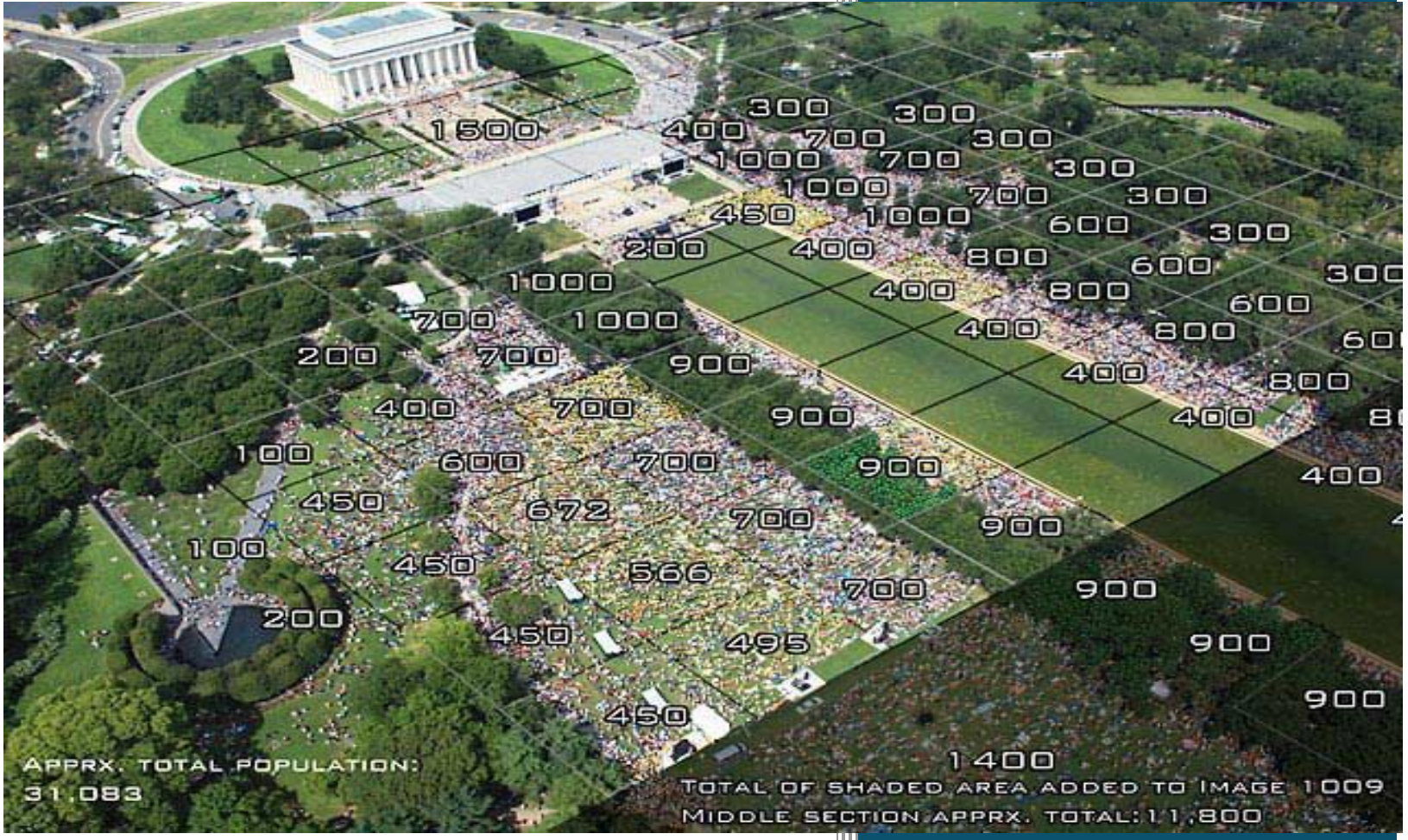


UCF RET Site: Research Experiences in Computer Vision and Crowd Counting Lesson Plan

0200335: AP Computer Science Principles

2018

Priscilla Reyes

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7/10/2018

RET Site: Research Experiences in Computer Vision and Crowd Counting Lesson Plan

Course: AP Computer Science Principles
Grade Level: 9th – 12th Grade
Suggested Length of Lesson: 1 Day

Materials/Technology Needed

- Presentation Capability (power point)
- Laptops
- Camera (Can be utilized through laptop or smartphone)
- Whiteboard/Smartboard
- Wi-Fi Access
- Ability to show python program
  - **(Extra not necessary)**

Where this Fits

- As an extension activity after students learn about how computers work and how to create and use algorithms

Lesson Objective(s)/Learning Goal(s)

After this lesson, students should be able to identify:

- Why do people count crowds?
- The technology behind counting crowds
- Be comfortable in performing the crowd counting activity

Standard(s)/Benchmark(s) Addressed

- *Standards:*
  - ***SC.912.CS-CS.6.4*** Explain the notion of intelligent behavior through computer modeling and robotics.
  - ***SC.912.CS-CS.6.5*** Describe common measurements of machine intelligence.
  - ***SC.912.CS-CS.6.6:*** Describe a few of the major branches of artificial intelligence (e.g., expert systems, natural language processing, machine perception, machine learning).

Evidence of Learning (Assessment Plan)

- Students will come up with an algorithm on how to determine the number of people in a crowd
- Students will be asked to take a picture of a crowd and make an infographic design with the picture and a list of steps on how to determine the number of students in the crowd

Instructional Strategies

- *Bloom's Taxonomy level of Understanding*
  - Question that will have students use the critical thinking process to help them understand the concept of algorithms
- *Bloom's Taxonomy level of Creating*
  - Create an infographic design based on the picture taken and write the steps needed to determine the number of people in the description
- *Bloom's Taxonomy level of Apply*
  - Students will construct a model algorithm in pseudo code to demonstrate how to calculate the number of people in the crowd

Description of Lesson Activity/Experiences

1. *Have students come up with an algorithm to determine how to count the amount of people in the crowd within a short amount of time.*
2. *Students will be given a photo in class in order to come up with various forms of crowd counting.*
3. *Independent Practice: Take a picture of a crowd of more than 50 people.*
4. *Make an infographic design on your findings.*
   Picture & Steps on how you determined the number of students in the crowd.
5. *Students will write a pseudo code for the algorithm used in determining the number of students in the crowd.*
6. *Do wrap up discussion on what UCF is doing with crowd counting*

Recommended Assessment(s) and Steps

- Have students take pictures of a crowd of more than 50 people.
  - Make sure to communicate the size preferred with students
  - Have students create an infographic design as well as write steps on how the number of the crowd can be estimated.

List of Materials/Resources Used

- PowerPoint – 12 slides
  - Project Example - Infographic design maker
    Links:
  - https://www.canva.com/create/infographics/
  - https://piktochart.com
  - https://venngage.com/

Important Vocabulary

Term	Definition
Algorithm	*A process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.*
Artificial Intelligence	*The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.*
Jacobs Method	*involves dividing the area occupied by a crowd into sections, determining an average number of people in each section, and multiplying by the number of sections occupied.*

Troubleshooting Tips

1. If students are having a hard time understanding the Jacobs method example it may be helpful to do an example in class.
2. Incorporate another lesson in which your take a picture of a large crowd and cut it into pieces and give a piece of the crowd to a student so they can calculate the number in the piece. Once each student has counted the number of people in their piece, then calculate all the pieces together to get the sum of the crowd.

Attachments

- PowerPoint – Crowd Counting Presentation.ppt

References

How Is Crowd Size Estimated?. (4, September). Retrieved from

https://www.livescience.com/8578-crowd-size-estimated.html

Acknowledgements

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Supporting Program

SHAH RET Program, College of Engineering and Computer Science, University of Central Florida. This content was developed under National Science Foundation grant #1542439.

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