Making Real Fake Stuff Simulating Real World Data

Charlie Chiccarine

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Making Real Fake Stuff

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Applications of Computing

There is a wide variety of reasons to write code

- Create software
- Automate tasks
- Simulate and model situations and experiments

We'll focus on this simulation and modeling. This is something that's incredibly easy to bring into the classroom for a wide variety of subjects.

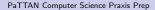
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Simulation and Modeling

Why would we do this?

- To predict future conditions
- Test things unable to be tested in our backyard
- Practice experiments before performing them



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Requirements

What do we need to simulate a situation?

- A starting point
- A formula to use in the situation
- Prior data to prove accuracy
- Specific situations may require other data

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An Example

- Currently, I am 20 year old man who weighs 150 lbs
- If I were to gain 5 lbs every week, how would this affect me?
- How much would I weigh when I'm 50 years old?

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An Example

Starting Point

- 20 years old
- 150 lbs

Formula

- 150 + 5*n*
- Where n is the number of weeks

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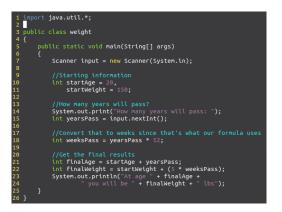
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The Code

- Since the situation is incredibly simple, so is the code
- I have commented the code at each of the main parts
- This code is in the 'Java Code Examples' folder
- Let's test and see if this is accurate



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Results and Accuracy

How many years will pass: 30 At age 50 you will be 7950 lbs

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Is this factually correct?

Yes. The formula produced the correct answer.

Is this realistic?

No. I would be long dead before I reached age 50 at nearly 8000 lbs

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Results and Accuracy

How can we make this more accurate?

- Include more variables
 - A death condition
 - What food I am eating
 - Exercise
 - Other health aspects
- The more data we take into account, the more accurate our simulation would be
- We cannot make an accurate statement about my health at age 50 from the data given to us from this simulation

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Other Examples

I mentioned earlier that a wide variety of simulations can be created for a wide variety of subjects

The following slides go though different subjects and simulations you can do

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- A common simulation in biology is population growth rate
- Lots of different factors to take into account
 - Environment and Climate
 - Food
 - Predator/prey relations
 - Growth rates
- In the 'Java Code Examples' folder, try out the population code

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- The act of throwing a ball and it's position on an x and y axis
- Typically the military considers this "missile trajectory"
- Many different factors to take into account
 - Gravity
 - Velocity
 - Angle
 - Air resistance
- In the 'Java Code Examples' folder, try out the ballthrowing code

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Recap

- We use code to simulate situations
- We need a certain amount of data to perform simulations

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We can also get a lot of data from performing accurate simulations