Introduction to Python

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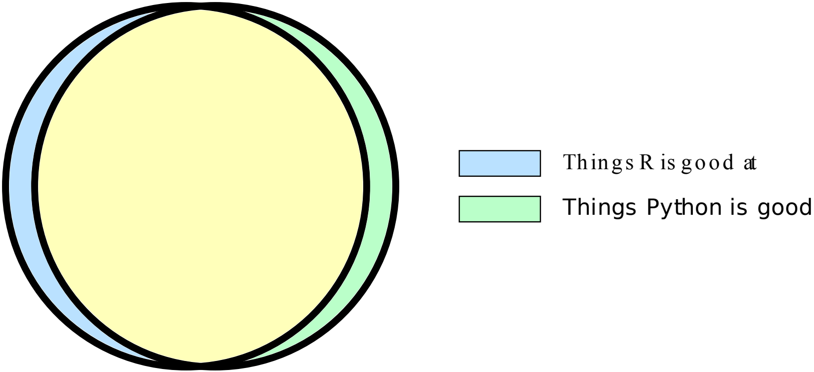
Outline

0. slides
1. basic syntax
2. compartmental model
3. individual-based model

When would you want to use Python



When would you want to use Python

- Domain-specific ecosystems
  - Machine learning (TensorFlow, PyTorch)
  - Climate modeling
- Building complex applications
- Faster*
- Because people around you do

R vs Python: Notable Differences

Feature	R	Python
whitespace	ignored	meaningful
data frames & stats	out-of-box	need package
packages	fussy	easy
operate on language	yes	no
modifying variables	copy-on-modify	modify-in-place
variable assignment	<- (madness)	= (sane)

Object oriented programming

- Objects = Data + Behaviour
- Classes are blueprints for creating objects

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```python
class Person():
  def __init__(self,name,age):
    self.name = name
    self.age = age
  def birthday(self):
    self.age += 1
```

General Python Resources

- Python Language Reference: `docs`
- Python Package Index: `pypi`

Task View: Packages

- Vectors & Arrays: `numpy`
- Dataframes: `pandas`, `polars`
- Plotting: `matplotlib`, `seaborn`
- Statistics & Algorithms: `scipy`
- Orderly: `outpack-py`

Example Model Code

- Optima HIV: `github`
- HIV in Eswatini: `github`
- Toy HIV-like model: `github`