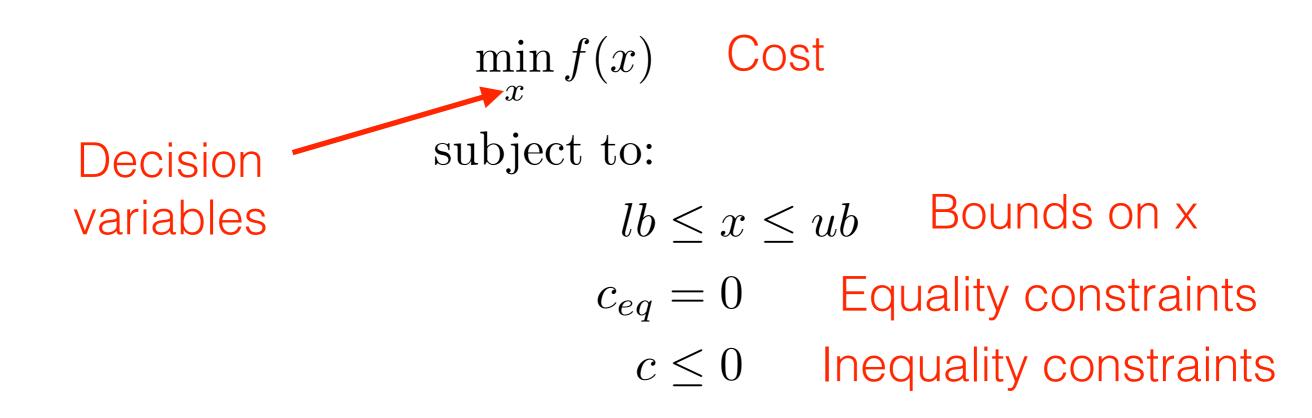
MuJoCo: Nonlinear Optimization



MuJoCo: Installing nlopt (1)*

- Download latest version of nlopt: https://
 nlopt.readthedocs.io/en/latest/ or search nlopt + download.
- 2. Unzip in a suitable location. Say Documents.
- 3. In terminal navigate to nlopt folder and type
 - mkdir build
 - cd build
 - cmake ..
 - make
 - sudo make install

^{*} I don't have instructions for Windows. For Windows, use Ubuntu via Virtualbox.

MuJoCo: Installing nlopt (2)*

- 4. Download template_nlopt from tiny.cc/mujoco.
- 5. Navigate to template_nlopt and type the following
 - gcc tutorial.c -o tutorial -w -lnlopt -lm
 - ./tutorial
- 6. If everything worked fine you will see the following: found minimum at f(0.3333333,0.296296) = 0.5443310474

* I don't have instructions for Windows. For Windows, use Ubuntu via Virtualbox.

MuJoCo: Example Nonlinear optimization(I)

$$\min_{x} f(x) = a_1 x_1^2 + a_2 x_2^2 + a_3 x_3^2 + a_4 x_4^2 + a_5 x_5^2$$

$$\text{Cost}$$

subject to:

$$-\infty \le x_2, x_4, x_5 \le \infty$$

$$0.3 \le x_1 \le \infty$$

$$-\infty \le x_3 \le 5$$

Bounds on x

$$x_1 + x_2 + x_3 = c_{eq1}$$

$$x_3^2 + x_4 = c_{eq2}$$

$$x_4^2 + x_5^2 \le c_{in}$$

Equality constraints

Inequality constraints

$$a_i = 1$$
, where $i = 1, 2, 3, 4, 5$
 $c_{eq1} = 5$, $c_{eq2} = 2$, $c_{in} = 5$

Parameters

MuJoCo: Example Nonlinear optimization(2)

- I. Navigate to template_nlopt and type the following
 - gcc constrained.c -o constrained -w -lnlopt -lm
 - ./constrained
- 2. If everything worked fine you will see the following:

```
found minimum at f(1.77378,1.77354,1.45269,-0.110295,4.95945e-05) = 8.414180297
```

Let us look at constrained.c closely

API: https://nlopt.readthedocs.io/en/latest/NLopt_Reference/