08

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1 Day 8: Handheld Halting

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- https://adventofcode.com/2020/day/8

1.1 Setup

[3]:
```python
import pandas as pd
import re

from IPython.display import display, Latex
```

[2]:
```python
with open("inputs/08-input.txt") as f:
    raw = f.read().splitlines()
```

[3]:
```python
# separate and convert operations to numbers
instructions = [item.split(" ") for item in raw]
instructions = [[item[0], int(item[1])] for item in instructions]
```

[4]:
```python
instructions[:5]
```

[4]:
```
[['acc', -5], ['nop', 333], ['acc', 45], ['jmp', 288], ['acc', -9]]
```

[4]:
```python
display(Latex(r"\newpage"))
```

1.2 Part 1

[5]:

```
# run infinite loop, stop when double back to visited instruction
def run_the_loop(instructions):
    line = 0
    accumulator = 0
    visited = []

    # loop through instructions
    while line not in visited:

        # define values
        operation = instructions[line][0]
        argument = instructions[line][1]

        # mark this line as visited
        visited.append(line)

        # if at end, break (part 2)
        if line == len(instructions) - 1:
            break

        # respond to new instructions

        if operation == 'acc':
            accumulator += argument
            line += 1

        if operation == 'jmp':
            line += argument

        if operation == 'nop':
            line += 1

    return {"last_line": line,
            "accumulator": accumulator}
```

[6]:

```
run_the_loop(instructions)
```

[6]:

```
{'last_line': 439, 'accumulator': 1709}
```

[5]:

```
display(Latex(r"\newpage"))
```

1.3 Part 2

[7]:

```
desired_end_index = len(instructions) - 1
```

[8]:

```
# swap 'nop' and 'jmp', run new instructions
for ind, item in enumerate(instructions):

    modified = instructions.copy()
    operation = item[0]
    argument = item[1]

    if operation != 'acc':

        if operation == 'jmp':
            modified[ind] = ['nop', argument]
        elif operation == 'nop':
            modified[ind] = ['jmp', argument]

        # run on new instructions
        results = run_the_loop(modified)

        # if the loop ends at the last line, print it out
        if results['last_line'] == desired_end_index:
            print(results)
```

```
{'last_line': 616, 'accumulator': 1976}
```