# MPHYG001 Assignment 2: Refactoring Boids

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## Introduction/Usage

For this assignment, the task was to take the Boids code[1], packaging it up into a form that can be `pip` installed and run from the command line. This code may be found at the GitHub repository `ddervs/bad-boids`. The usage of the packaged function is shown below (the output of `boids --help`).

```
usage: boids [-h] [--config CONFIG] [--example_config]

Runs the boids simulation.

optional arguments:
  -h, --help        show this help message and exit
  --config CONFIG   YAML file with simulation options. See README.md or use
                    --example-config option for specification.
  --example_config  Saves default config file to current working directory.
```

## Refactorings

| Code Smell | Commit number |
|---|---|
| Repeated Loops | 515da7c |
| Magic Numbers | 87c90c7 |
| Turn `boids` into a class | 2ff425b |
| Repeated code/copypasta | 0128753 |
| Many constants → config file | a23e2fa |
| Large function into units | fa117b3 |
| Too many loops → `numpy` | 980ce16 |

## UML Diagram

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[1] http://development.rc.ucl.ac.uk/training/engineering/ch05construction/10boids.html

```
┌─────────────────────────────────┐
│             Boids               │
├─────────────────────────────────┤
│    boids: tuple(np.array)       │
│          config:dict            │
├─────────────────────────────────┤
│       fly_tom_middle()          │
│       fly_away_nearby()         │
│        match_speed()            │
│         move_boids()            │
│        update_boids()           │
│          animate()              │
│       run_animation()           │
└─────────────────────────────────┘

┌─────────────────────────────────┐
│      boids.new_flock()          │
├─────────────────────────────────┤
│          count:int              │
│      xlimits:list(float)        │
│      ylimits:list(float)        │
│      vxlimits:list(float)       │
│      vylimits:list(float)       │
└─────────────────────────────────┘
```
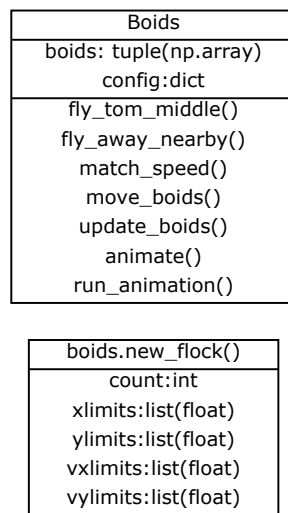
Figure 1: UML diagram of `boids` package.