Monte Carlo simulations

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Lecture 12

Coin flipping bets

Imagine the game where someone spin a coin.
If the coin falls face up (50/50 chance) you get your bet quadrupled,
otherwise your bet is taken by another player.

What fraction of your money should you bet each time to get the
maximum gain?

Anonymous function and their use

Often we have some function of multiple variables. If all of these
arguments but one are fixed, we can say that result is a function of
only one variable.
This is very handy since many Matlab built-in functions often ask us to
give them a handle to a single argument function.
Suppose we have a function

```
function y=parabola(a,b,c,x)
 y=a*x^2 + b*x +c;
end
```

Now we define number `a,b,c` and make a function of only one
variable `x`. This is done via **anonymous function**

```
a=2, b=4, c=1; %Matlab will plug these values below
fn = @(x) parabola(a,b,c,x); % <-- new function
fn(0)
  ans = 1
```

Anonymous function continued

```
% we can even change some parameters
% but this will not change result of fn(0).
% Since it uses hard coded values for a, b, and c
% at that time of anonymous function definition.
c = 2;
fn(0)
  ans = 1
c = 5;  a=12;
fn(0)
  ans = 1
```

The Monty Hall Paradox

Suppose you have 'N' doors, behind one of them there is a prize.

1. make your choice
2. host rules out all other doors without prize behind but one
3. now you face 2 doors (one of your choice and the other)
4. behind one of them the prize is located
5. should you change your mind and pick the other door?

Disease spread

What is more deadly a highly contagious disease with the low mortality rate or a not so contagious disease with the high mortality rate?

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