

The K -Staged Two-Dimensional Cutting Stock Problem with Variable Sheet Size

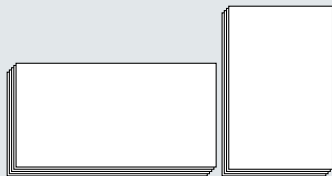
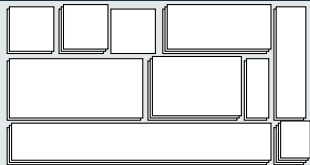
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The K -Staged 2-Dim. Cutting Stock Problem with Variable Sheet Size

Basic problem definition

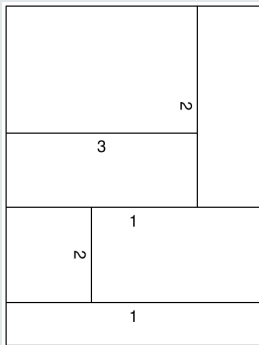


Given:

- ▶ n_E rectangular *element types* E , each $i \in E$ defined by
 - ▶ height $h_i \in \mathbb{N}^+$
 - ▶ width $w_i \in \mathbb{N}^+$
 - ▶ demand $d_i \in \mathbb{N}^+$
- ▶ n_T *stock sheet types* T , each $t \in T$ defined by
 - ▶ height $H_t \in \mathbb{N}^+$
 - ▶ width $W_t \in \mathbb{N}^+$
 - ▶ available quantity $q_t \in \mathbb{N}^+$
 - ▶ cost factor $c_t \in \mathbb{R}$

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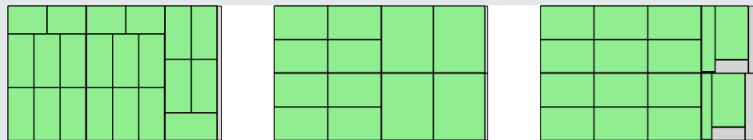
A 3-staged cutting pattern

- ▶ $K \in \mathbb{N}^+$: maximal number of guillotine stages.

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Goal:



Find a set of *cutting patterns* $P = \{P_1, \dots, P_n\}$ for cutting out all elements minimizing the number of used sheets weighted by their cost factors.

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- ▶ $|E|$ relatively small, but $\sum_{i=1}^{|E|} d_i$ relatively large.
- ▶ Low runtimes required (in the range of a few seconds).
- ▶ Meaningful selection of used sheet types necessary.
- ▶ Approach needs to be flexible enough to incorporate various side constraints.