Introduction to MATLAB

A New Solution to Deep Learning

Presenter: Shulin&& Stanley @MLDA

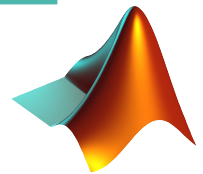


Photo: Wikipedia

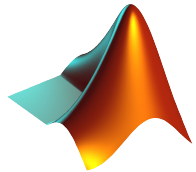
Agenda

Shulin

1) Introduction of Workshop
2) Basic Syntax
3) Extract Data Points from Image
4) Random Walk
5) Monte-Carlo Simulation using Blackjack

Stanley

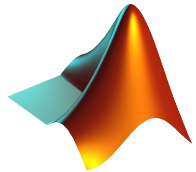
1) Overview of AI
2) Deep Learning Labelling
3) Training Detector Model with Labelled Data
4) Using the Detector on the Video
5) Evaluate the Detector Model



What is MATLAB

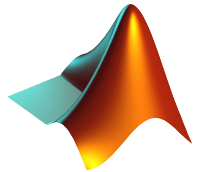
“MATLAB is a programming and numeric computing platform used by millions of engineers and scientists to analyze data, develop algorithms, and create models.”

----Mathworks



What can you do with MATLAB?

- Analyze data
- Develop algorithms
- Create models and applications

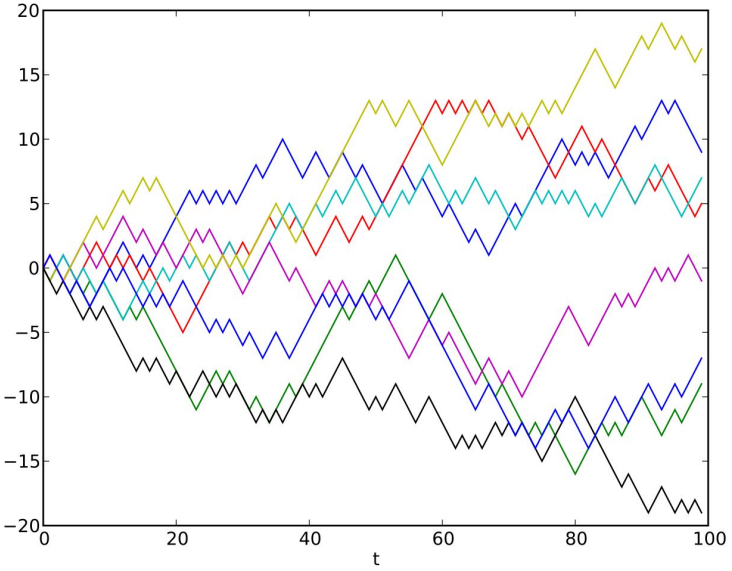


Random Walk

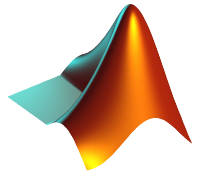
Wikipedia: In mathematics, a **random walk** is a mathematical object, known as a stochastic or random process, that describes a path that consists of a succession of random steps on some mathematical space such as the integers.

Changes in the model

- same distribution
- independent of each other.

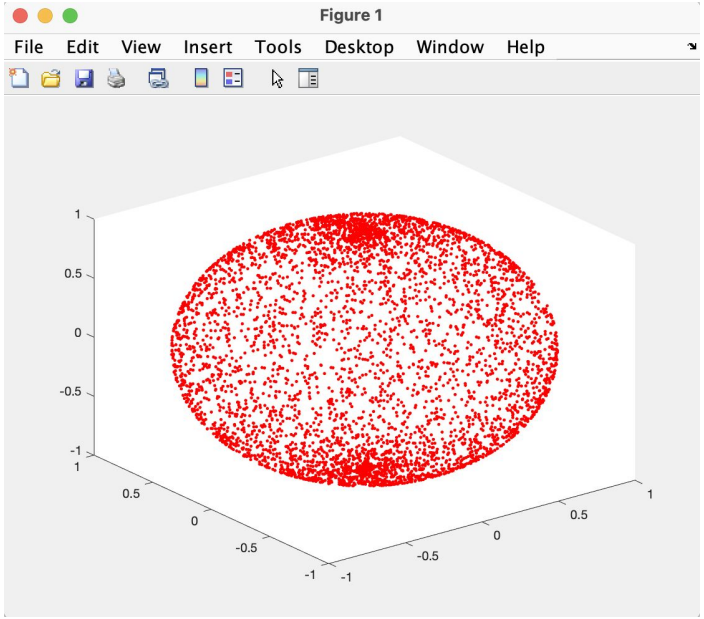


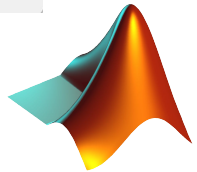
Random walk model, Photo: Wikipedia



Isotropic distribution in 3D

```
1  close all;
2  clear all;
3
4  lamda = 6;
5  npoints = 5000;
6
7  for i = 1: npoints
8      r = 1;
9      theta = pi*rand();
10     phi = 2*pi*rand();
11
12     x(i) = r*sin(theta)*cos(phi);
13     y(i) = r*sin(theta)*sin(phi);
14     z(i) = r*cos(theta);
15 end
16
17 plot3(x,y,z,'r.');
```





What is Monte-Carlo Prediction?

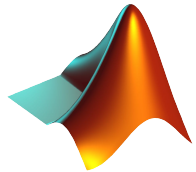
" repeated random sampling to obtain numerical results "

Source: Wikipedia

" the process of generating independent, random draws from a specified probabilistic model "

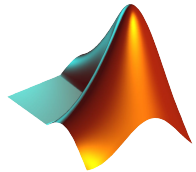
MathWorks

Source: MathWorks



What is Monte-Carlo Prediction?

*Use **RANDOMNESS** to solve problems that might be **DETERMINISTIC** in principle.*



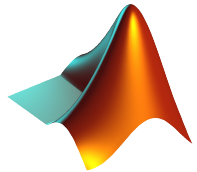
Monte-Carlo Simulation

“Help to answer probability questions”

Used for example:

- in **Finance** for economic forecasting, risk management and stress testing.

Source: MathWorks



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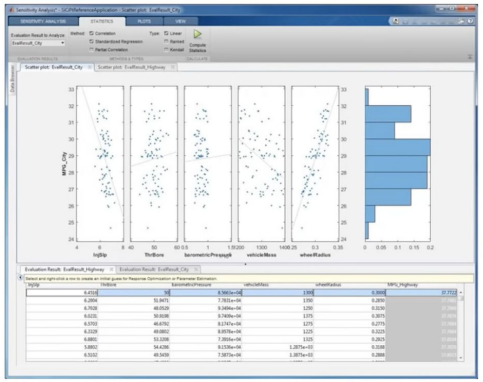


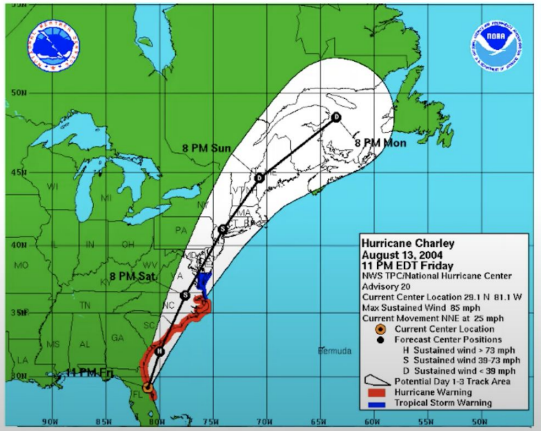
Source: MathWorks

Monte-Carlo Simulation

"Help to answer probability questions"

Used for example:

- in **Finance** for economic forecasting, risk management and stress testing.
- in **Automotive** for sensitivity analyses to result in robust consumer products
- in **Weather Forecasting**



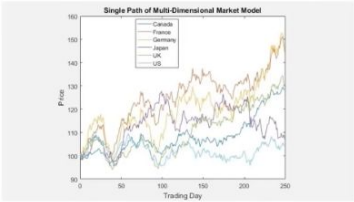
How to Make Monte-Carlo Simulation?

1. Start with a simulation model

2. Run that model many times with randomly changing parameters

```
for i = 1:inf
    run
end
```

3. Analyze the results systematically



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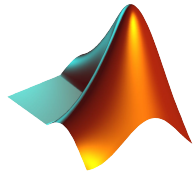
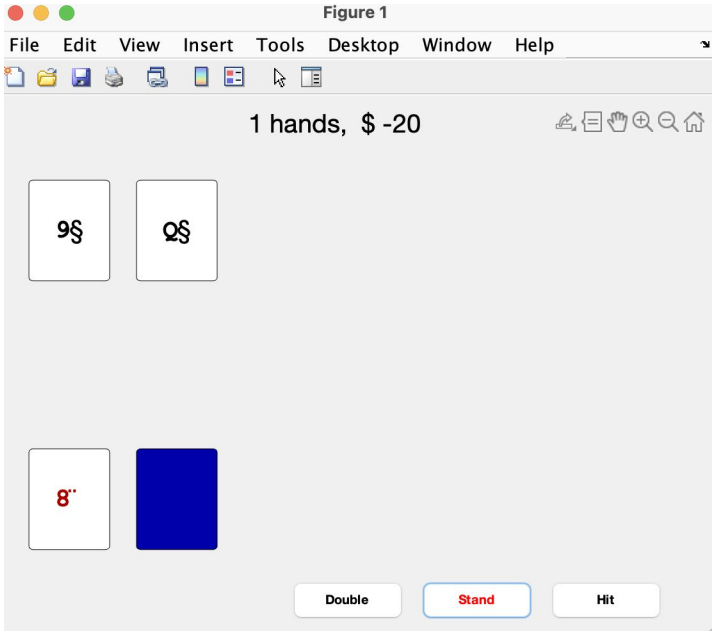


Blackjack (“21”)

Rules:
The object is to get a hand with a value close to, but not more than, 21.

- Face cards are worth 10 point
- Aces are worth either 1 or 11
- All other cards are worth their numerical value.

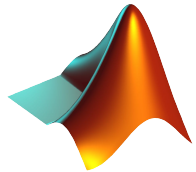
You play against the dealer.
You each start with two cards.
Your cards are dealt face up; one of the dealer's cards stays face down.



Double: Take 1 more card; increase the initial bet by 100%
Stand: Take no more cards
Hit:Take 1 more card

Blackjack conclusion

In the long run, the casino still has 0.5% higher probability of winning.



Feedback