Image Retrieval

Amar Shah, Randall Harris, Sonia Nigam

Resources

- Bing Maps Tile System Documentation
  - https://msdn.microsoft.com/en-us/library/bb259689.aspx
  - Mapped out our core methodology (explained in next process slide)
  - Provided pseudocode/logic for the core functions
- GDAL2Tiles Project: Google Summer of Code 2007 & 2008
  - http://www.klokan.cz/projects/gdal2tiles/
  - This project was a good example of a python interpretation of the Bing docs, we referenced this project to convert coordinates into a Quadkey

Method

1) Find center of latitude and longitude bounding box given two input coords
   a) centers(lat, lon, lat1, lon1)
2) Convert these geographic coordinates to pixel coordinates using highest zoom level (explained on next slide)
   a) LatLonToPixels(lat, lon, level)
3) Convert these pixel coordinates to tile coordinates
   a) PixelsToTile(px, py)
4) Convert these tile coordinates to Quadkey value
   a) QuadTree(tx, ty, level)
5) Download the picture corresponding to the calculated Quadkey

Determining Highest Resolution

- Goal: select highest level as input for BingImageRetreiver()
  - Inputs: center_lat, center_lon, level
  - Iterated through eligible zoom levels (23 to 1)
  - Once a queried URL produced a valid image, the program breaks
- Compared the saved error image to Bing output
  - open("error.jpg","rb").read() == open("tile.jpg","rb").read()
  - If the two images were the same we would go on to the next level
  - If the two images were different, we had a successful query and the program outputs the maximum resolution image as ‘tile.jpg’

Results

- Input: two bounding coordinates (latitude, longitude)
  - LatLon1 (42.882654 -88.623293)
  - LatLon2 (40.882654 -86.623293)
  - Bounding box for The Bean
  - Entered via command line: *python script.py x1 y1 x2 y2*
- Output: image of the location within bounds
  - Calculated quadkey to query Bing system
    - 03022223103102003210
  - Saves image as “tile.jpg” under the same directory
    - Saved image on the right

Improvements

- It would be helpful to overlay the bounding box coordinates on our outputted image file
- It would be informative to title the outputted file as the most popular landmark in the image.
    - For example, ours would be called “TheBean.jpg”

Future Iterations

- It would be interesting to see if we could see what major landmark lies in the bounding box and prompt the user to see if that is what they were trying to obtain.
  - In order to accomplish this we would need to access the Bing database of landmarks and first check and see what landmarks are inside the inputted lat/lon box.
  - List the landmarks in descending order of popularity to see if the search matched the user's expectations