最优化方法第九次作业

算法中的最优化方法 21-22 秋

计算机科学与技术学院

日期：2021 年 11 月 14 日

1 说明

- ★ 作业提交的**截止日期是 2021 年 11 月 21 号 23:55**。
- ★ 需给出必要的过程（每次的选择产生的 u, J 要给出，并画出相应的树状图），尽量格式规范。
- ★ 熟悉分支定界算法即可。

2 作业

Consider the process modeled by the following linear discrete-time system:$y(n+1) = ay(n) + bu(n) + e(n)$, where $y(n)$ is the output, $u(n) \in \{0,1\}$ the input(binary input), $a = 0.9$ and $b = 0.1$ are the model parameters, and $e(n)$ is white noise of mean value 0 and standard deviation σ. At instant time n the output $y(n) = 0.5$ is measured and we have to obtain a control action $u(n) \in \{0,1\}$. Let us define the prediction $\hat{y}(n+1) = a\,y(n) + bu(n)$, and $\hat{y}(n+k) = a\,\hat{y}(n+k-1) + bu(n+k-1)$ for $k \in \{2,3,4,5\}$.

- ■ Obtain the control action $u(n) \in \{0,1\}$ that minimizes $J = (\hat{y}(n+1) - r)^2 + \lambda u(n)^2$, where $\lambda = 0.01$ is a weighting factor and $r = 1$ the output reference.
- ■ Using branch-and-bound, obtain the control sequence $U = [u(n), u(n+1), u(n+2)]$, that minimize min $J_n^{n+2} = \sum_{k=1}^{3} (\hat{y}(n+k) - r)^2 + \lambda \sum_{k=1}^{3} u(n+k-1)^2$.