GENERAL ASSEMBLY

DATA SCIENCE

CLASS 19: WEB DEVELOPMENT WITH FLASK / HEROKU

AGENDA

I. WHAT IS WEB DEVELOPMENT?

II. WHAT IS HEROKU / FLASK?

III. MVC

IV. DEPLOYING KNN

I. WHAT IS WEB DEVELOPMENT?

The work involved with building and maintaining a live website

Two types of web development:

Two types of web development:

Front-end Development

- HTML / CSS
- Responsive design
- Makes things pretty / easy to use

Back-end Development

- Many backend languages
- Model View Controller
- Database work
- Makes the site “work”

Full-stack Development comprises of both front end and back end work

Part of being a web developer is knowing the technologies used

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Web-framework

Consists of database work and logistics of the site

Deployment

How we “serve” the website. So that other people can use it

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II. HEROKU / FLASK

Web Development is hard..

Which is why GA has several classes dedicated to it

We will use two very simple web development tools:
Heroku and **Flask**

Did someone say Flask!?

Flask

web development,
one drop at a time

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Flask
web development,
one drop at a time

Flask is a micro-web-framework based entirely in python

What does that mean?

It means we can write the entire backend in Python!

Did someone say Heroku!?

Heroku is a Salesforce company that lets us deploy our websites easily

What does that mean?

We use heroku to rent servers to host the website

One thing that stays constant over all technologies is the idea of the

ModelView Controller paradigm

III. MODEL VIEW CONTROLLER

MODEL VIEW CONTROLLER

Model View Controller:

MODEL VIEW CONTROLLER

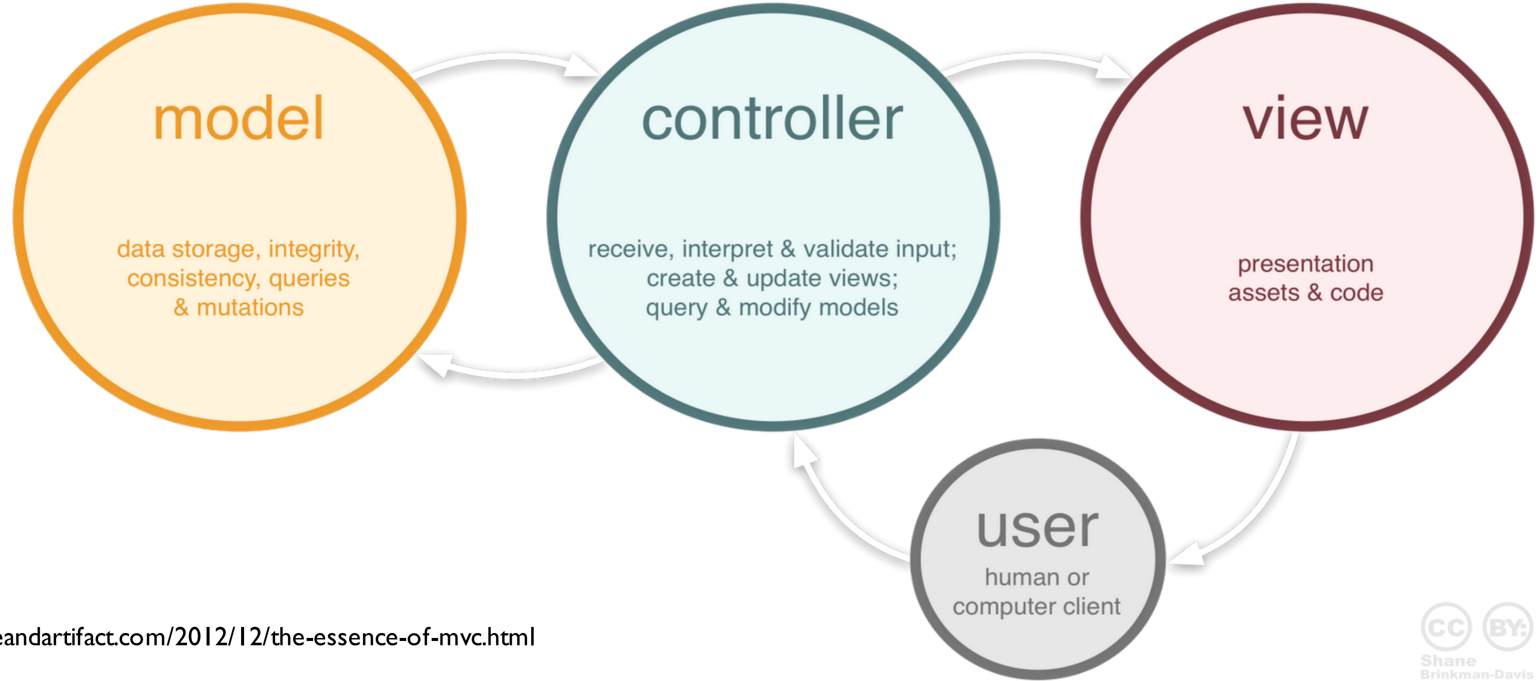
ModelView Controller:

Is a way of life

MODEL VIEW CONTROLLER

Model View Controller:

But actually it's a software design pattern specifically for web apps


model
data storage, integrity, consistency, queries & mutations
controller
receive, interpret & validate input; create & update views; query & modify models
view
presentation assets & code
user
human or computer client
Shane Brinkman-Davis

Source: http://www.essenceandartifact.com/2012/12/the-essence-of-mvc.html

MODEL VIEW CONTROLLER

ModelView Controller:

Model

- Responsible for managing the data
- It's a database essentially!

View

- Presents the data / app
- Responsible for design / user experience

Controller

- Responds to user input and performs operations based on it
- Eg. User inputs a number of neighbors and the controller trains the model

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QUESTION:

Which ones are handled by

Back end developers?

Front end?

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Model (Backend)

- Responsible for managing the data
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- Presents the data / app
- Responsible for design / user experience

Controller (Backend / Frontend)

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- Eg. User inputs a number of neighbors and the controller trains the model

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Back end developers?

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IV. DEPLOYING KNN

Sample Flask App

https://github.com/sinanuozdemir/sinan_iris

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Notice we have:

1. Models
2. Views (called templates)
3. Controller (controller.py)

Sample Flask App

https://github.com/sinanuozdemir/sinan_iris

Go ahead and clone it

NOT IN YOUR OTHER GIT REPOSITORY ☺

Sample Flask App

https://github.com/sinanuozdemir/sinan_iris

To run locally, go to root and run

python controller.py

Go to **http://127.0.0.1:5000/**

Sample Flask App

https://github.com/sinanuozdemir/sinan_iris

NOTE:

You may not have the required modules to run it right now..

If not, run

```
sudo pip install –r requirements_clean.txt
```

To run locally, go to root and run

```
python controller.py
```

Go to **http://127.0.0.1:5000/**

We have two forms

The top form **trains the model**

The bottom form **predicts incoming data**

When we submit the data Which part of MVC handles the input?

We have two forms

The top form **trains the model**

The bottom form **predicts incoming data**

When we submit the data the **controller** handles it!

The machine learning model lives in the folder

It is pickled…

The machine learning model lives in the **model** folder
not to be confused with the model in MVC

It is pickled…

You know, the standard mechanism
for serializing an object.

Essentially we can transform a
python object into a file!

DEPLOYING KNN

You can pickle anything!!

1. sklearn models
2. Jsons!
3. Strings!
4. Your own models
5. Any python object can be pickled

Comprehensive Step by Step

1. Sign up for Heroku here
2. Create a new app (make sure Heroku toolbelt is installed)
3. Clone our flask app here
    1. Change and test at will
4. Run the command: **heroku git:remote –a <APP>**
5. Install the custom build back for scipy and numpy (this installs sklearn)
    1. heroku config:set BUILDPACK_URL=https://github.com/thenovices/heroku-buildpack-scipy --app <APP>
    2. Run the command above in the root of your app (with the toolbelt installed)
6. Use as normal git repository:
    1. git add, commit, etc...
    2. **git push heroku master** (instead of origin)
7. Amaze people with your mad data science skillz

1. SIGN UP FOR HEROKU

Self-explanatory?

http://heroku.com

2. CREATE A NEW APP (MAKE SURE HEROKU TOOLBELT IS INSTALLED)

Not self-explanatory

1. https://toolbelt.heroku.com/

2. Type into your console:

```
heroku login
```

3. CLONE OUR FLASK APP HERE

Self-explanatory?

Now you can run it locally!! (***python controller.py***)

4. RUN THE COMMAND: HEROKU GIT:REMOTE –A <APP>

At the root of the directory

This adds a new git “remote”

A new place to push

Check this by running *git remote –v*

You should see **origin** and **heroku**

5. INSTALL THE CUSTOM BUILD BACK FOR SCIPY AND NUMPY

Not self-explanatory. This will install sklearn directly on our rented servers

https://github.com/thenovices/heroku-buildpack-scipy

Run:

```
heroku config:set BUILDPACK_URL=https://github.com/thenovices/heroku-buildpack-scipy --app <APP>
```

At the root of the directory

6. USE AS NORMAL GIT REPOSITORY

Self-explanatory?

git add .

git commit –m “I am a genius”

Git push heroku master

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Note:

It is installing a bunch of modules because of the requirements.txt file

7. AMAZE PEOPLE WITH YOUR MAD DATA SCIENCE SKILLZ

Self-explanatory!!!!!

WHAT NOW?!!?!?!!1?

Put in your own machine learning model!

But Sinaaaaan, it’s too hard to make it train on the website because I am a genius and am ensembling so many things and stuff

Fine!

1. Build your model elsewhere (in an ipython notebook)
2. ***Pickle*** your model
3. Load it into the **model** folder manually

DEPLOYING KNN

Note:

Your unique website will have your app name instead of sinan-iris

http://sinan-iris.herokuapp.com/