Computing for Medicine: Phase 3, Seminar 4 Project

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Seminar 4 Project

- The project handout is posted:
  - [http://c4m.cdf.toronto.edu/cohort1/phase3/](http://c4m.cdf.toronto.edu/cohort1/phase3/)

- Two approaches for doing your work:
  - Use the Computer Science Teaching Labs computing network.
  - Use your personal computer.
Software installation

- New required packages:
  - skimage (http://scikit-image.org/docs/dev/api/skimage.html)
  - joblib (https://pythonhosted.org/joblib/)

- Required packages that were also used by the previous projects:
  - numpy, pylab, scipy, matplotlib, sklearn
OVERVIEW
Starter code and data

- **Starter code**
  - image_processing_tutorial.py
  - nuclei_detection_tutorial.py
  - project_helpers.py
  - project.py

- **Data**
  - 100 H&E stained histology images of colorectal adenocarcinomas
Your tasks

Project goal:
automatically detect Nuclei centres in histology images.

- Read and understand the code provided in image_processing_tutorial.py.
- Complete functions from
  - project_helpers.py,
  - nuclei_detection_tutorial.py, and
  - project.py
by modeling your solutions after the provided tutorials and starter code.
Data path

- The starter code assumes that the data directory (`crchistophenotypes_2016_04_28`) will be in the same directory as the .py files.

- If the data is in a different location, you must set the `data_path` variable to the right directory.
Viewing plots

- In the starter code, there is a constant named VIEW.
- When VIEW is set to False, no images are shown. When VIEW is set to True, the images are displayed using matplotlib’s show function.
- You may change the value of VIEW as you develop your code.
- Example code snippet from starter code:
  ```python
  if VIEW:
      pyplot.show()
  ```
tuple

- Python has a type `tuple`, which is used to store ordered collections of data.
- Like lists, tuples can be indexed.
- Unlike lists, tuples are immutable.
- Example:
  ```python
  >>> t = (1, 2, 3, 4)
  >>> len(t)
  4
  >>> t[1]
  2
  ```
Numpy’s `vstack`

- Take arrays and stack them vertically to produce a single array.
- Example:

  ```python
  >>> a1 = np.array([1, 2, 3])
  >>> a2 = np.array([4, 5, 6])
  >>> result = np.vstack((a1, a2))  # note: two sets of parentheses; the argument is the tuple (a1, a2)
  >>> result
  array([[1, 2, 3],
         [4, 5, 6]])
  ```
Numpy’s dstack

- Take arrays and stack them depth wise to produce a single 3D array.
- Example:

```python
g>>> a1 = np.array([1, 2, 3])
g>>> a2 = np.array([4, 5, 6])
g>>> result = np.dstack((a1, a2))  # note: two sets of parentheses; the argument is the tuple (a1, a2)
g>>> result
array([[[1, 4],
       [2, 5],
       [3, 6]]])
```
UPCOMING SEMINARS
Seminar 5: Dr. Periklis Andritsos

- Tuesday December 13 2016 6-8pm
- Location: DCS Innovation Lab
- Topic: Database Systems
- https://www.ischool.utoronto.ca/faculty/periklis-andritsos
FEEDBACK
Phase 3, Seminar 4 Survey

- You will receive an email with the subject “C4M: Phase 3, Seminar 4 Feedback Survey”.
- Please complete that survey now:
  - [https://www.surveymonkey.com/r/C4MSeminar4](https://www.surveymonkey.com/r/C4MSeminar4)