VaR

2025 年 3 月 16 日

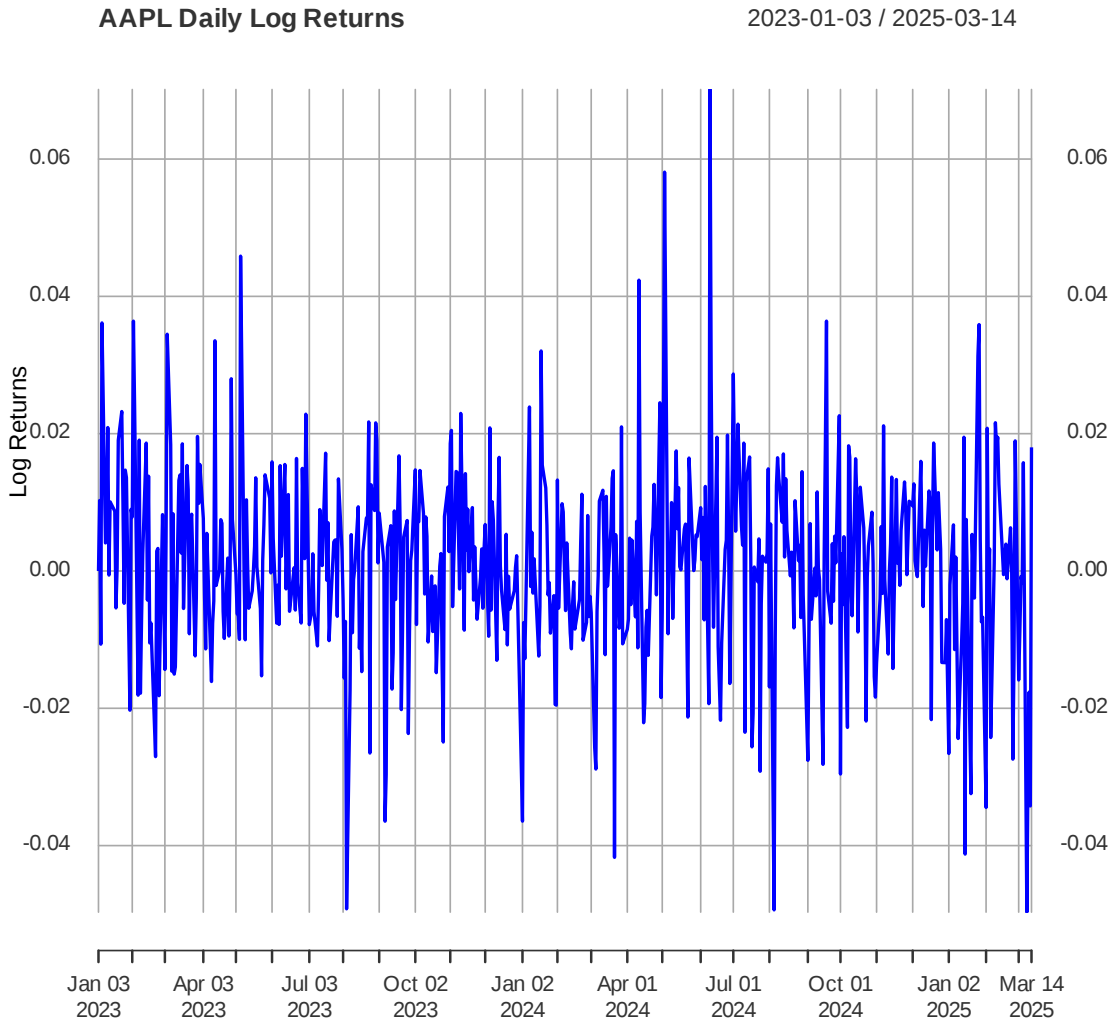
[1]:
```r
# 加载包
# R 加载包
library(pacman)
p_load(dplyr,
       ggplot2,
       tidyverse,
       # data.table,
       # zoo,purrr,
       # ggthemes,
       # showtext,
       # rio,
       # bruceR,
       quantmod,
       PerformanceAnalytics)
# 设置时间范围（示例使用 2023-01-01 到 2025-03-16 的数据）
start_date <- "2023-01-01"
end_date <- "2025-03-16"

# 获取股票数据（以苹果公司 AAPL 为例）
getSymbols("AAPL", src = "yahoo", from = start_date, to = end_date)

# 查看数据
head(AAPL)

# 计算日收益率（使用调整后的收盘价）
returns <- dailyReturn(Ad(AAPL), type = "log")
head(returns)
```

```r
# 去除 NA 值
returns <- na.omit(returns)

# 绘制收益率时间序列图
plot(returns, main = "AAPL Daily Log Returns", ylab = "Log Returns", col =␣
 ↪"blue")
```

'AAPL'

	AAPL.Open	AAPL.High	AAPL.Low	AAPL.Close	AAPL.Volume	AAPL.Adjusted
2023-01-03	130.28	130.90	124.17	125.07	112117500	123.6325
2023-01-04	126.89	128.66	125.08	126.36	89113600	124.9077
2023-01-05	127.13	127.77	124.76	125.02	80962700	123.5831
2023-01-06	126.01	130.29	124.89	129.62	87754700	128.1302
2023-01-09	130.47	133.41	129.89	130.15	70790800	128.6541
2023-01-10	130.26	131.26	128.12	130.73	63896200	129.2275

	daily.returns
2023-01-03	0.000000000
2023-01-04	0.010261485
2023-01-05	-0.010661262
2023-01-06	0.036133399
2023-01-09	0.004080554
2023-01-10	0.004446495



[2]:
```
# 方法 1: 历史模拟法计算 VaR
# 设置置信水平 (例如 95%)
confidence_level <- 0.95

# 计算历史 VaR (假设投资金额为 1,000,000 美元)
portfolio_value <- 1000000
VaR_historical <- -quantile(returns, probs = 1 - confidence_level) *␣
 ↪portfolio_value
```

```
cat("Historical VaR at", confidence_level * 100, "% confidence level:",␣
 ↪VaR_historical, "\n")
```

```
Historical VaR at 95 % confidence level: 23141.62
```

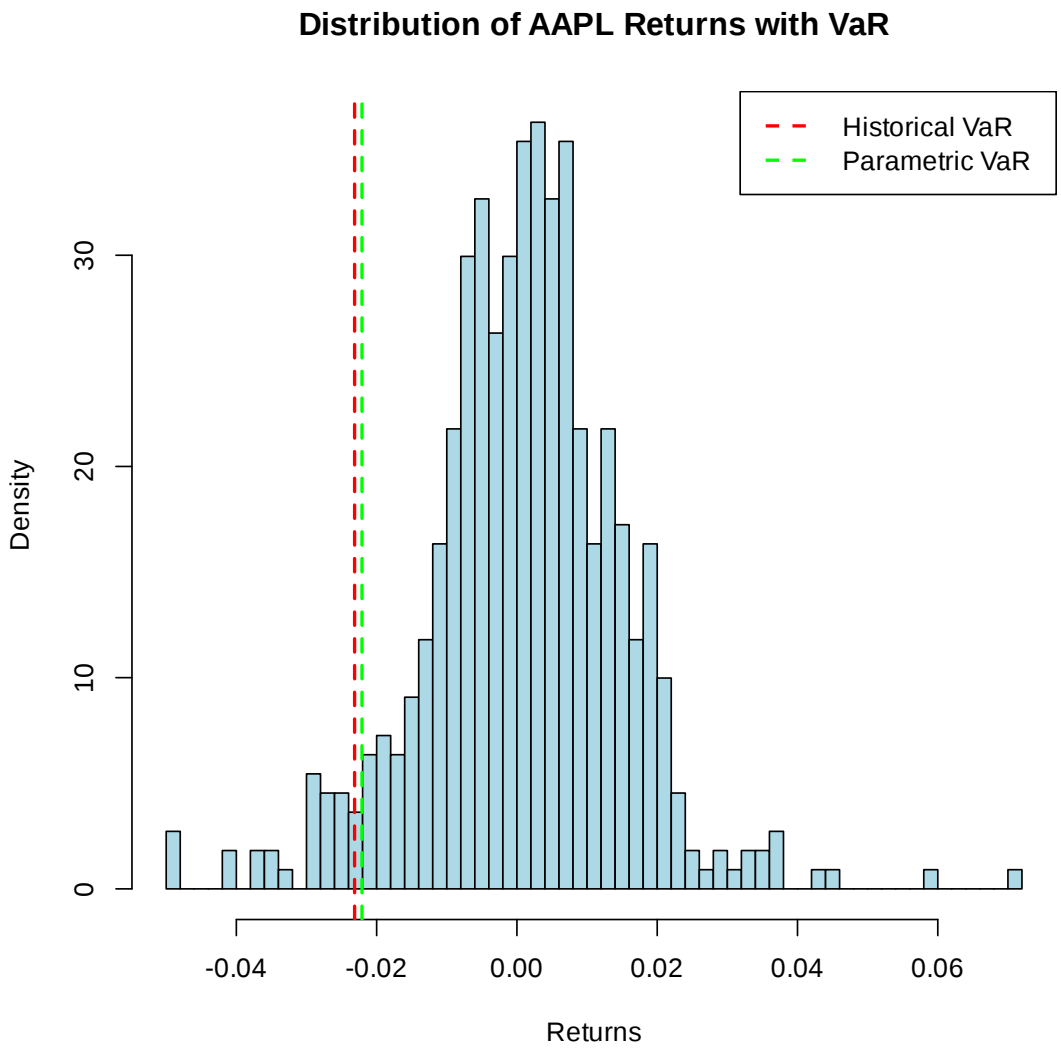
[3]:
```
# 方法 2: 参数法（假设正态分布）计算 VaR
mean_return <- mean(returns)
sd_return <- sd(returns)

# 使用正态分布计算 VaR
VaR_parametric <- -(mean_return + qnorm(1 - confidence_level) * sd_return) *␣
 ↪portfolio_value
cat("Parametric VaR at", confidence_level * 100, "% confidence level:",␣
 ↪VaR_parametric, "\n")
```

```
Parametric VaR at 95 % confidence level: 22088.29
```

[4]:
```
# 方法 3: 使用 PerformanceAnalytics 包计算 VaR
VaR_PA <- VaR(returns, p = confidence_level, method = "historical") *␣
 ↪portfolio_value
cat("PerformanceAnalytics Historical VaR at", confidence_level * 100, "%␣
 ↪confidence level:", -VaR_PA, "\n")
```

```
PerformanceAnalytics Historical VaR at 95 % confidence level: 23141.62
```

[5]:
```
# 可视化收益率分布与 VaR
hist(returns, breaks = 50, main = "Distribution of AAPL Returns with VaR",
     xlab = "Returns", col = "lightblue", probability = TRUE)
abline(v = -VaR_historical / portfolio_value, col = "red", lwd = 2, lty = 2)
abline(v = -VaR_parametric / portfolio_value, col = "green", lwd = 2, lty = 2)
legend("topright", legend = c("Historical VaR", "Parametric VaR"),
       col = c("red", "green"), lty = 2, lwd = 2)
```



[6]:
```
# 输出结果
summary <- data.frame(
  Method = c("Historical", "Parametric", "PerformanceAnalytics"),
  VaR = c(VaR_historical, VaR_parametric, -VaR_PA)
)
print(summary)
```

```
                Method      VaR
1           Historical 23141.62
2           Parametric 22088.29
```

```
3 PerformanceAnalytics 23141.62
```

[ ]: