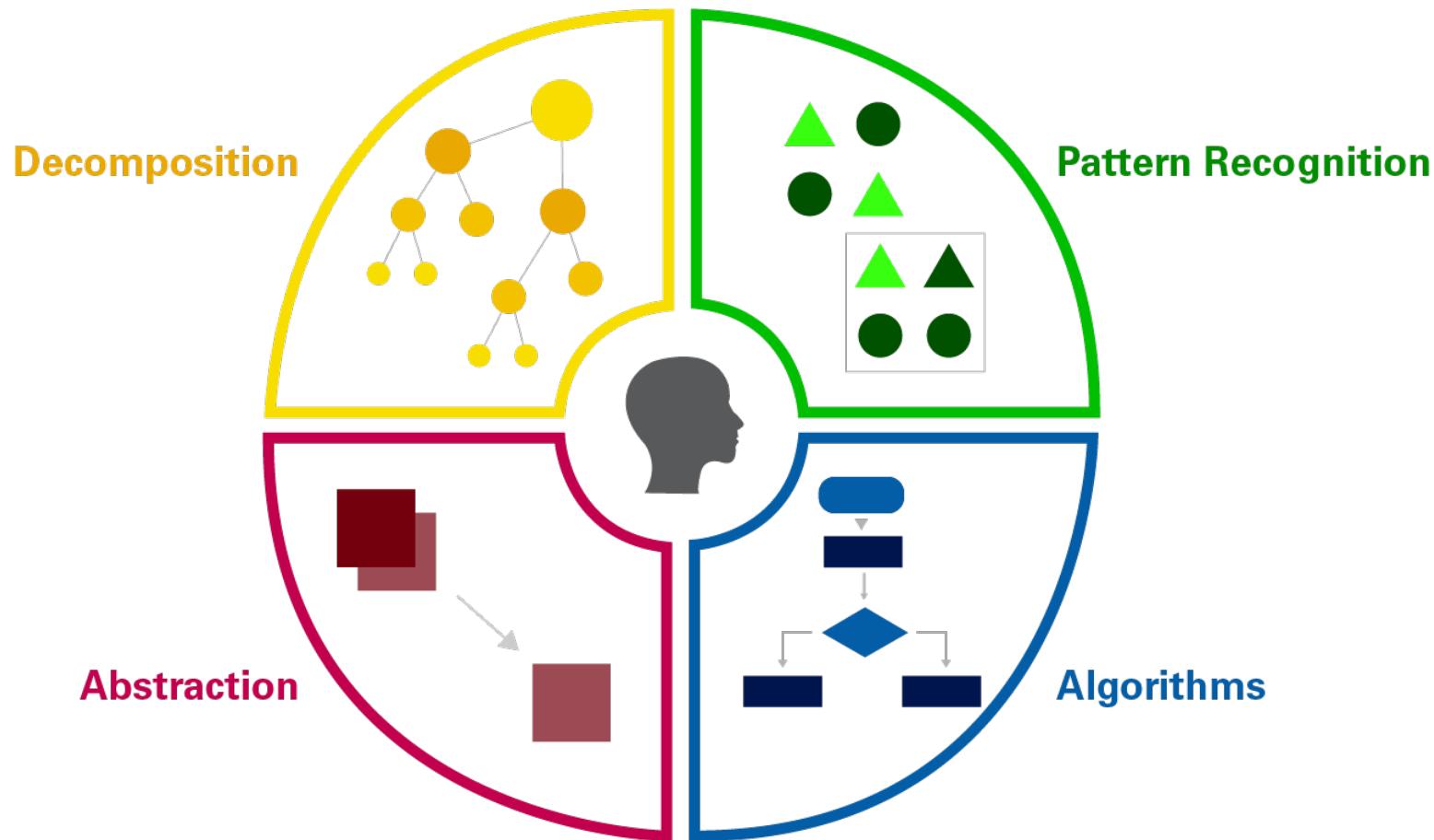


Introduction to Computational Thinking

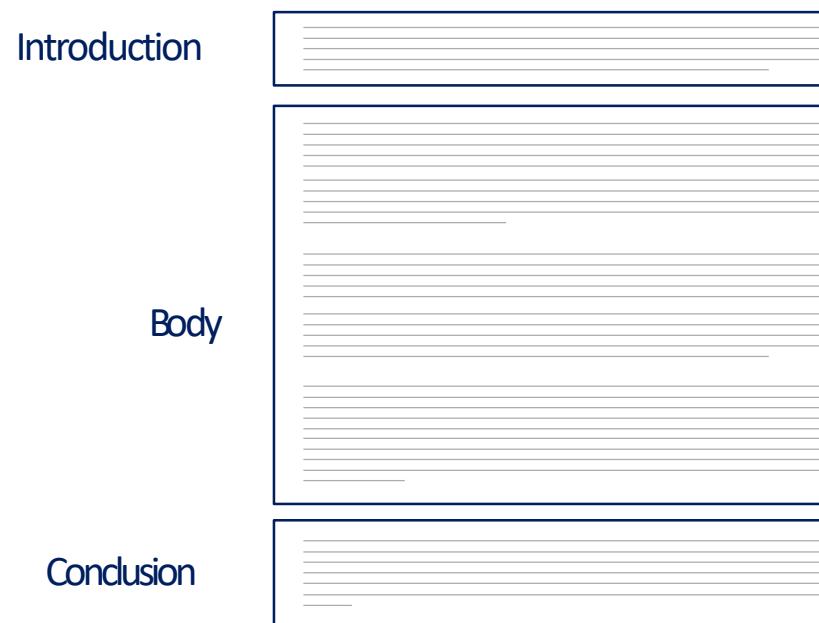
Pillars of Computational Thinking



Decomposition

- Breaking a complex problem into more manageable sub-problems
- Putting the solutions to the sub-problems together gives a solution to the original, complex problem

Decomposition: Outlining a Paper



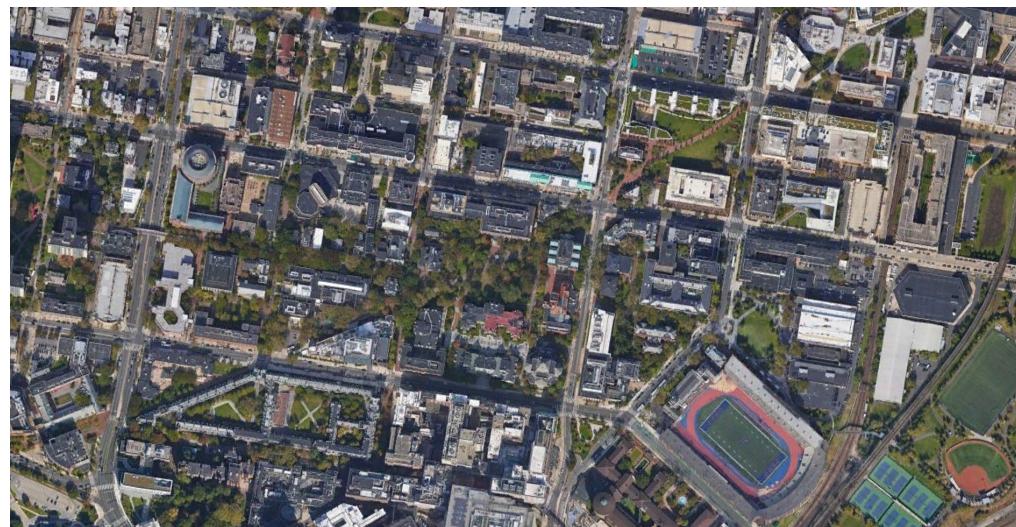
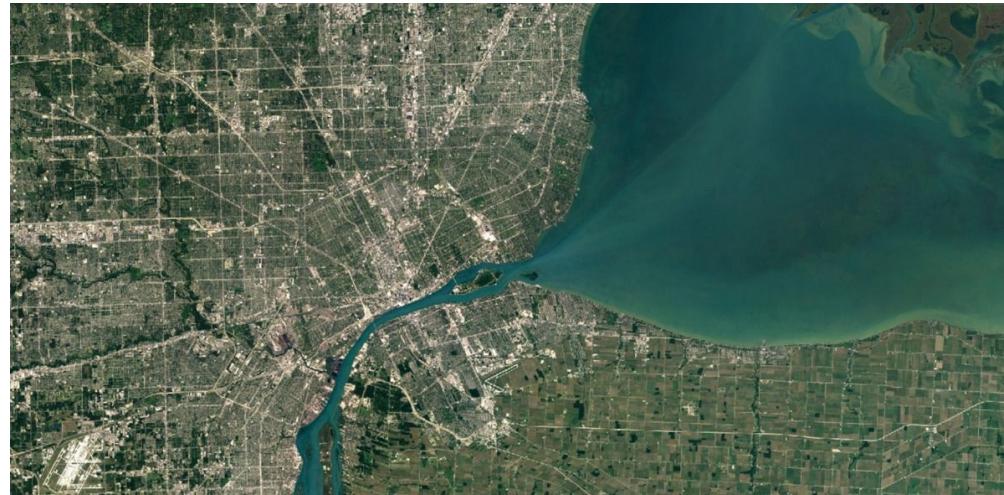
Mulching the Yard



Mulching the Yard



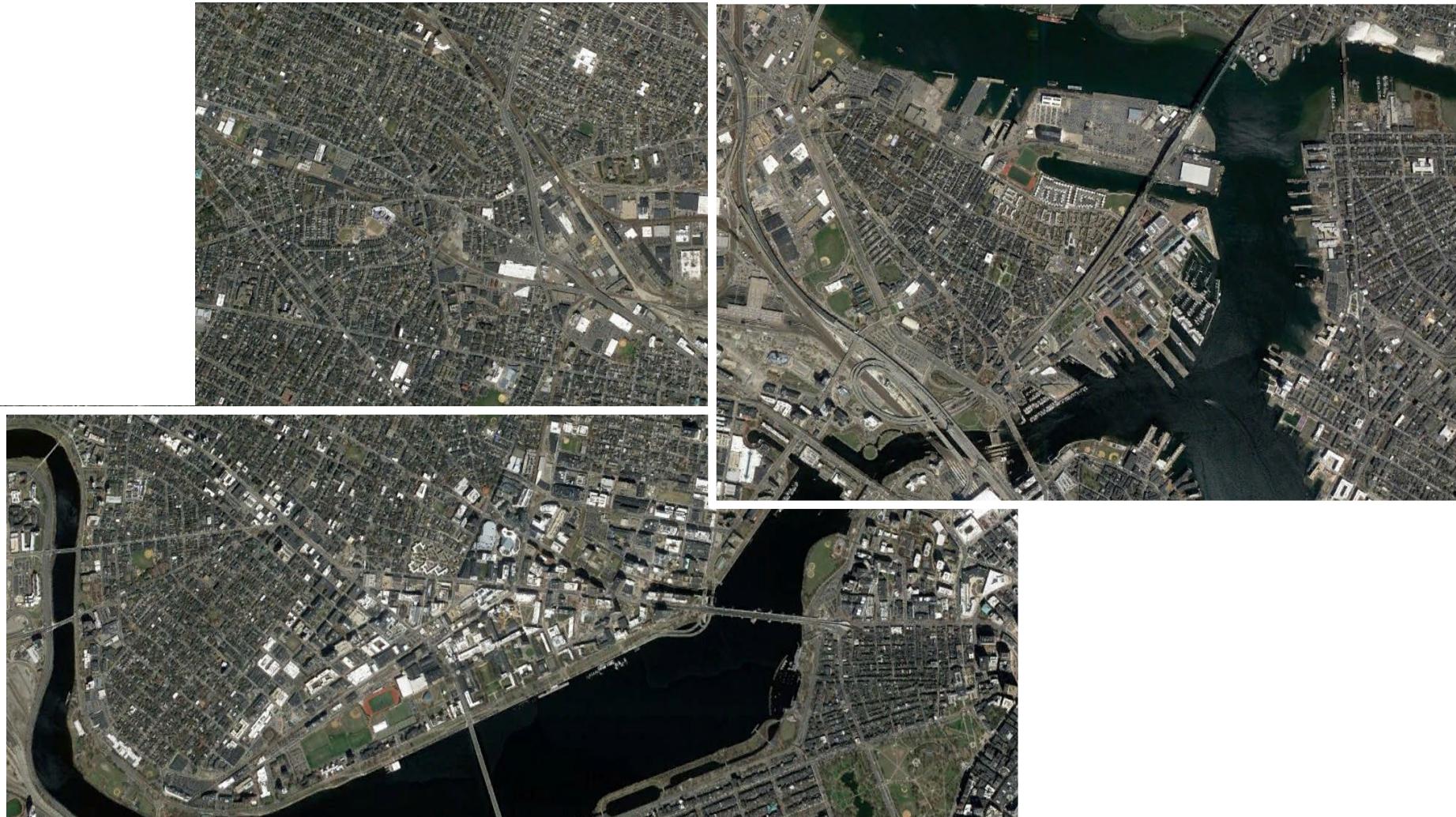
Mapping the Earth



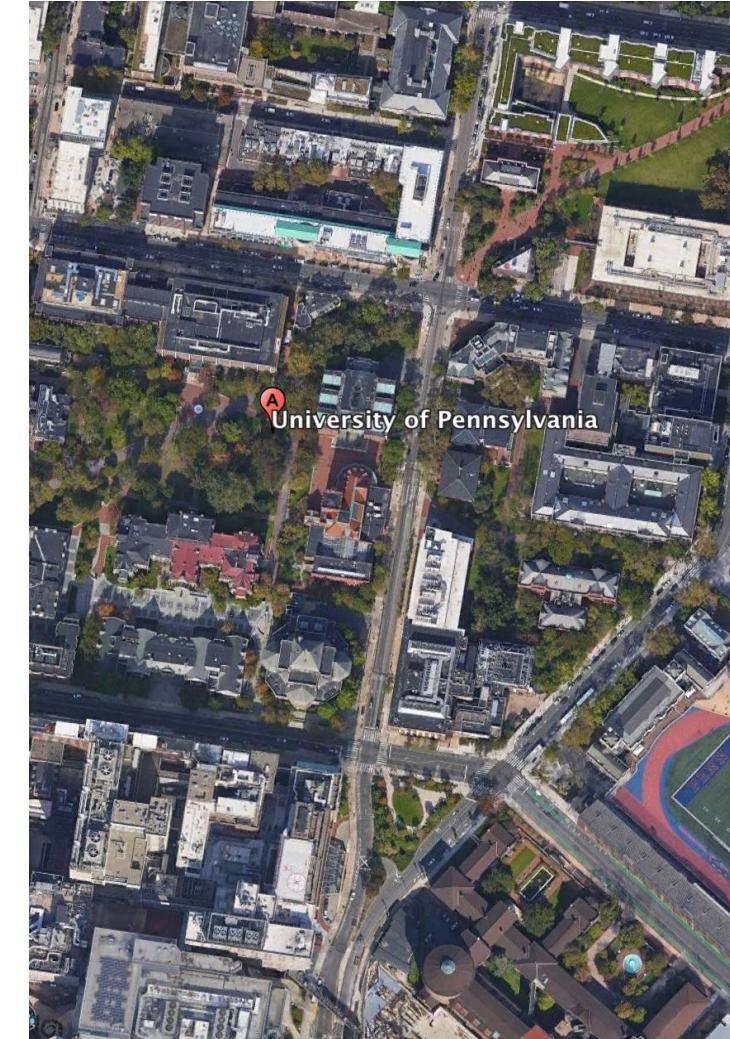
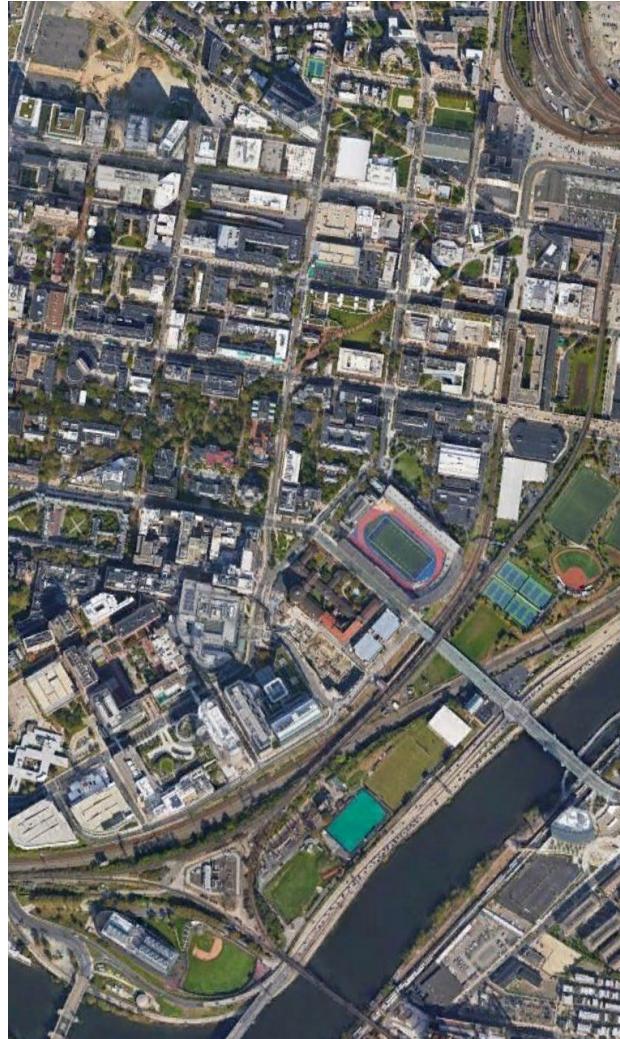
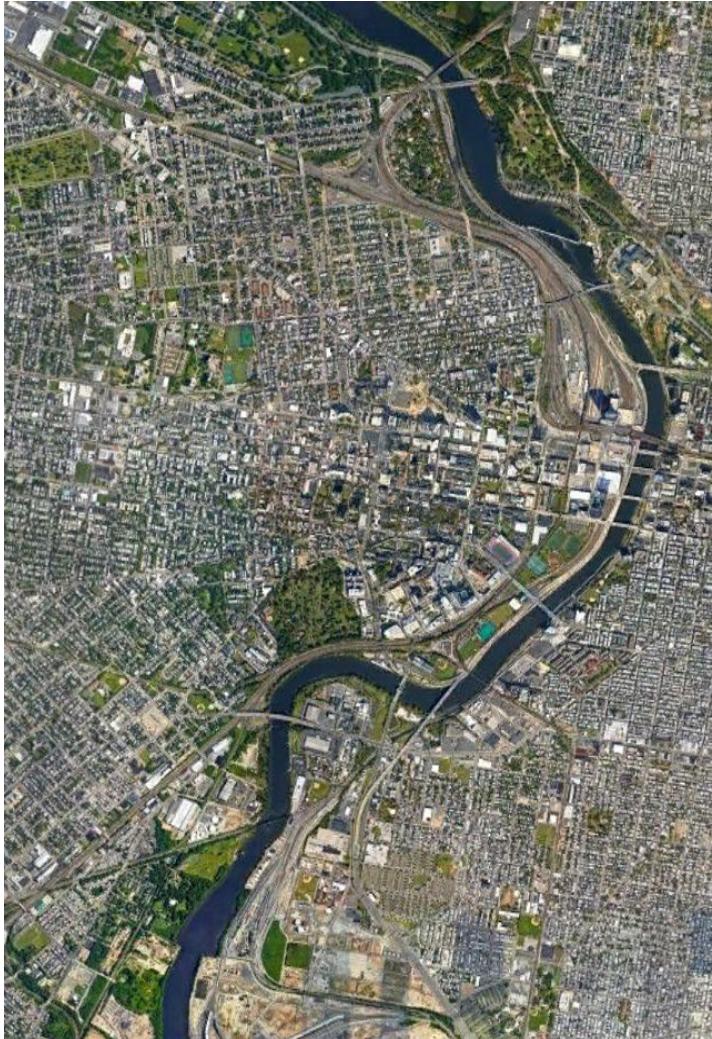
Collecting the Data



Stitching the Images



Functionality: Zoom and Search



Summary

- Decomposition means breaking a complex problem into more manageable sub-problems
- Putting the solutions to the sub-problems together gives a solution to the original, complex problem

Pattern Recognition

- Finding similarities or shared characteristics within or between problems
- Makes the problem easier to solve since the same solution can be used for each occurrence of the pattern



Pattern Recognition

Drawing Dogs

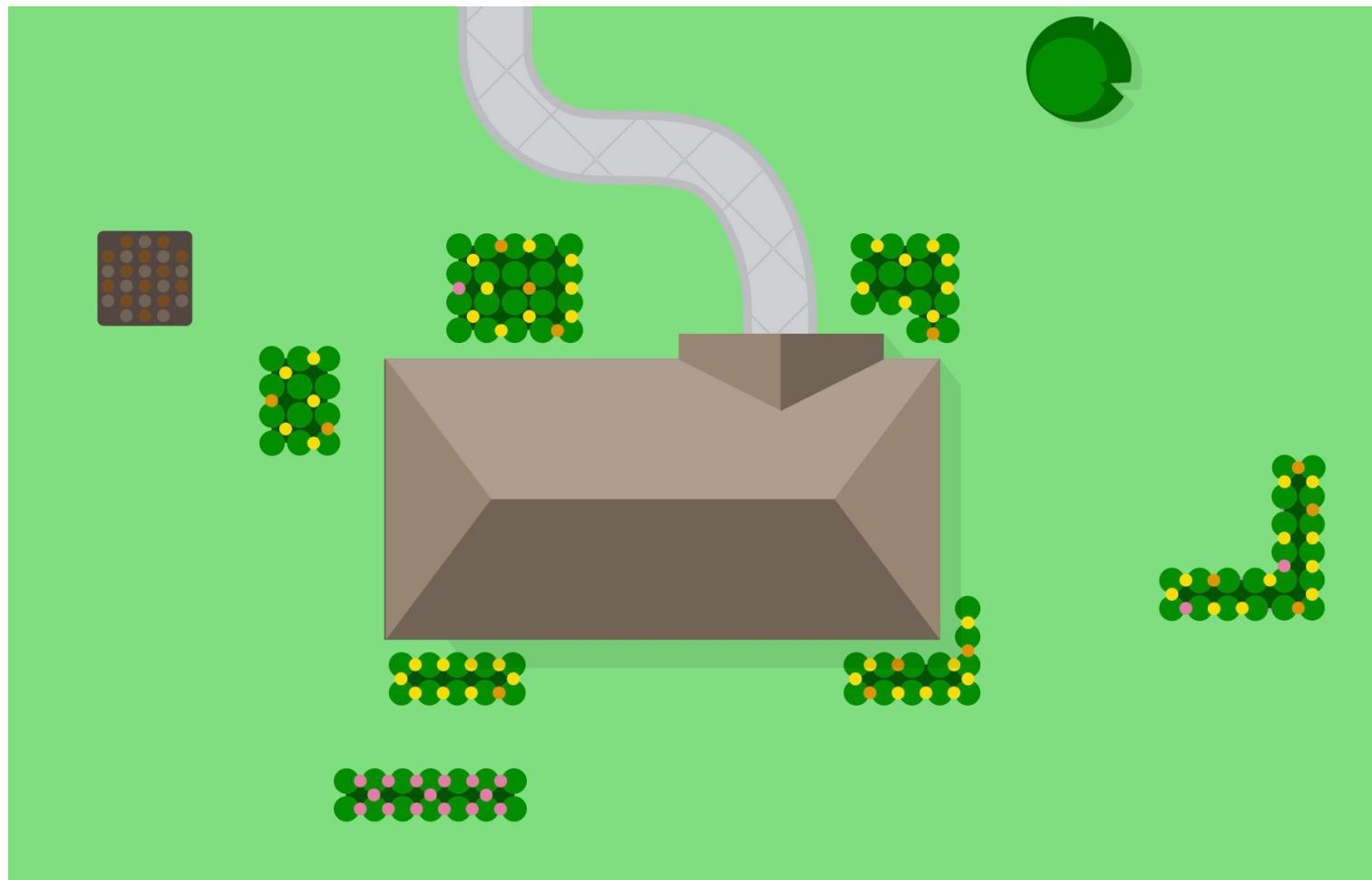


Pattern Recognition

Drawing Different Dogs

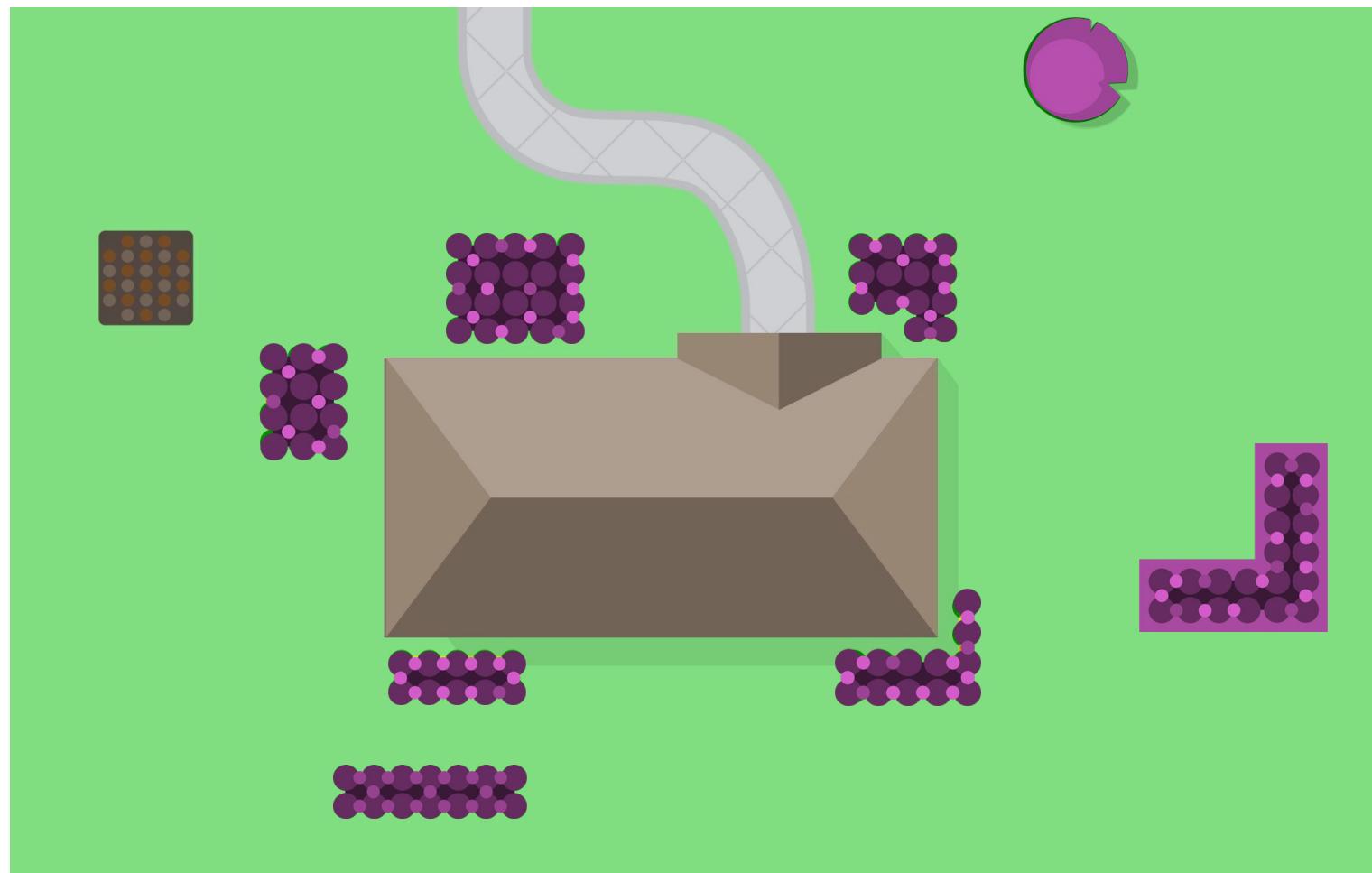


Mulching the yard



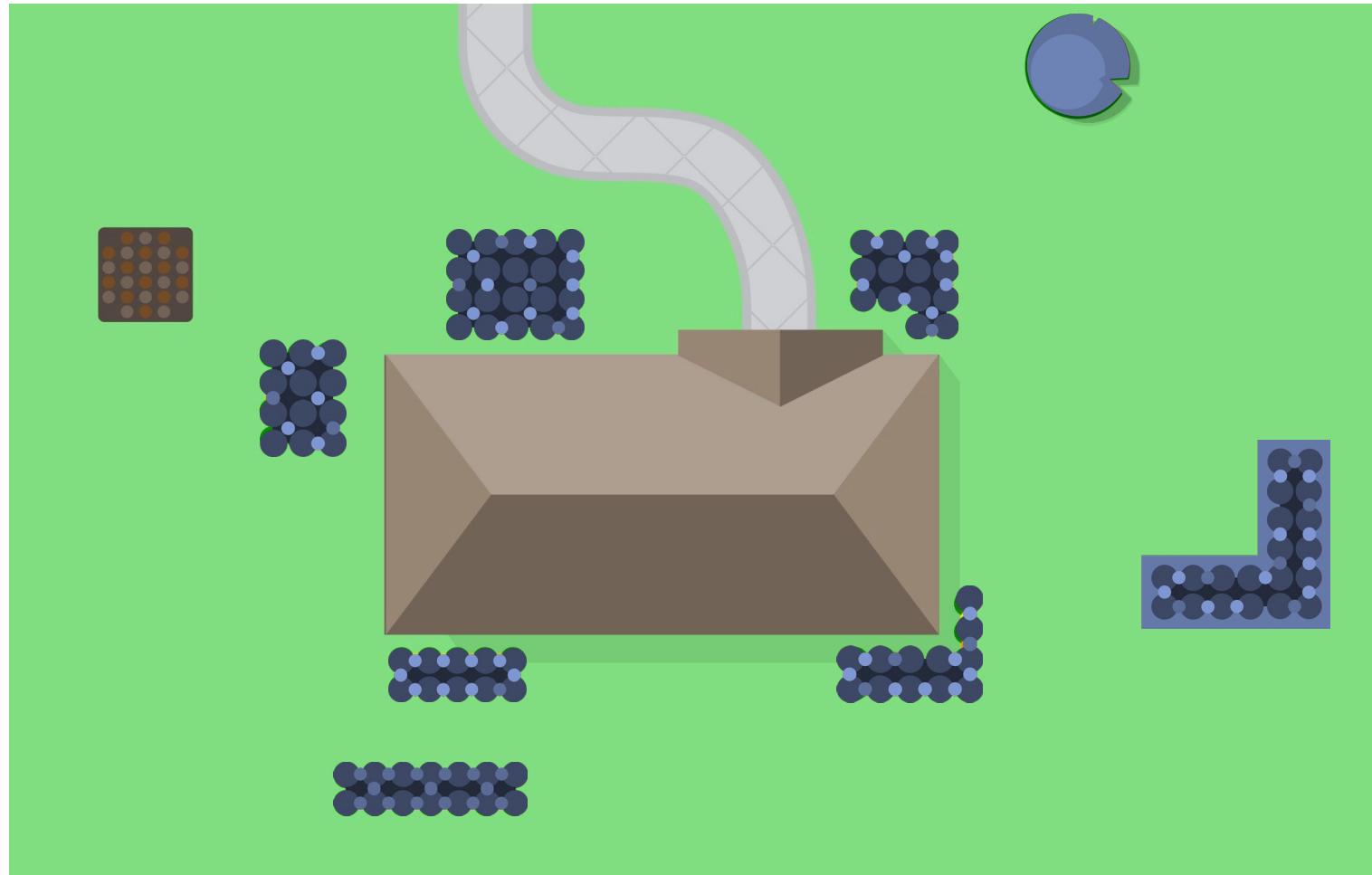
Mulching the yard

Cleaning and weeding



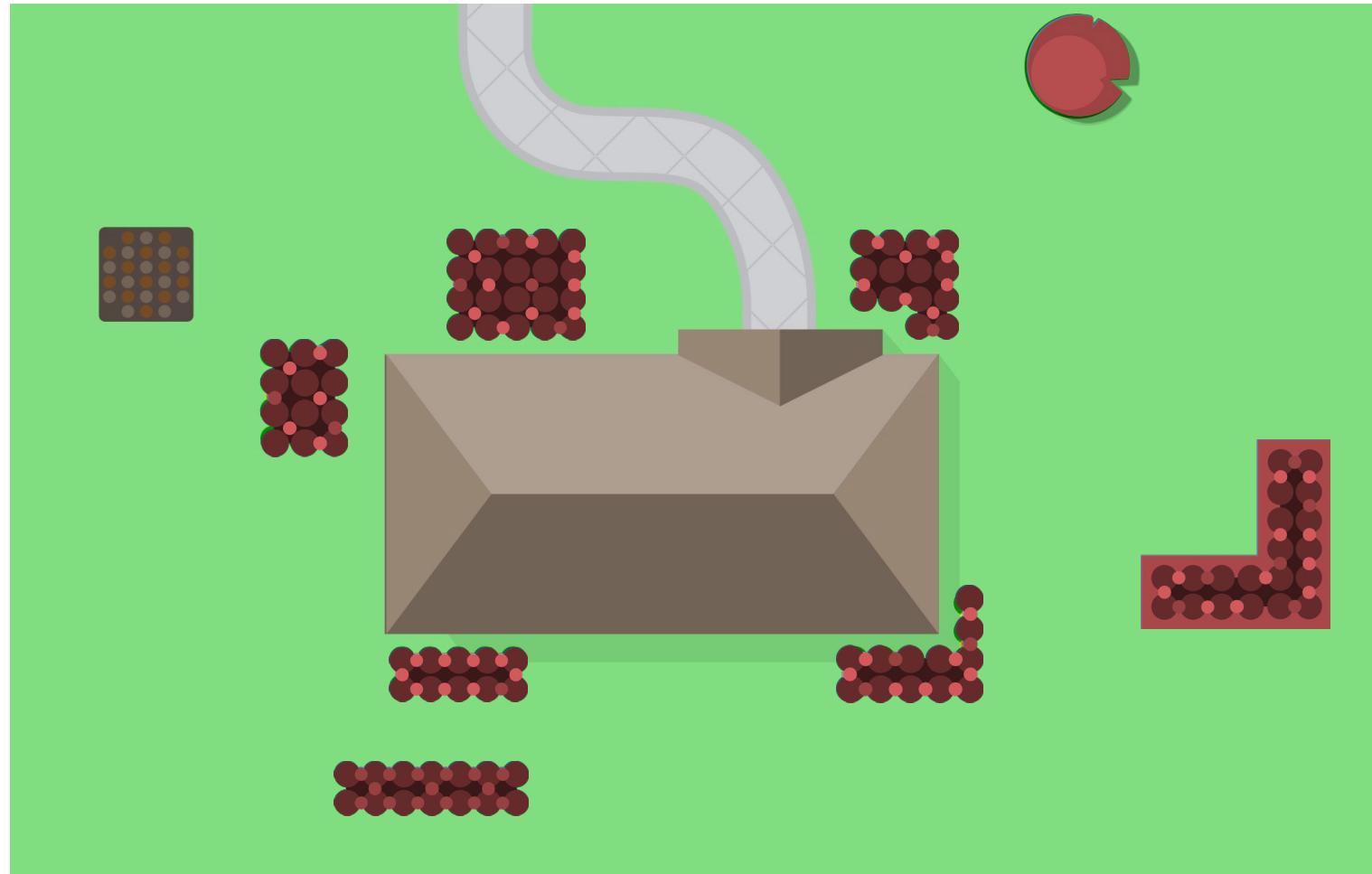
Mulching the yard

Bringing the mulch



Mulching the yard

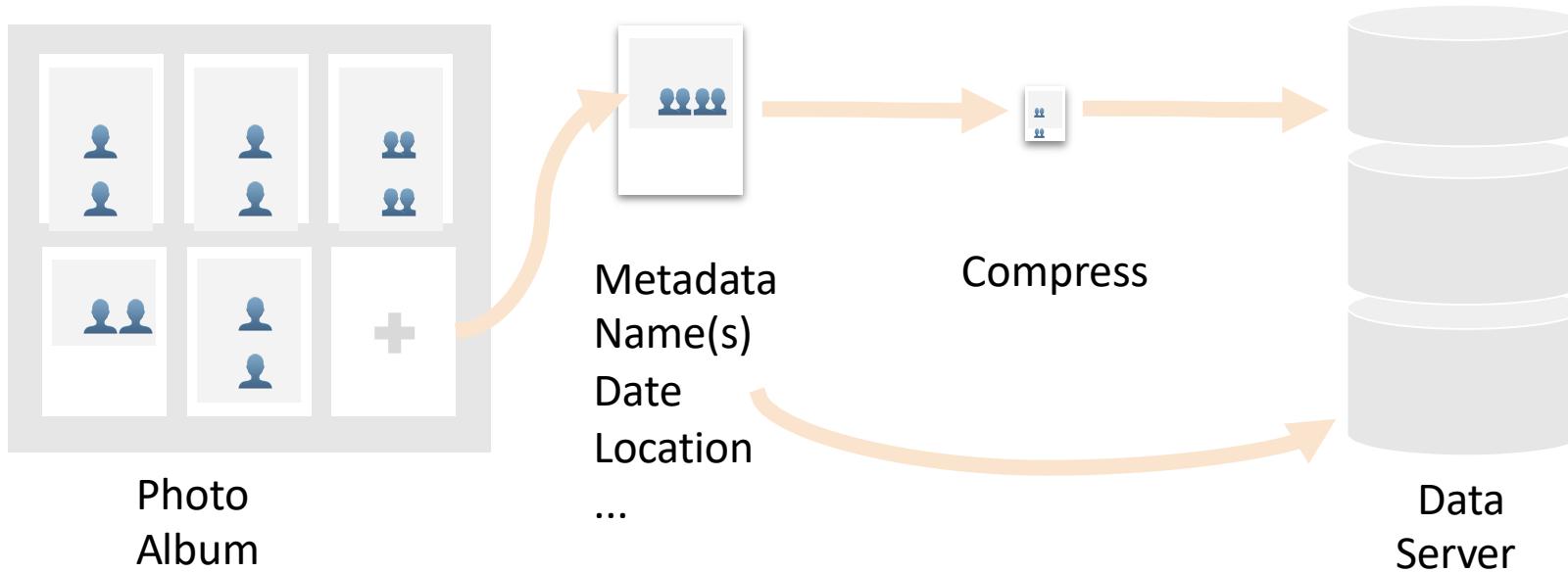
Laying down the mulch



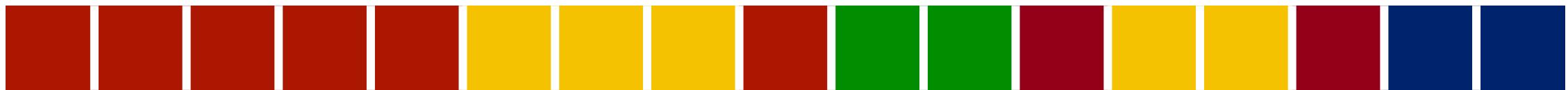
Different Types of Gardens



Social Media Site: Photo Albums



Data Compression



Summary

- Pattern recognition means finding similarities or shared characteristics within or between problems
- The same solution can be used for each occurrence of the pattern.



Data Representation & Abstraction

- Determining what characteristics of the problem are important and filtering out those that are not
- Use these to create a representation of what we are trying to solve



Students in a University Setting



Data Representation: Students

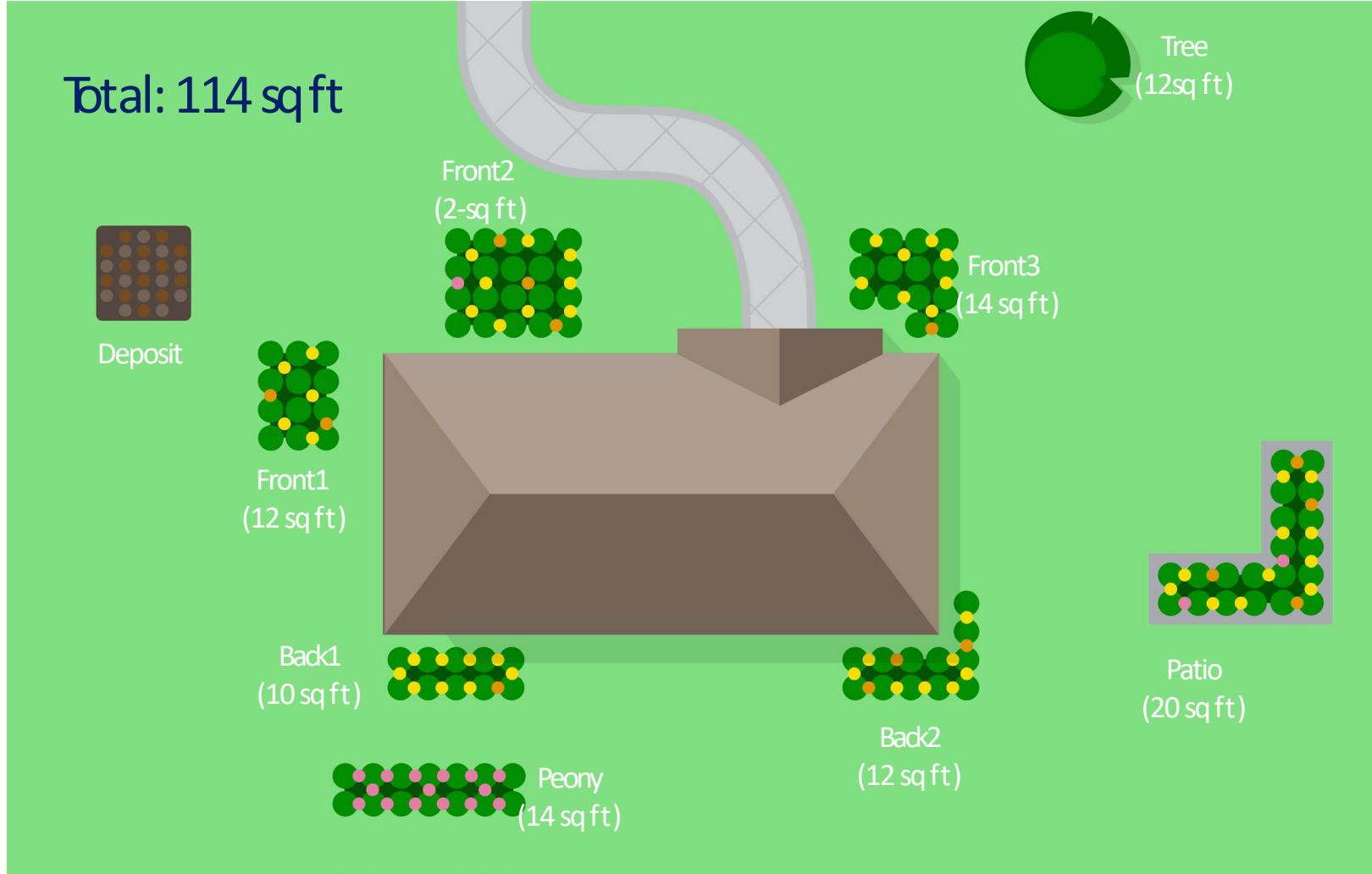
Important:

- name and billing address
- student id
- on-campus address
- phone number
- ...

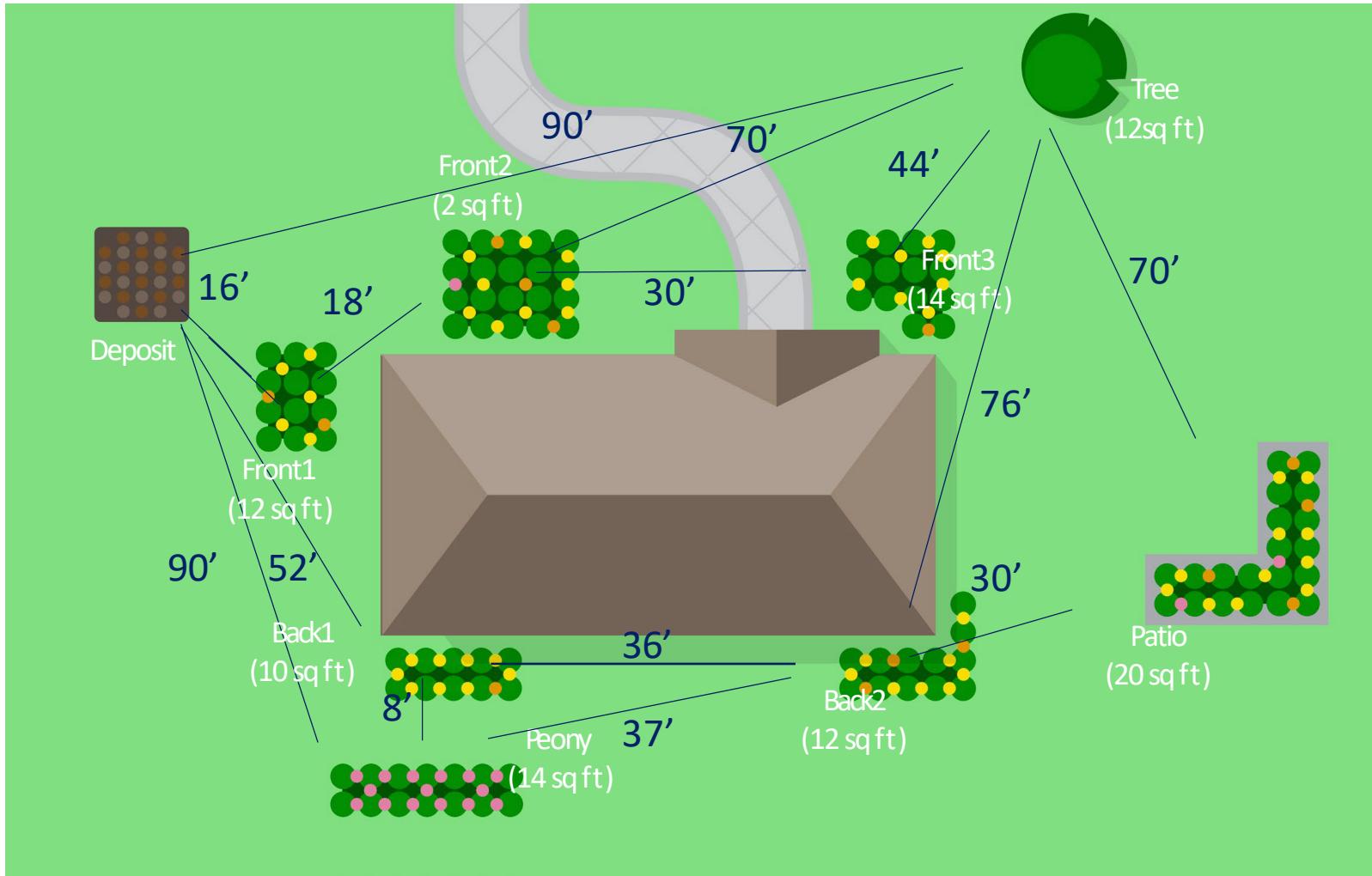
Not Important:

- favorite color
- shoe size
- food preferences
- ...

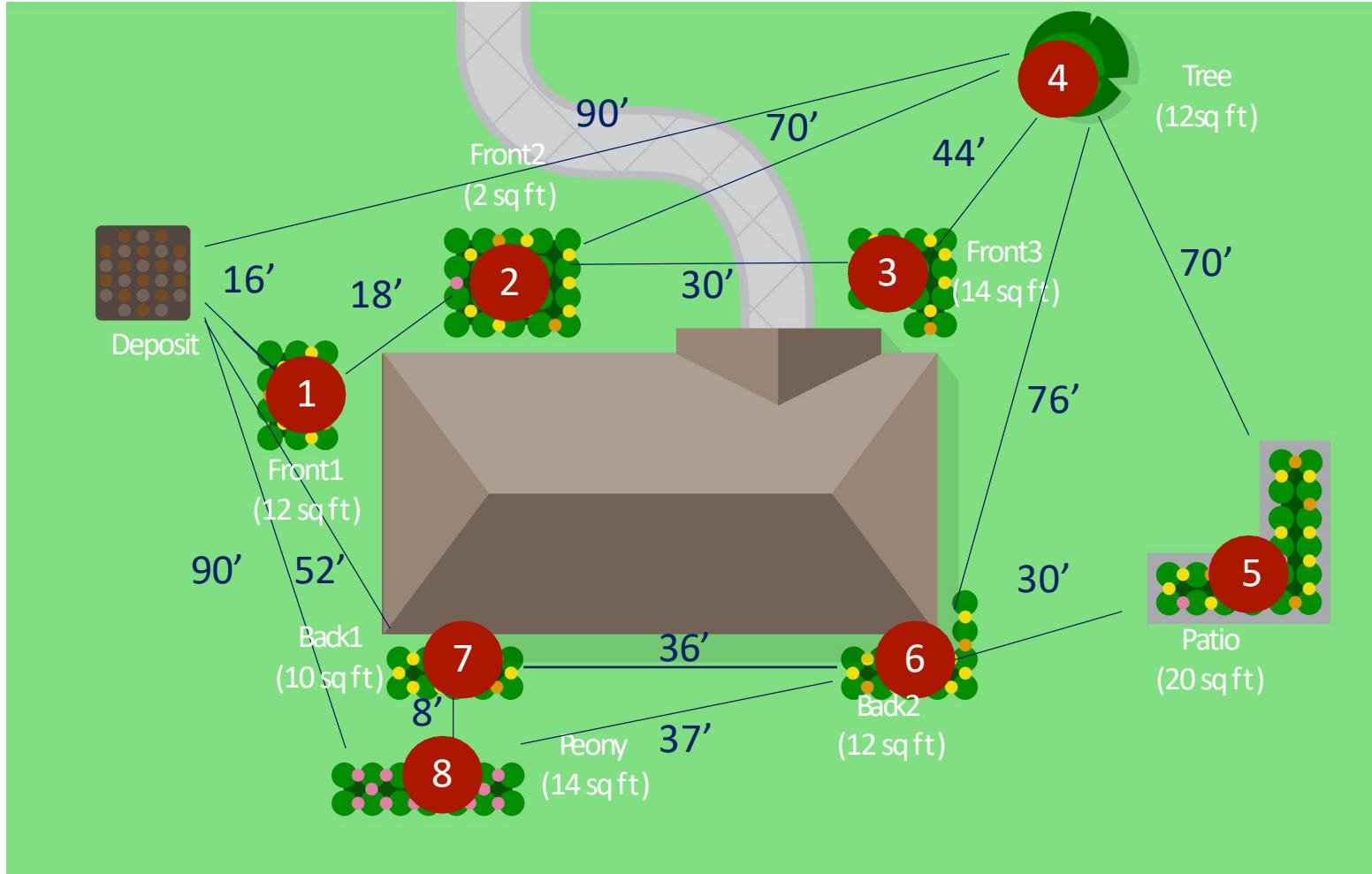
Data Representation: Mulching the Yard



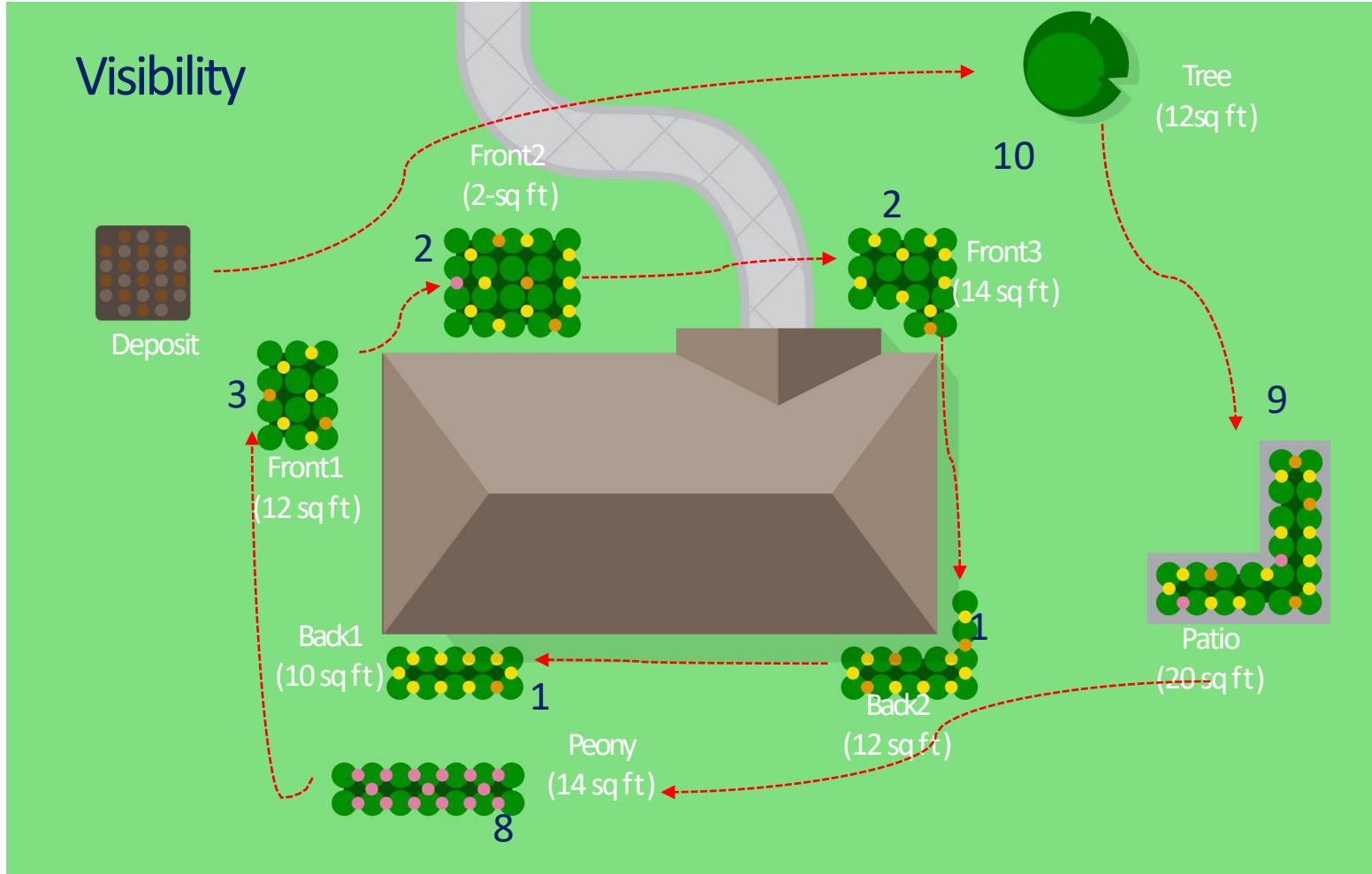
Layout: Distances Between Beds



Layout: Shortest Distance



Layout: Maximizing Satisfaction



Data Representation: Books

Important:

- author list
- title
- ISBN
- publication date
- edition
- category
- ratings
- summary
- ...

Not Important:

- color of the cover
- birthplace of authors
- complete contents of the book
- ...



Summary

- In data representation and abstraction, we determine what characteristics of the problem are important and filter out those that are not
- Use these to create a representation of what we are trying to solve

