



ENG 346

Data Structures and Algorithms for Artificial Intelligence

Python Basics

Dr. Kürşat İnce
kince@gtu.edu.tr

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About Python

- Python is an *interpreted, object-oriented* and *high-level* programming language.
- Created by Guido van Rossum, a Dutch programmer, in 1989.
- First public release: Python 0.9.0 in 1991.
- Python 2.0 released in 2000.
- Python 3.0 released in 2008.

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PYPL: Popularity of Programming Languages



Position	PYPL ranking September 2023
#1	Python
#2	Java
#3	JavaScript
#4	C#
#5	C/C++
#6	PHP
#7	R
#8	TypeScript
#9	Swift
#10	Objective-C

<https://www.stackstyle.com/blog/most-popular-programming-languages/>

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How to Access Python Interpreter?



- Official Website: <https://www.python.org/>
 - Interpreter + pip
 - Jupyter notebook via “jupyter” package
- Anaconda: <https://anaconda.org/>
 - Interpreter + conda + pip
 - Jupyter notebook via “jupyter” package
- Google Colab: <https://colab.research.google.com/>
 - Via Colab notebooks (like Jupyter notebooks)
- Kaggle: <https://www.kaggle.com/>
 - Via Kaggle notebooks (like Jupyter notebooks)

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Python Basics



- Variable naming: case-sensitive (e.g., temp vs Temp vs TEMP)
- Reserved words: cannot be used as variables.
 - False as continue else from in not return yield None assert def except global is or try True break del finally if lambda pass while and class elif for import nonlocal raise with
- Dynamically typed: No declarations are needed for the variables.
- Everything is basically an Object.

Built-in Types



Type	Description
bool	Boolean value
int	Integer
float	Floating-point number
list	Mutable sequence of objects
tuple	Immutable sequence of objects
str	Character string
set	Unordered set of distinct objects
frozenset	Immutable form of set class
dict	Dictionary (Associative mapping)

Operators



Operator Precedence		
	Type	Symbols
1	member access	expr.member
2	function/method calls container subscripts/slices	expr(...) expr[...]
3	exponentiation	**
4	unary operators	+expr, -expr, ~expr
5	multiplication, division	*, /, //, %
6	addition, subtraction	+, -
7	bitwise shifting	<<, >>
8	bitwise-and	&
9	bitwise-xor	^
10	bitwise-or	
11	comparisons containment	is, is not, ==, !=, <, <=, >, >= in, not in
12	logical-not	not expr
13	logical-and	and
14	logical-or	or
15	conditional	val1 if cond else val2
16	assignments	=, +=, -=, *=, etc.

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Control Flow



```

if first condition:
    first body
elif second condition:
    second body
elif third condition:
    third body
else:
    fourth body
  
```

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Loops



```
while condition:  
    body
```

```
for element in iterable:  
    body
```

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Functions



```
def count(data, target):  
    n=0  
    for item in data:  
        if item == target: # found a match  
            n += 1  
  
    return n
```

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Built-in Functions



Common Built-In Functions	
Calling Syntax	Description
abs(x)	Return the absolute value of a number.
all(iterable)	Return True if bool(e) is True for each element e.
any(iterable)	Return True if bool(e) is True for at least one element e.
chr(integer)	Return a one-character string with the given Unicode code point.
divmod(x, y)	Return (x // y, x % y) as tuple, if x and y are integers.
hash(obj)	Return an integer hash value for the object (see Chapter 10).
id(obj)	Return the unique integer serving as an "identity" for the object.
input(prompt)	Return a string from standard input; the prompt is optional.
isinstance(obj, cls)	Determine if obj is an instance of the class (or a subclass).
iter(iterable)	Return a new iterator object for the parameter (see Section 1.8).
len(iterable)	Return the number of elements in the given iteration.
map(f, iter1, iter2, ...)	Return an iterator yielding the result of function calls f(e1, e2, ...) for respective elements $e1 \in \text{iter1}, e2 \in \text{iter2}, \dots$
max(iterable)	Return the largest element of the given iteration.
max(a, b, c, ...)	Return the largest of the arguments.
min(iterable)	Return the smallest element of the given iteration.
min(a, b, c, ...)	Return the smallest of the arguments.
next(iterator)	Return the next element reported by the iterator (see Section 1.8).
open(filename, mode)	Open a file with the given name and access mode.
ord(char)	Return the Unicode code point of the given character.
pow(x, y)	Return the value x^y (as an integer if x and y are integers); equivalent to x ** y.

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Google Colab Exercises



- M01-Python_Basics.ipynb

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