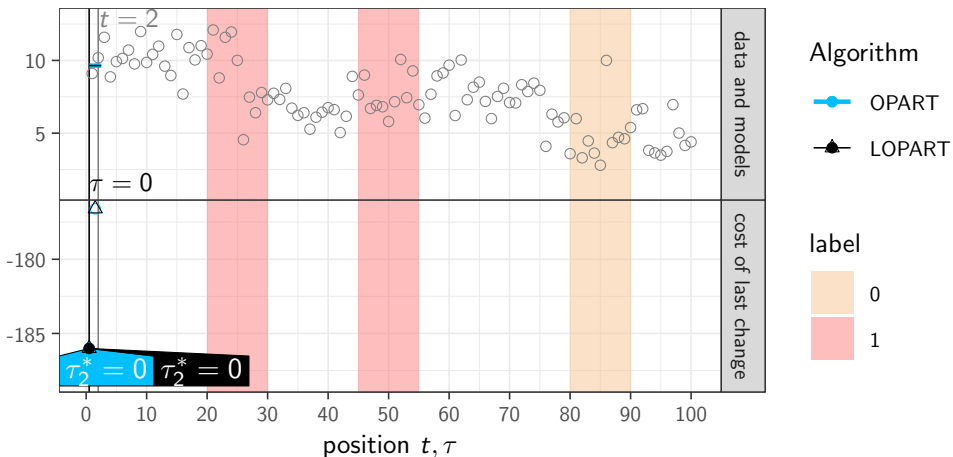# Labeled Optimal Partitioning

Toby Dylan Hocking
toby.hocking@nau.edu
joint work with Anuraag Srivastava

6 June 2020
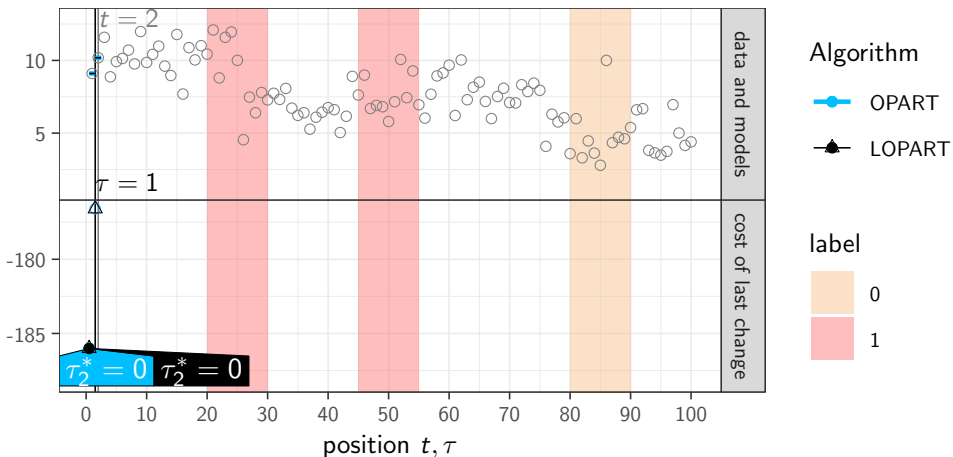
Demo

Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$

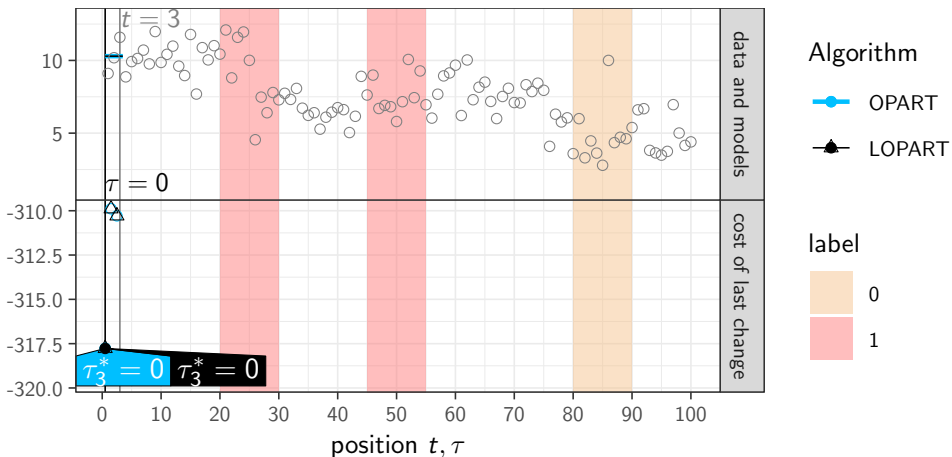# Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$

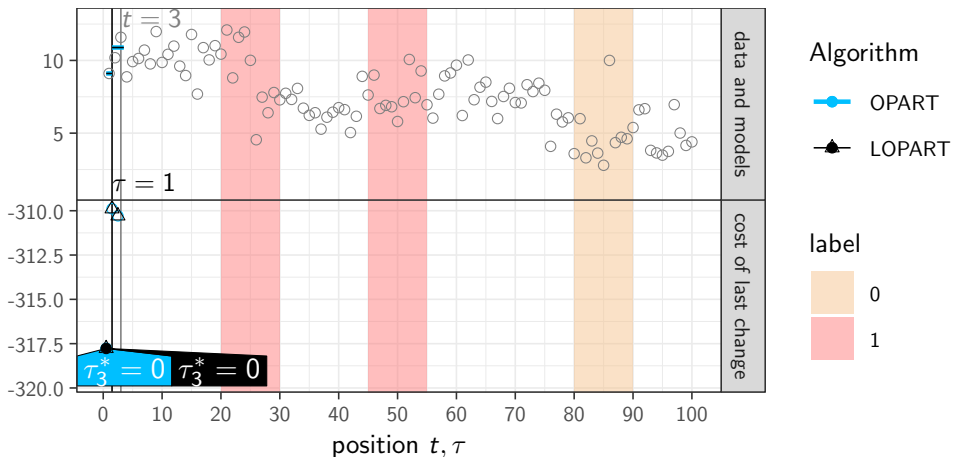# Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
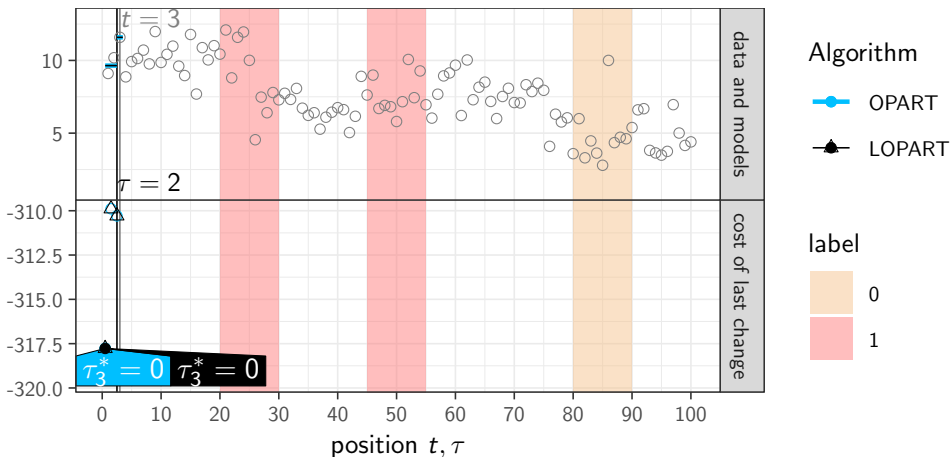
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
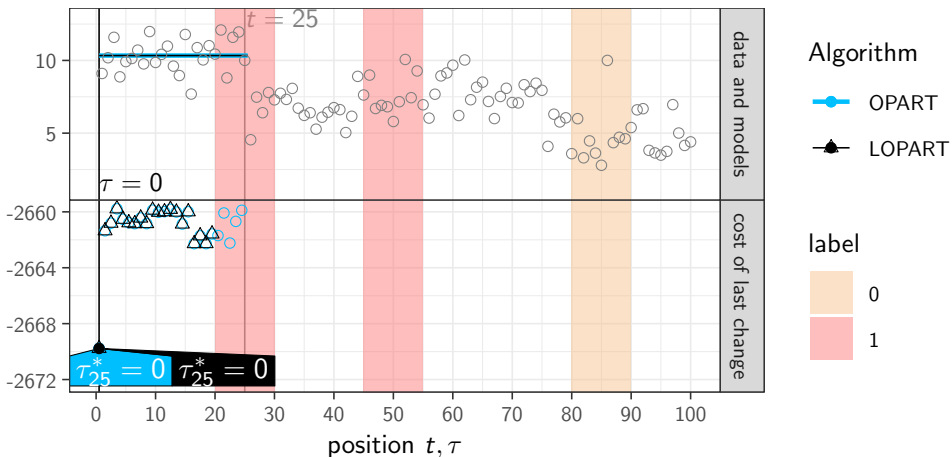
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
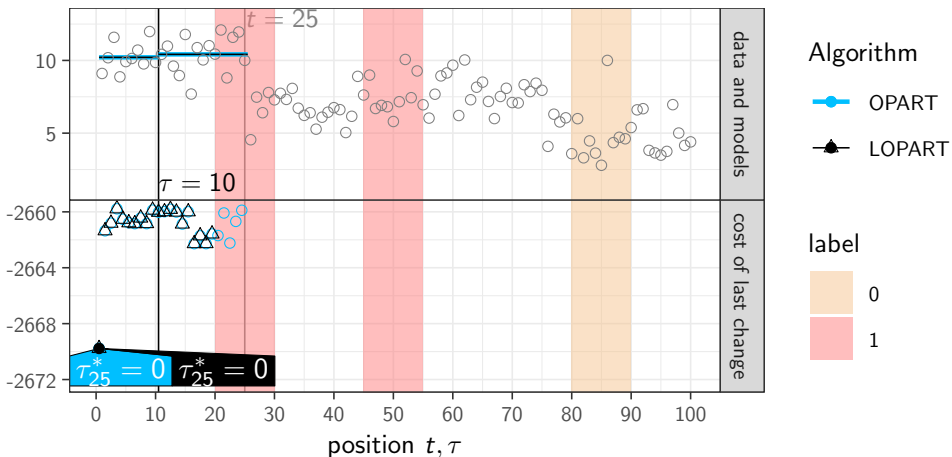
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
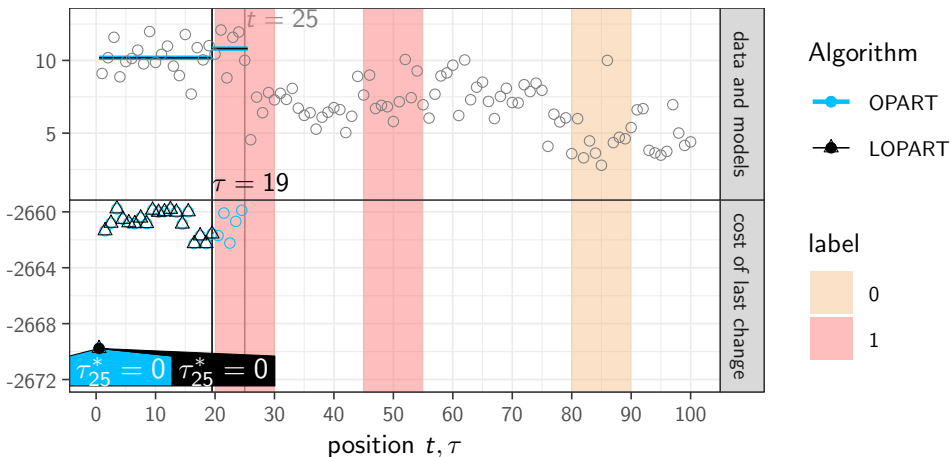
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
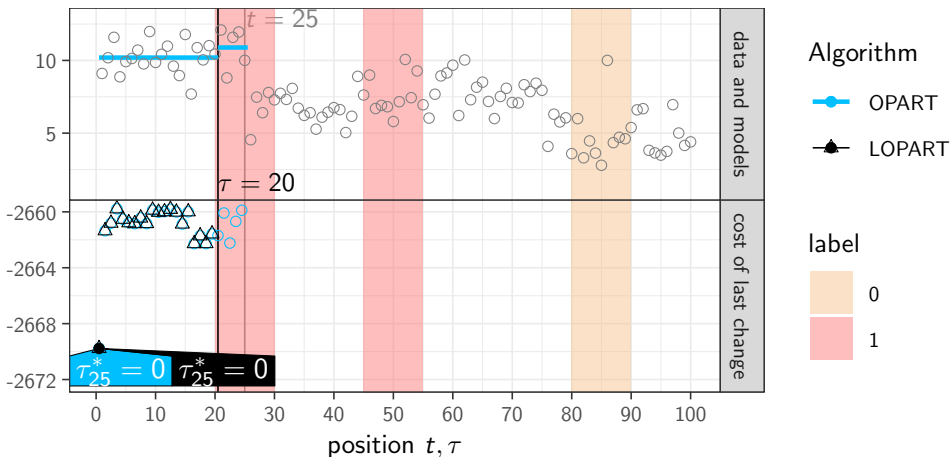
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
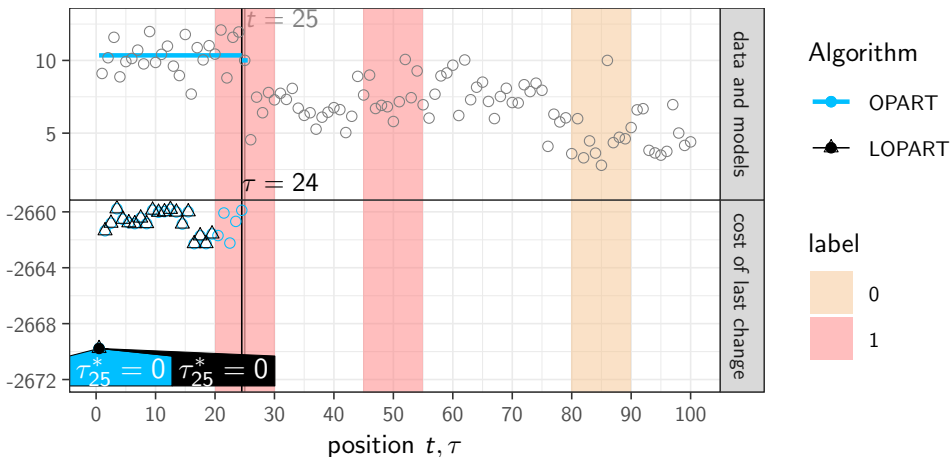
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
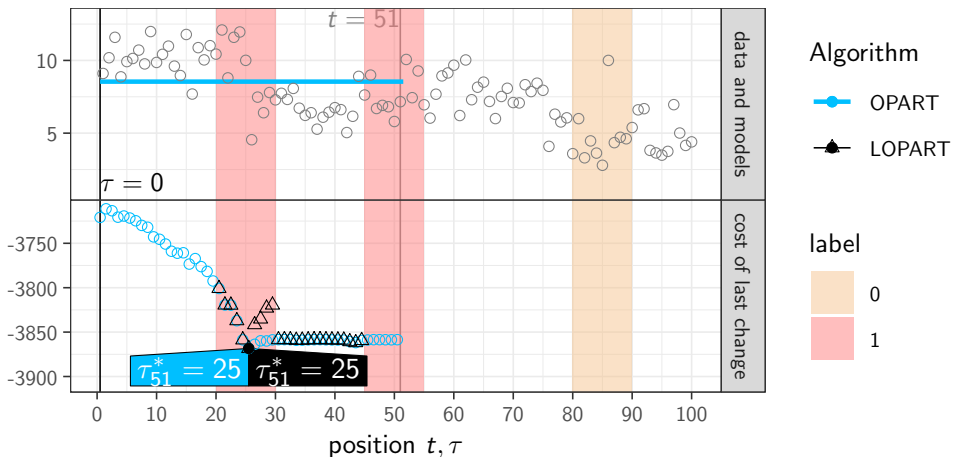
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
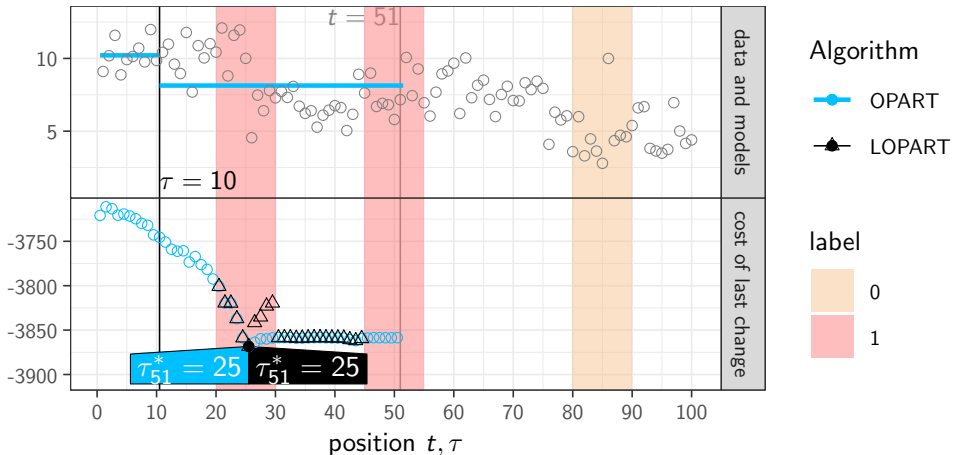
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
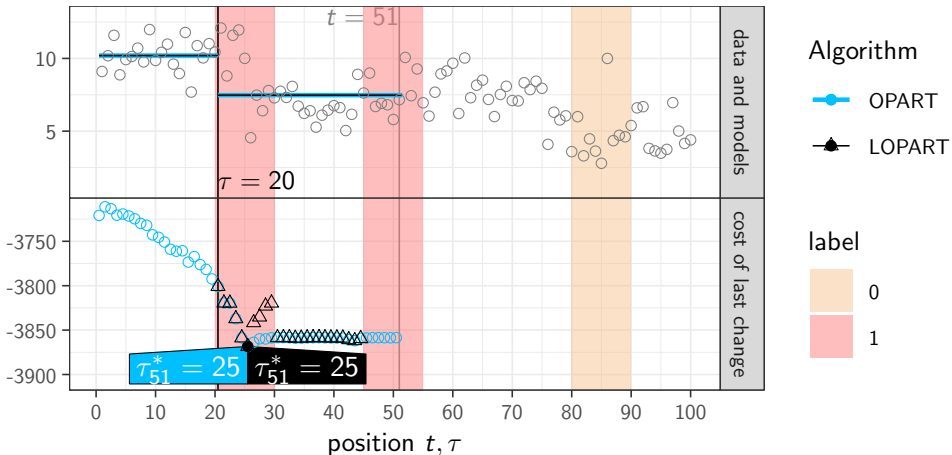
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
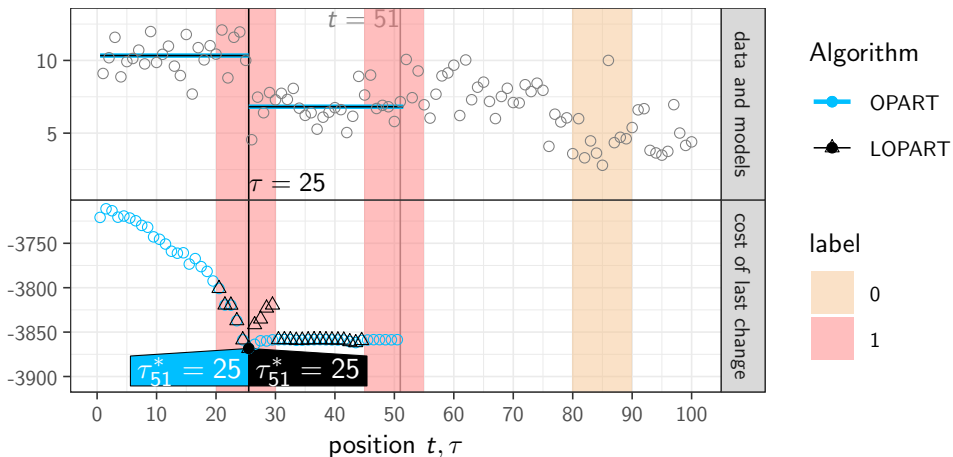
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
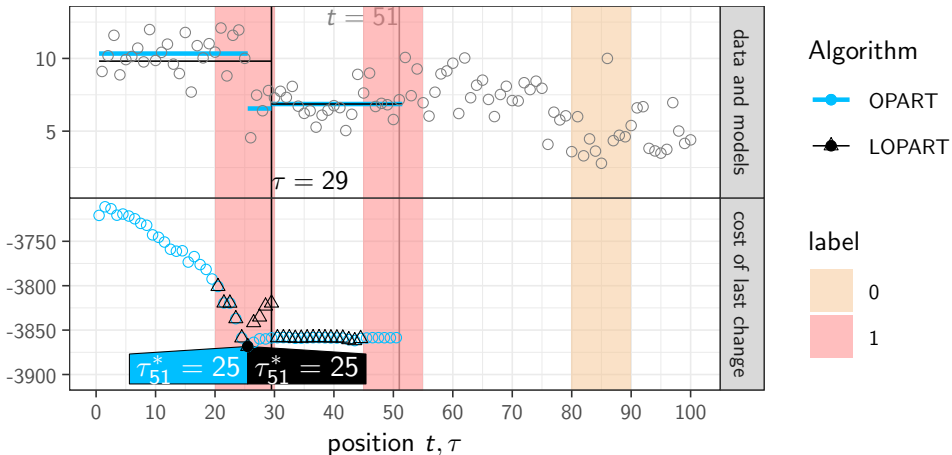
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
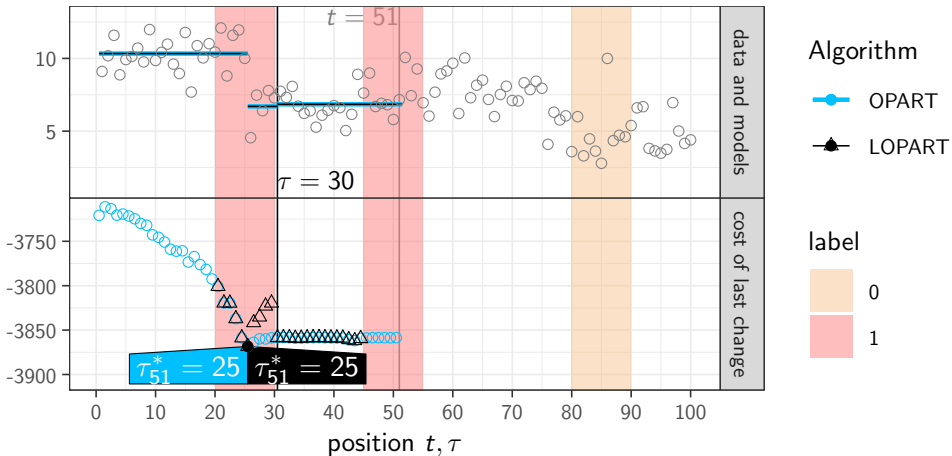
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
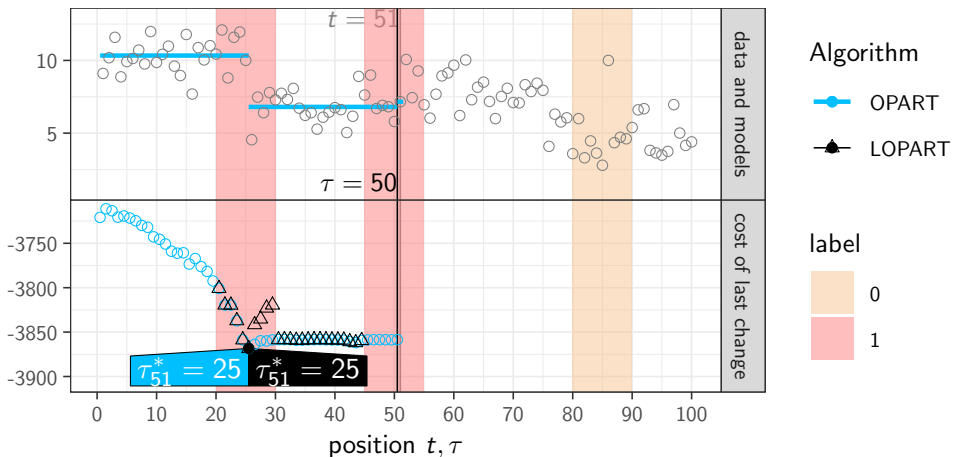
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
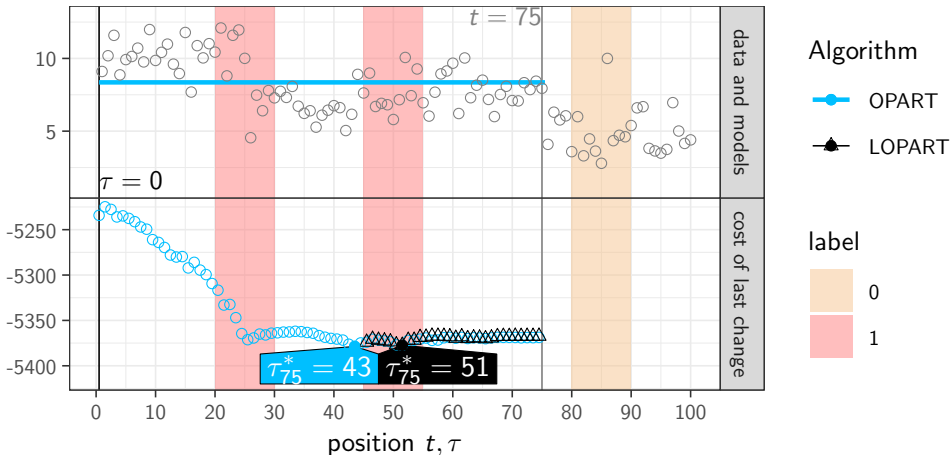
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
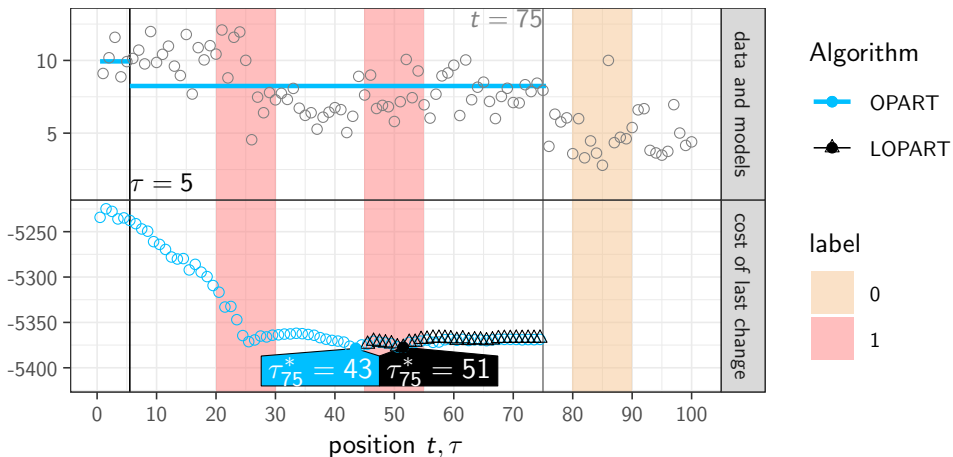
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
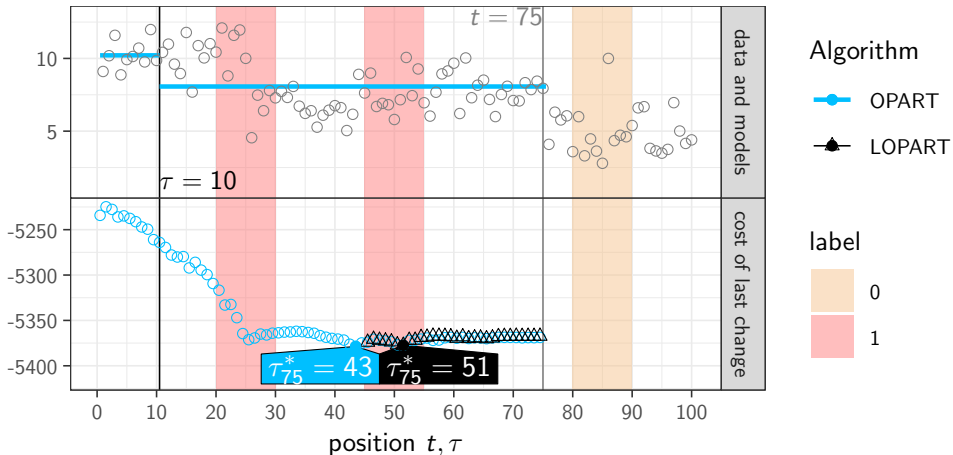
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
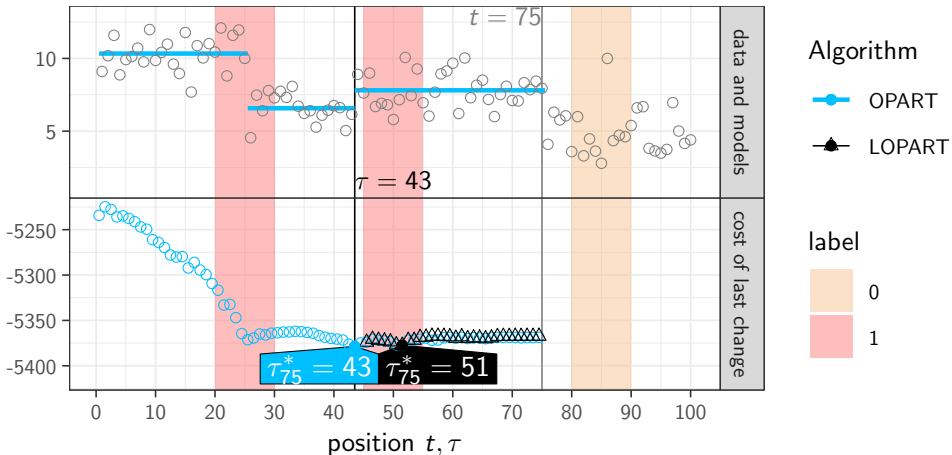
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
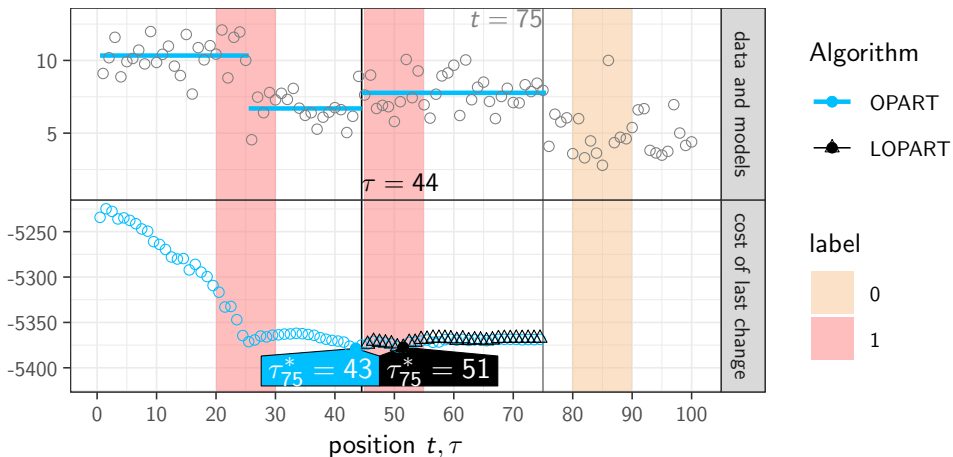
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
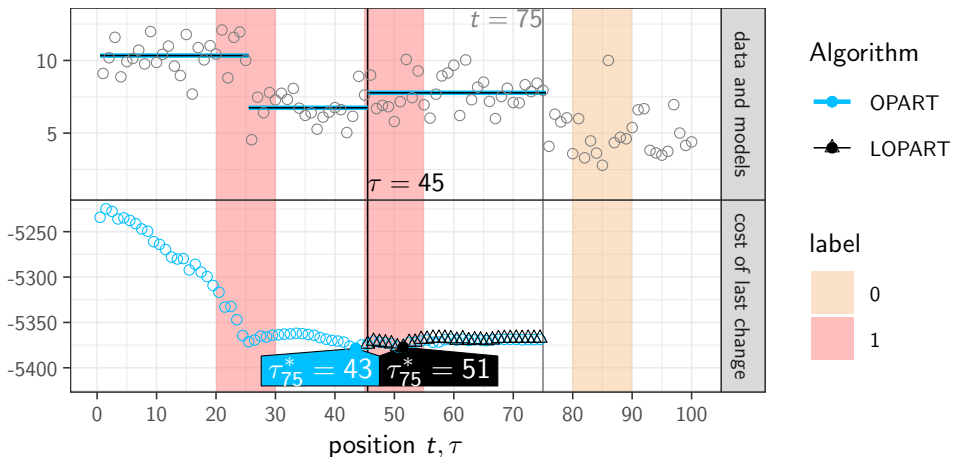
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
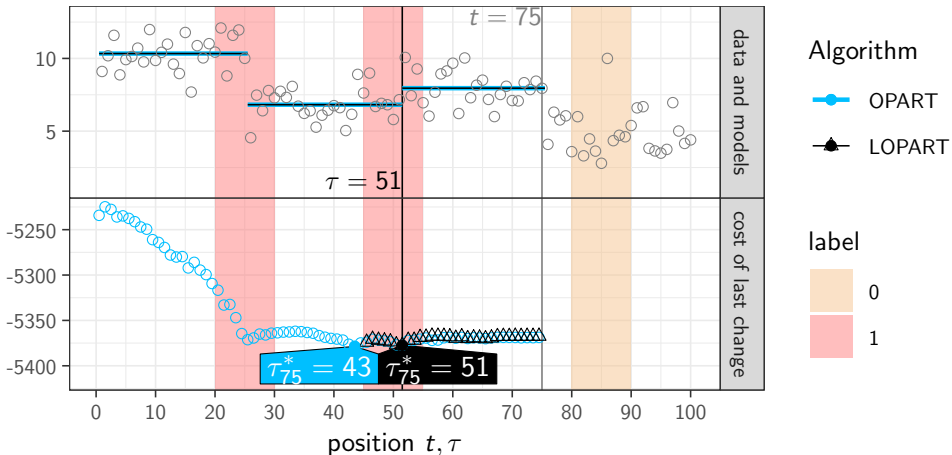
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
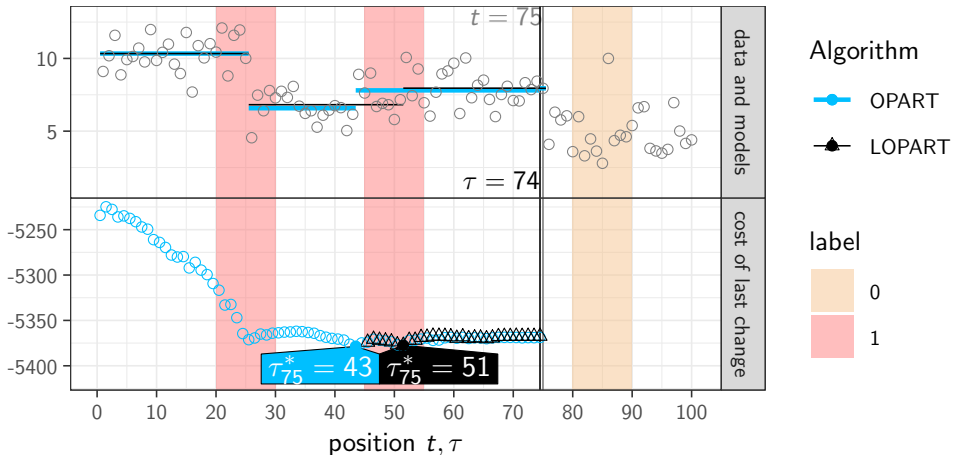
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
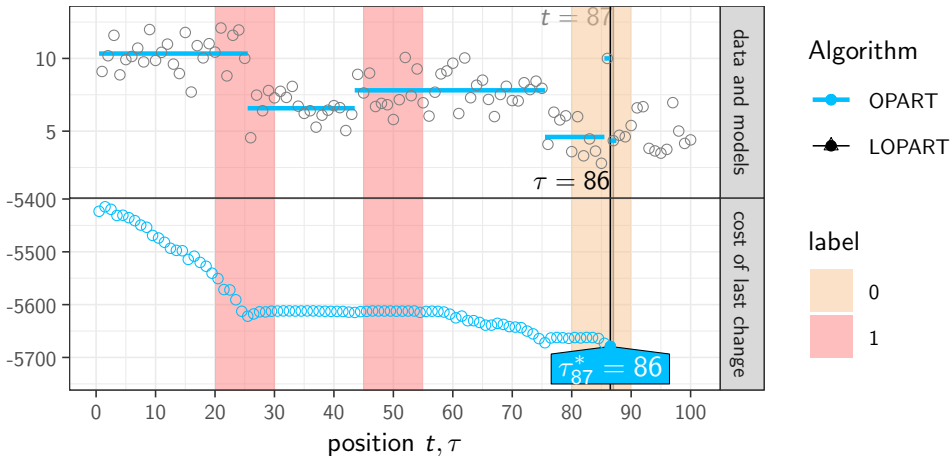
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
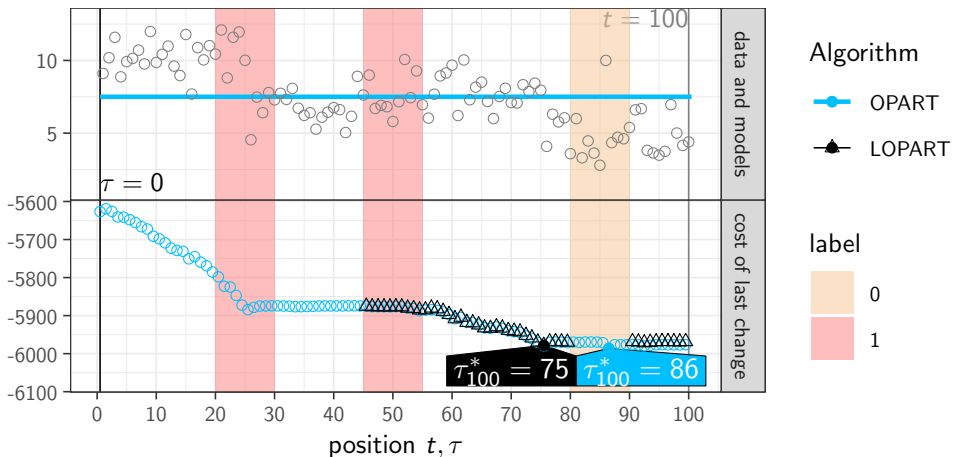
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
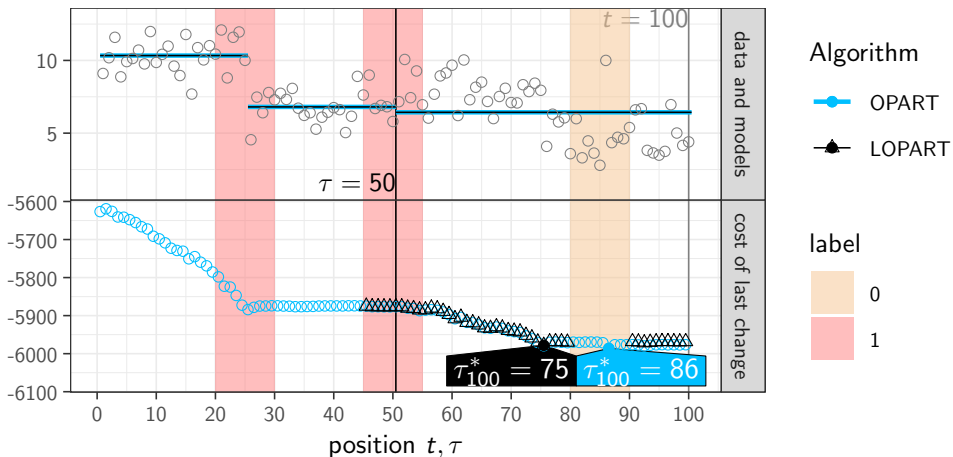
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
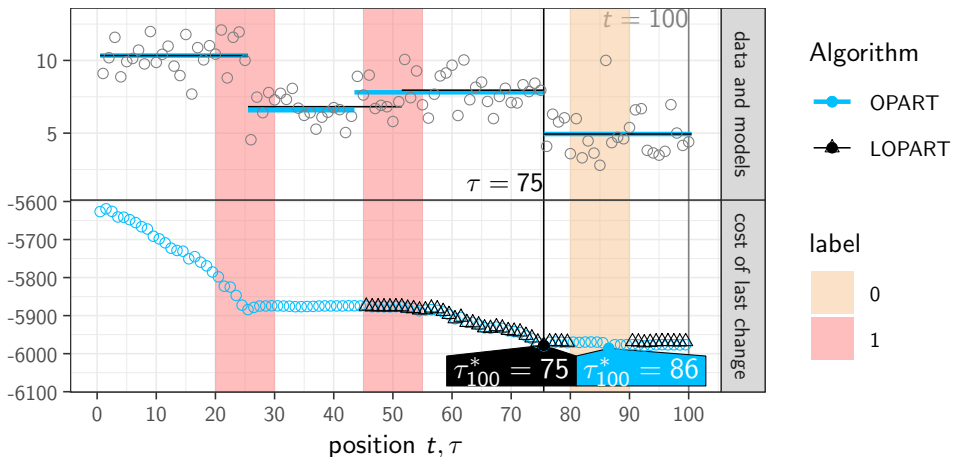
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
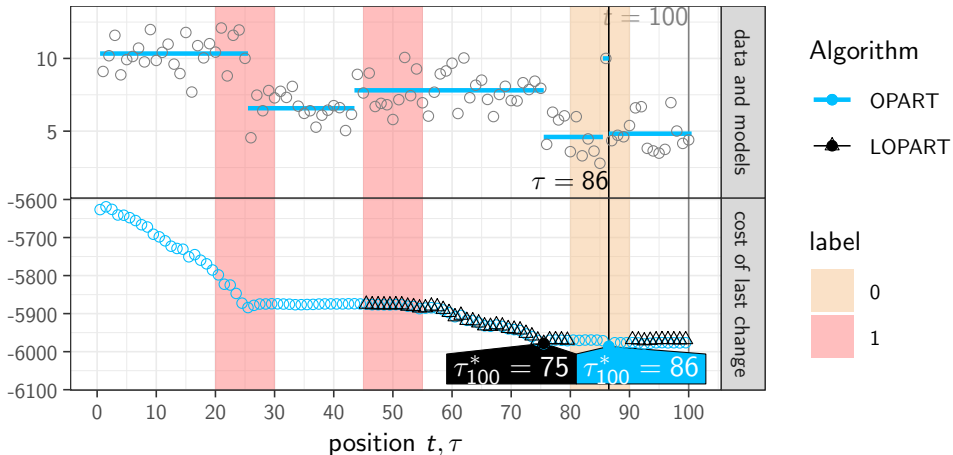
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$
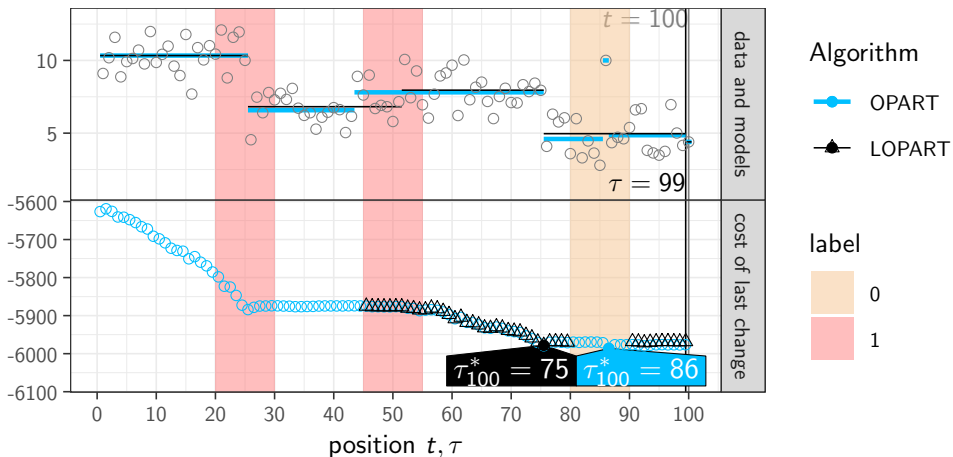
Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$

Demonstration of LOPART with penalty $\lambda = 10$

$$W_t = \min_{\tau \in T_t} \underbrace{W_\tau}_{\text{optimal cost up to } \tau} + \underbrace{\lambda}_{\text{penalty}} + \underbrace{L(\tau + 1, t, \mathbf{x})}_{\text{optimal cost of last segment}}$$