Mid-PhD Defense

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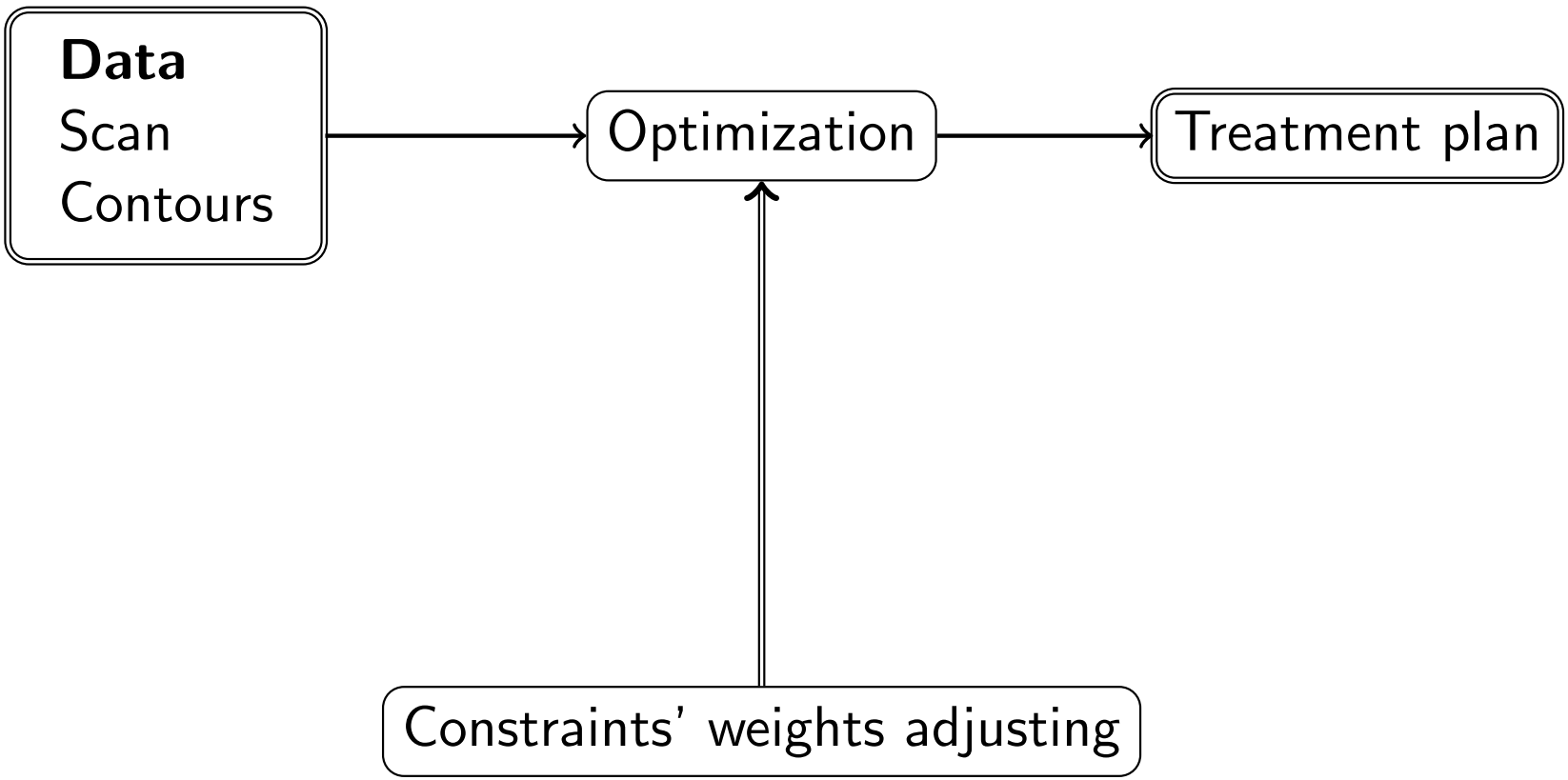
Automatic Dose Optimization for Radiotherapy



Problem Formulation

IMRT

Bixel values:

$$x_{i,j}^{\theta} \geq 0, \text{ for } \theta \in \Theta \text{ and } 1 \leq i, j \leq 20^{1}$$

usually concatenated to a single bixels-value vector x.

Dose calculation:

$\mathbf{y} = L\mathbf{x}$ with L (pre-calculated) dose-influence (DI) matrix

[1] 20x20 is a typical bixel discretization

Problem Formulation

IMRT (bis)

Objective function (for *maximum* constraint c on structure s, dose d):

$$f_c(\mathbf{y}) = \frac{1}{|\mathcal{V}|} \sum_{v \in \mathcal{V}} (\mathbf{y}_v - d)_+^2$$