量化交易学习笔记

自动化交易 R 语言实战指南

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目录

1 自动化交易的基础

1.1 代码清单 1-1：导入 SPY 数据

```r
if (!require(quantmod)) {
  install.packages("quantmod")
}

options(
  "getSymbols.warning4.0" = FALSE,
  "getSymbols.auto.assign" = FALSE
)

# Loads S&P 500 ETF data, stores closing prices as a vector
SPY = suppressWarnings(
  getSymbols(c("SPY"), from = "2012-01-01")
)
SPY = as.numeric(SPY$SPY.Close)[1:987]

# 保存数据到本地，方便后期使用
if (!dir.exists("data")) dir.create("data")
write.table(
  x = SPY,
  file = "./data/SPY.txt",
  sep = ",",
  row.names = FALSE
)
```

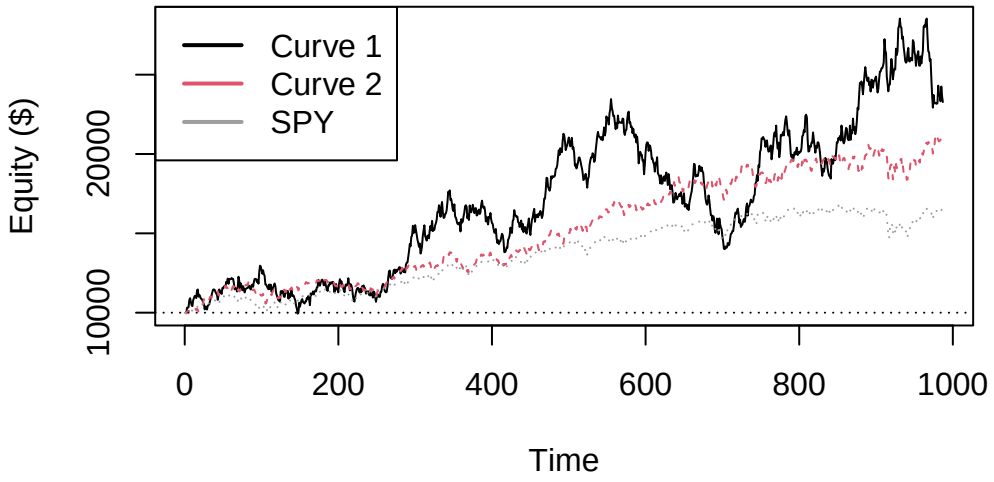
1.2 代码清单 1-2：模拟净值曲线

```r
# 设置随机种子
set.seed(123)

# 初始化参数
n = length(SPY)
V0 = 10000

# 基准收益率计算
Rb = c(NA, diff(SPY) / head(SPY, -1))  # 直接计算每日收益率
```

```r
# 基准资产净值曲线
Eb = c(V0, V0 * cumprod(1 + Rb[-1]))    # 初始值后接复利计算

# 定义模拟收益率函数
generate_rt = \(Rb, mean_coef, sd_coef) {
  rnd = rnorm(
    n,
    mean = mean_coef / n,
    sd = sd_coef * sd(Rb, na.rm = TRUE)
  )
  rt = Rb + rnd
  return(rt)
}

# 生成两条模拟收益率序列
Rt1 = generate_rt(Rb, mean_coef = 0.24, sd_coef = 2.5)
Rt2 = generate_rt(Rb, mean_coef = 0.02, sd_coef = 0.75)

# 计算模拟资产净值曲线
calc_equity = \(Rt, V0) c(V0, V0 * cumprod(1 + Rt[-1]))
Et1 = calc_equity(Rt1, V0)
Et2 = calc_equity(Rt2, V0)

# 绘图投资组合
plot_data = data.frame(
  Time = 1:n,
  Curve1 = Et1,
  Curve2 = Et2,
  SPY = Eb
)

matplot(
  plot_data$Time,
  plot_data[, -1],
  type = "l",
  col = c(1,2,8),
  xlab = "Time",
  ylab = "Equity ($)",
  main = "Figure 1.3: Randomly Generated Equity Curves"
```

```
)
abline(h = V0, lty = 3)
legend(
  "topleft",
  legend = c("Curve 1", "Curve 2", "SPY"),
  col = c(1,2,8),
  lwd = 2
)
```

Figure 1.3: Randomly Generated Equity Curves



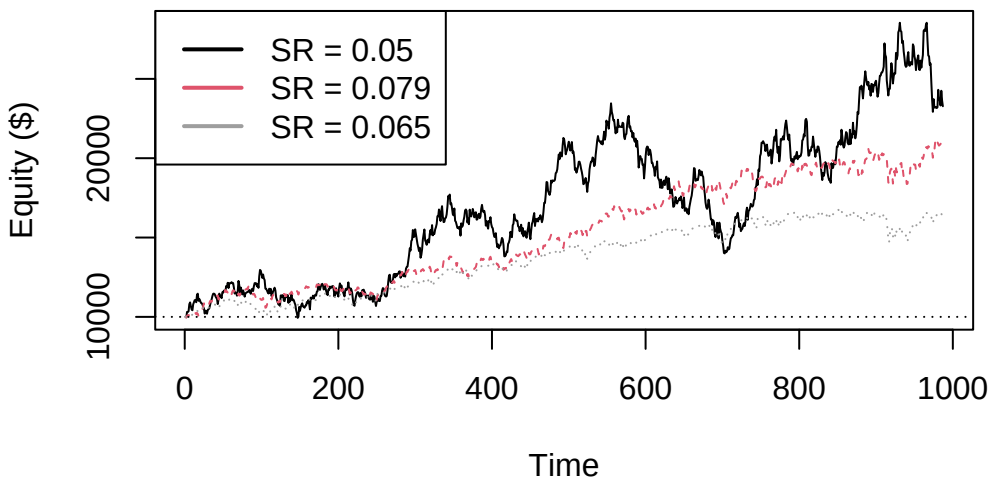
1.3 代码清单 1-3：计算股票的夏普比率

```
shap_rate = \(x) {
  # 忽略第一个 NA 元素
  mean(x, na.rm = TRUE) / sd(x, na.rm = TRUE)
}
SR1 = shap_rate(Rt1)
SR2 = shap_rate(Rt2)
SRb = shap_rate(Rb)
```

1.4 代码清单 1-4：绘制股票的夏普比率曲线

```
matplot(
  plot_data$Time,
  plot_data[, -1],
  type = "l",
  col = c(1,2,8),
  xlab = "Time",
  ylab = "Equity ($)",
  main = "Figure 1.4: Sharpe Ratios"
)
abline(h = V0, lty = 3)
legend(
  "topleft",
  legend = c(
    paste0("SR = ", round(SR1, 3)),
    paste0("SR = ", round(SR2, 3)),
    paste0("SR = ", round(SRb, 3))
  ),
  col = c(1,2,8),
  lwd = 2
)
```

Figure 1.4: Sharpe Ratios



1.5　代码清单 1-5：最大回撤函数