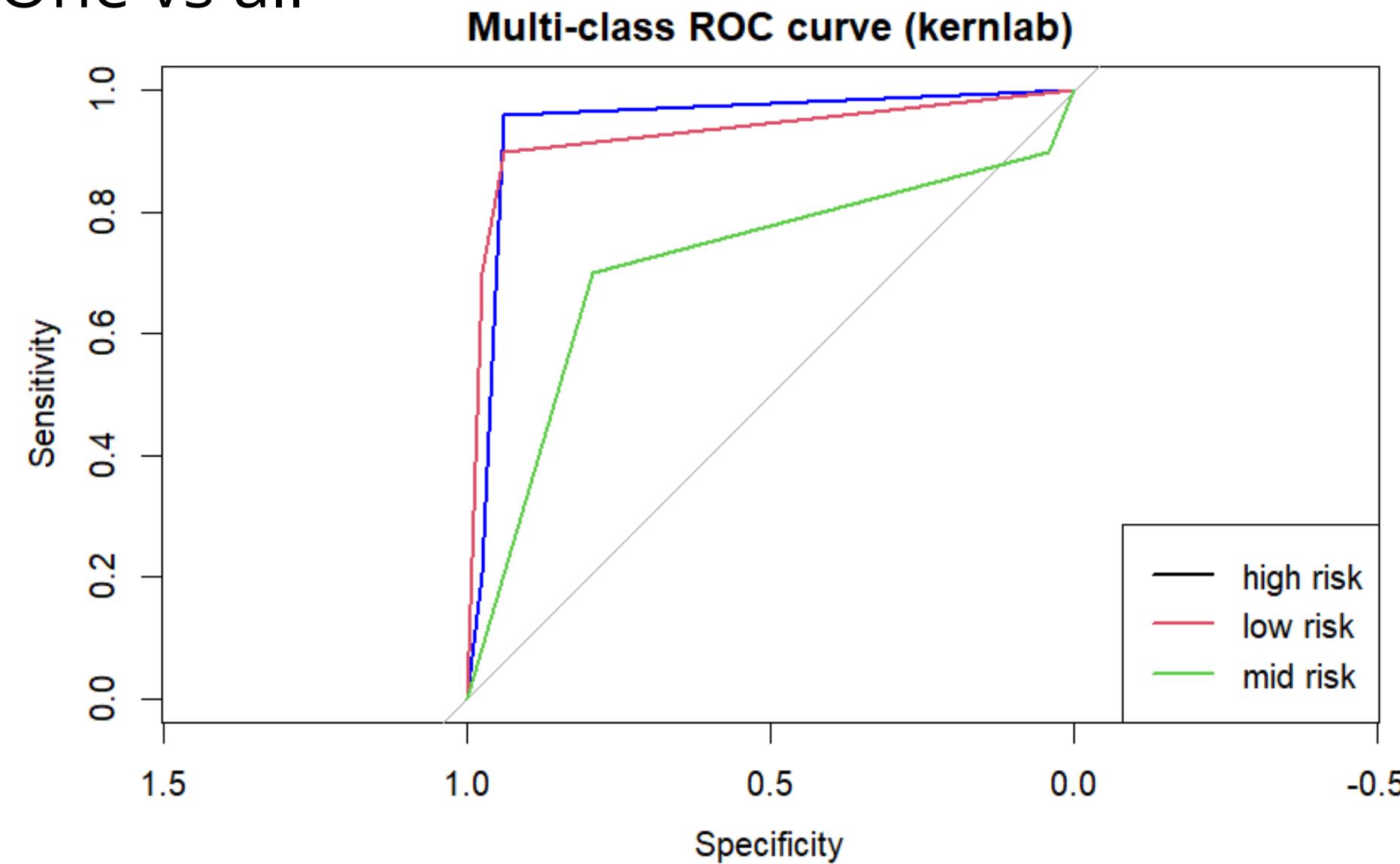


Métrique utilisée

$$\text{Accuracy} = \frac{\text{Correct predictions}}{\text{All predictions}}$$

# Modèle SVM

One vs all



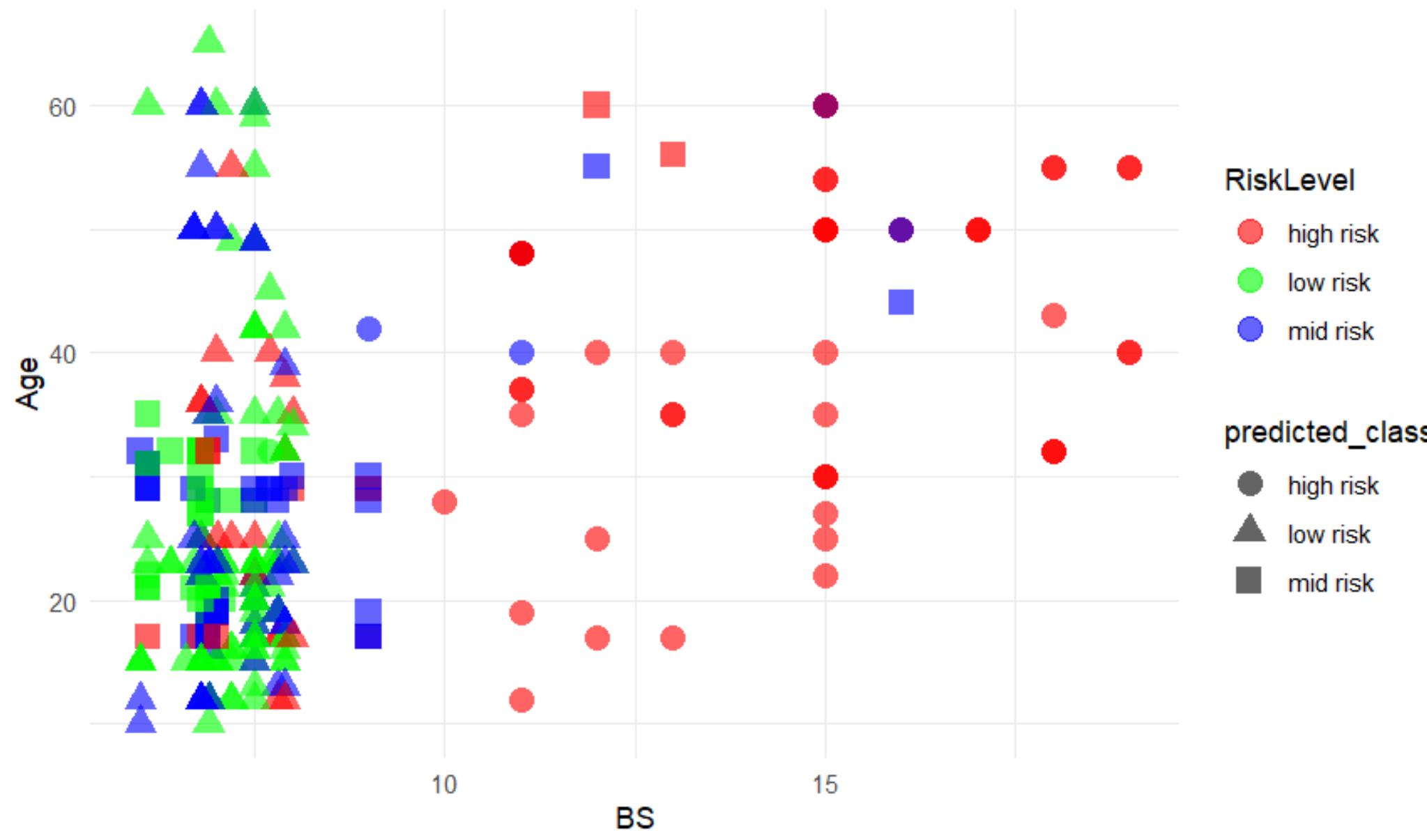
Accuracy du modèle kernlab: 0.7847682

Statistics by Class:

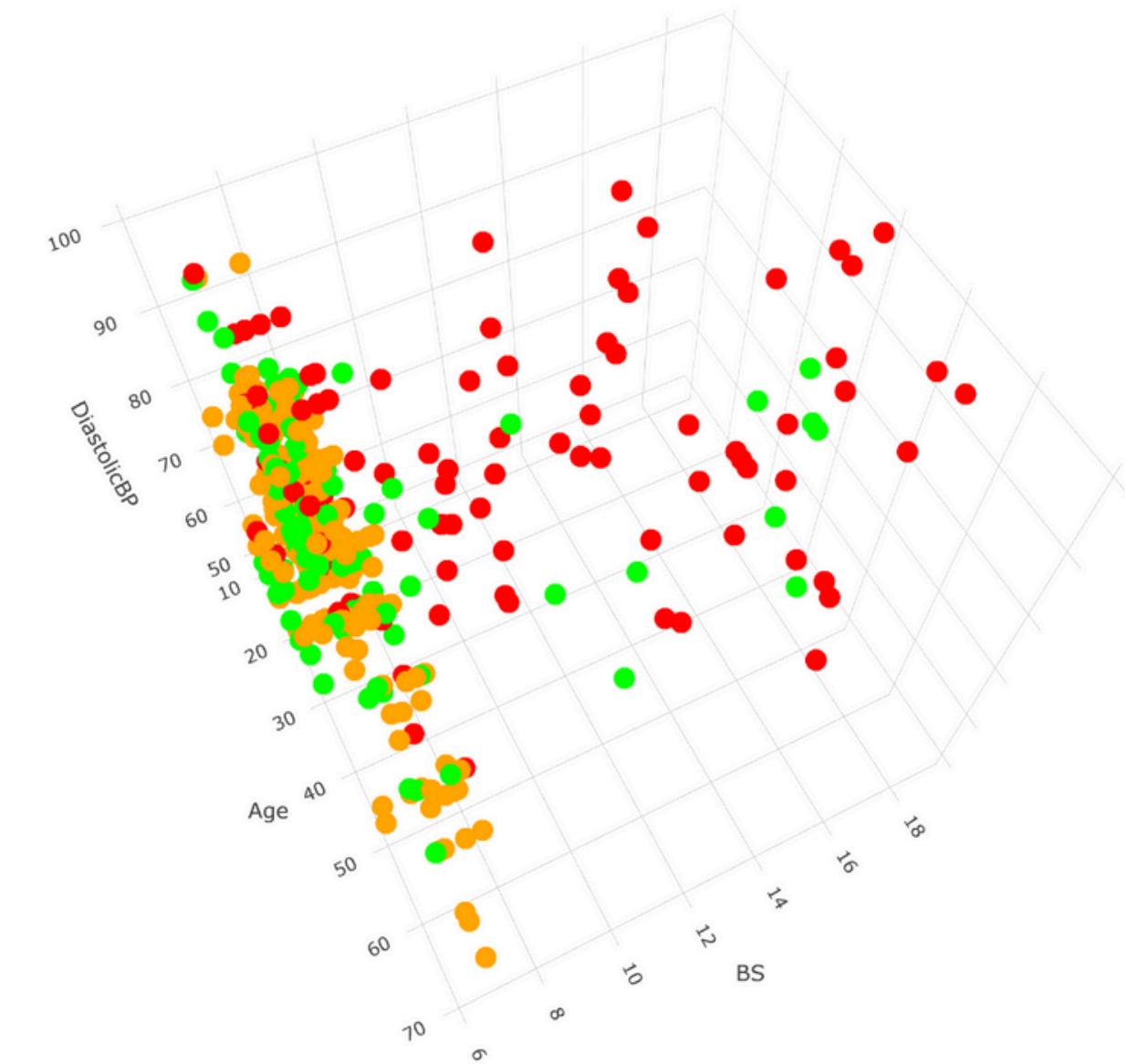
Sensitivity  
Specificity

Class: high risk Class: low risk Class: mid risk  
0.9383 0.7851 0.6600  
0.9457 0.8453 0.8762

## Visualisation de la séparation SVM

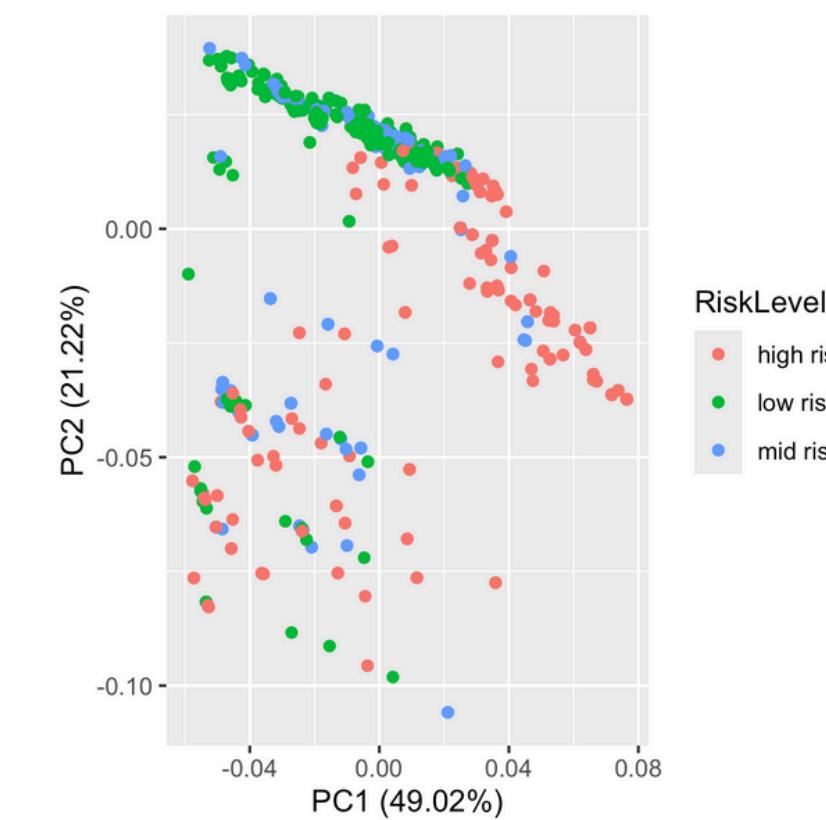
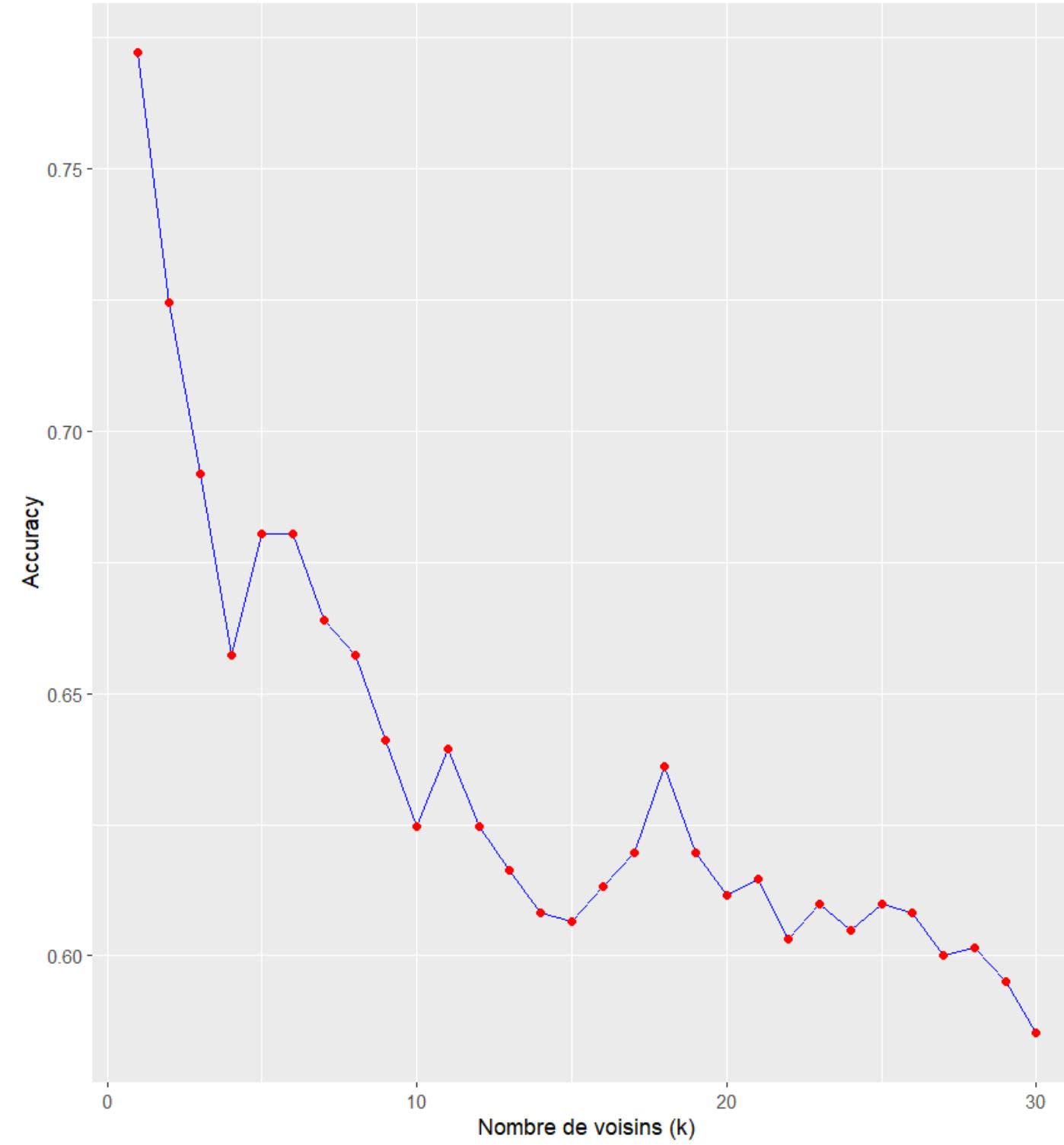


vu 3D data

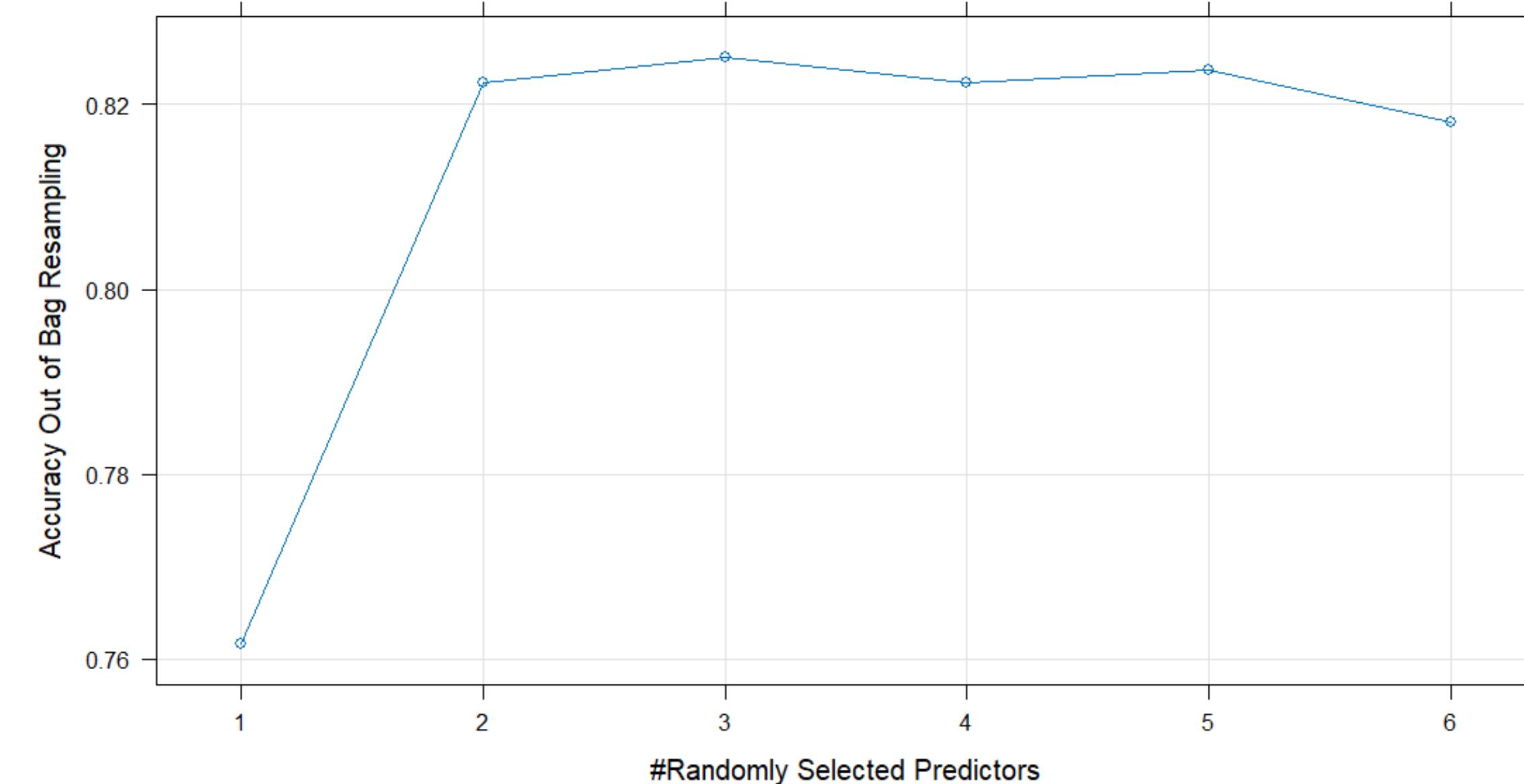


# Méthode des Knn

Evolution de l'Accuracy pour KNN avec validation croisée

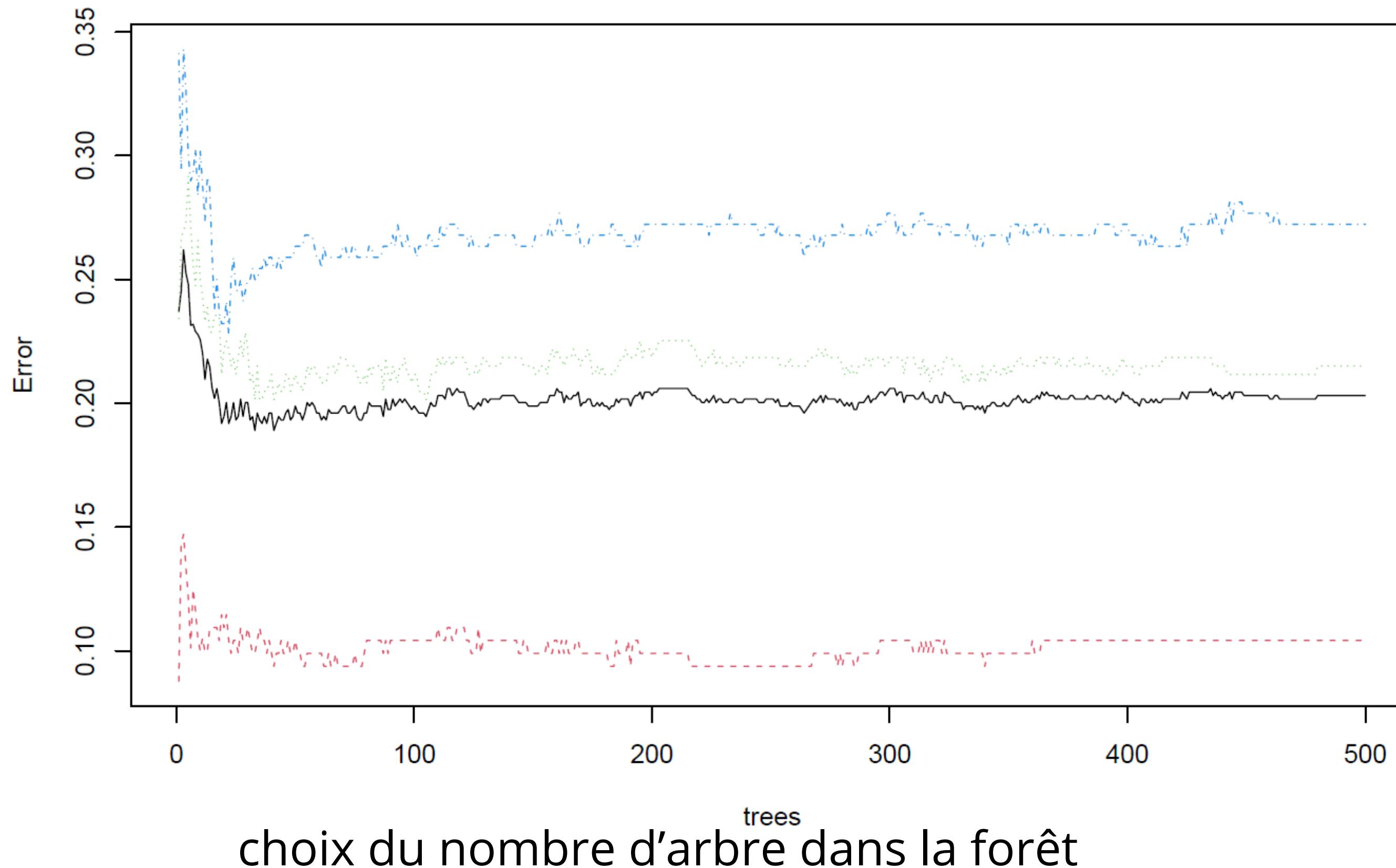


# Modèle de RandomForest

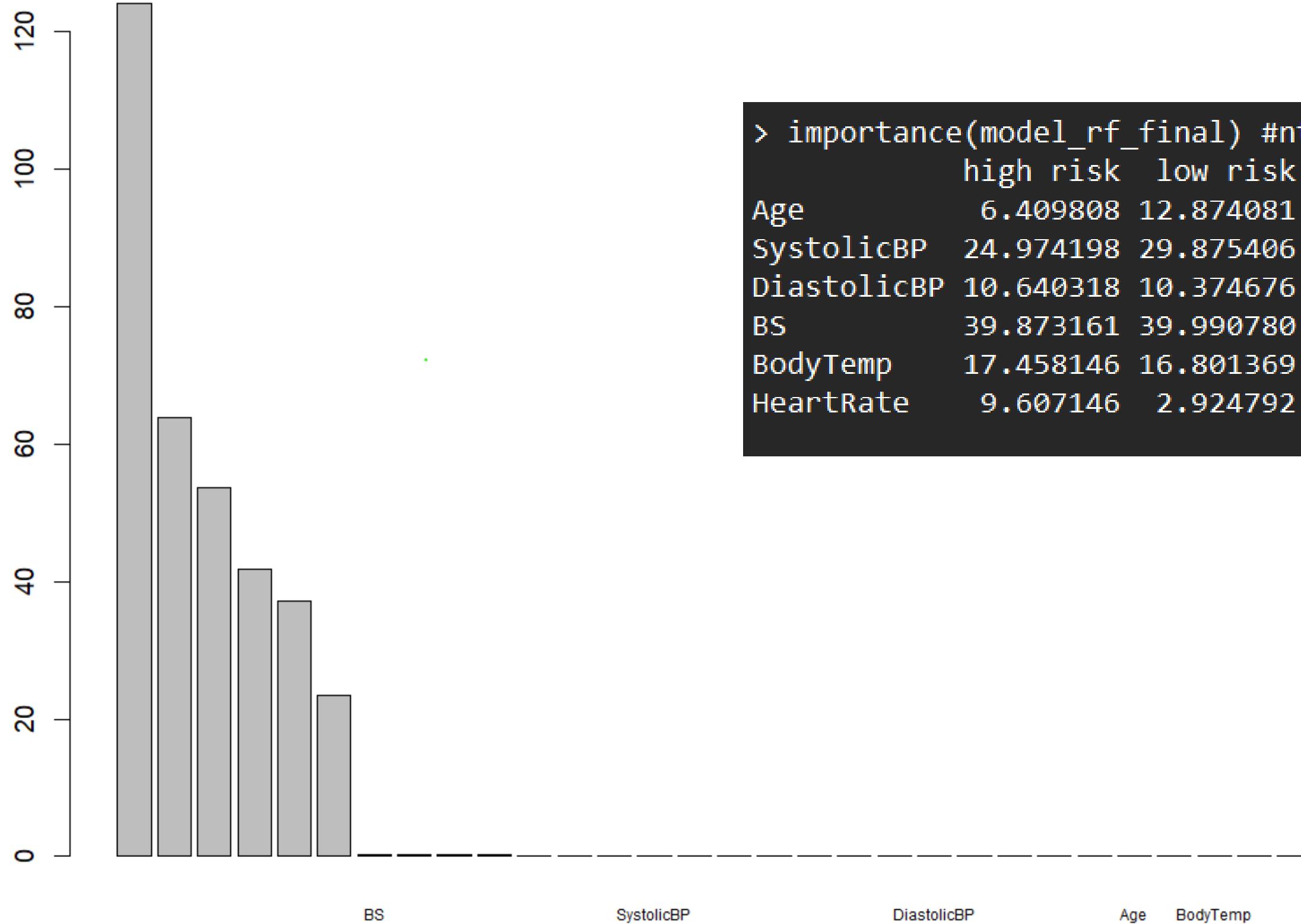


choix du nombre de prédicteurs

# Modèle de RandomForest

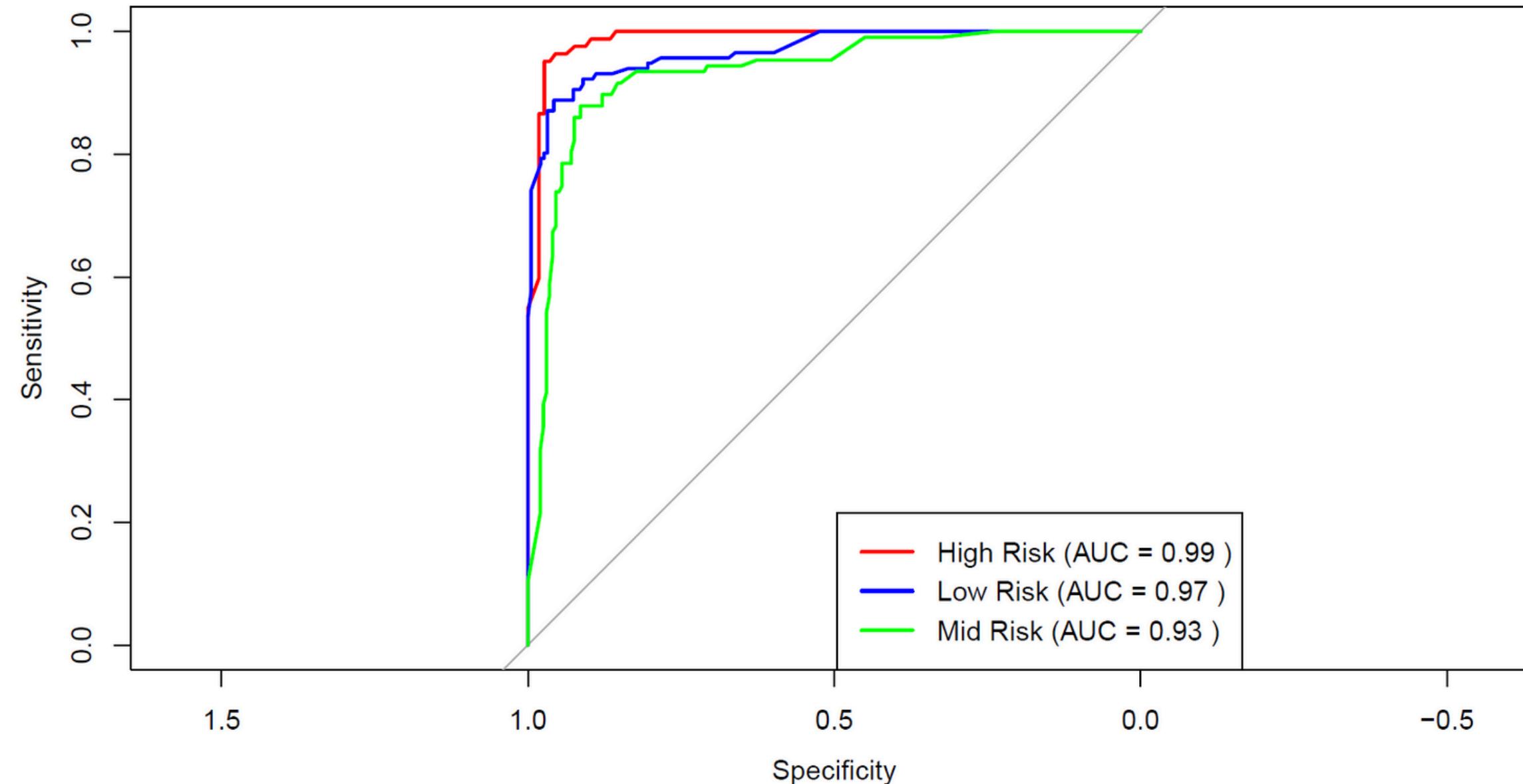


# L'importance des variables dans le modèle de Random Forest



```
> importance(model_rf_final) #ntree = 156, mtry = 3
   high risk  low risk mid risk MeanDecreaseAccuracy MeanDecreaseGini
Age          6.409808 12.874081 32.93074          27.94008          62.29304
SystolicBP  24.974198 29.875406 31.05894          46.96642          81.27927
DiastolicBP 10.640318 10.374676 24.11840          25.92491          45.42211
BS           39.873161 39.990780 52.58974          71.92234          147.54516
BodyTemp     17.458146 16.801369 20.29793          29.77565          27.52238
HeartRate    9.607146  2.924792 25.98515          25.92925          38.72488
```

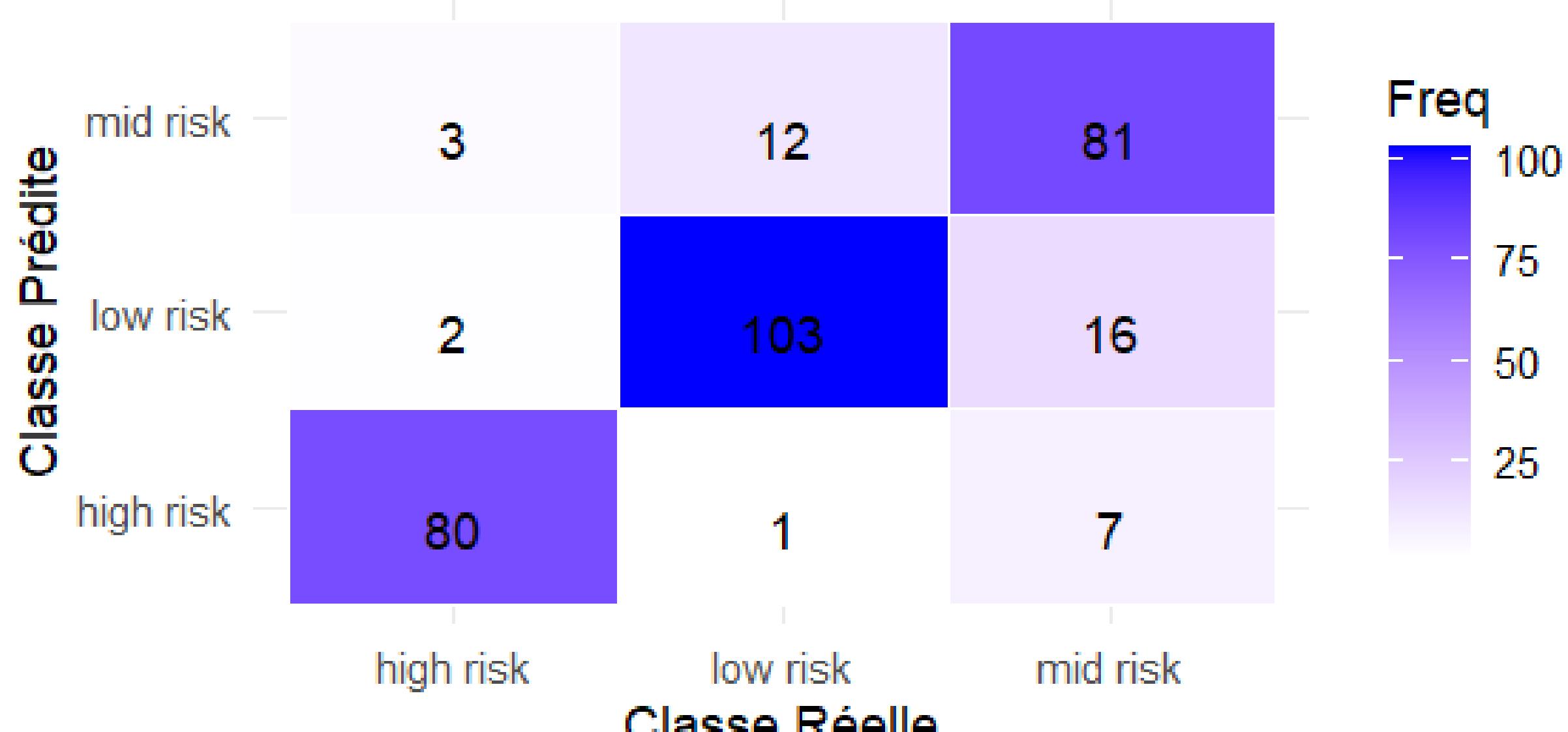
# Modèle de Random Forest



Accuracy : 0.8656

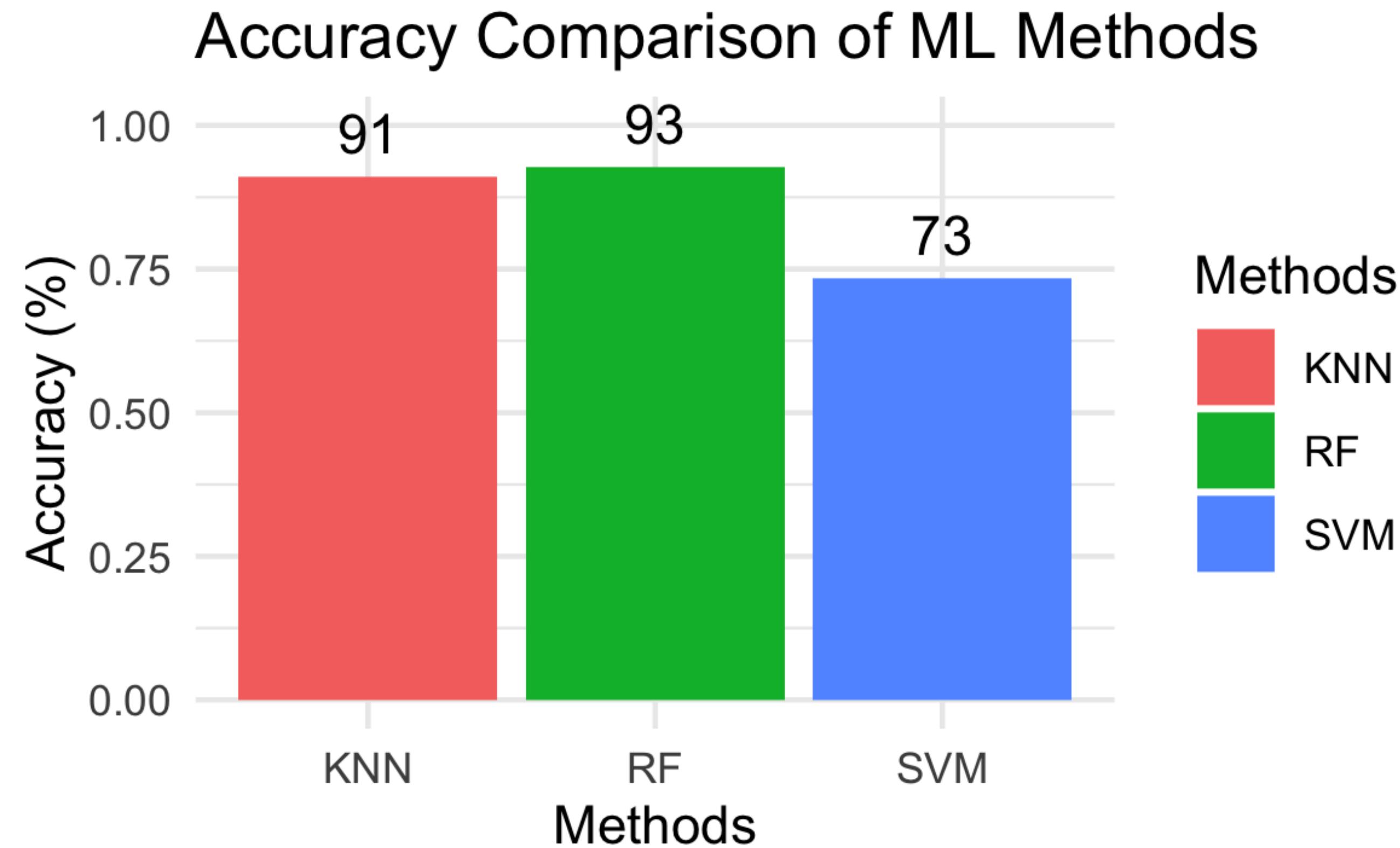
# Modèle de RandomForest

## Matrice de Confusion



Accuracy : 0.8656

*Best model*



# *Application de Prédiction du Risque Maternel*

[https://shiny.shinyapps.io/essaie\\_appli\\_randomf/](https://shiny.shinyapps.io/essaie_appli_randomf/)

# CONCLUSION

- Après avoir testé trois modèles de machine learning, nous avons retenu le modèle RandomForest en nous basant sur le critère de précision.
- Ce choix nous a permis de développer une application destinée aux professionnels de santé prenant en charge les femmes enceintes.
- L'application leur permettra de saisir les données recueillies par les appareils connectés utilisés par leurs patientes, facilitant ainsi un suivi à distance. En cas de nécessité, des interventions pourront être mises en place pour prévenir toute aggravation de l'état de santé maternel, réduisant ainsi le risque d'incidents graves, voire de décès.

**Merci pour votre attention**