Informatics Competitions

Informatics is the study of computational systems. It requires a robust foundation in mathematics, coupled with the ability to implement algorithms on a computer. In this document we give a rough roadmap for developing an understanding of the discipline via competitive programming.

Stage I - Learn to Code in Python. Python is an excellent general programming language to learn because it is widely used and not too difficult to understand. There are many online tutorials and resources suitable for those who are just starting out. For example,

`https://www.sololearn.com/`

In addition to free introductory courses this website also provides an online playground that allows you to experiment with coding without having to install any software on your own computer. Once you are ready to install and run Python on your own computer, you can do so at

`https://www.anaconda.com/products/individual`

This installation includes a superb environment for coding with Python called Jupyter Notebooks.

Stage II - Informatics Olympiads with Python. The flagship programming competition in Australia is the Australian Informatics Olympiad (AIO). This is an open competition in which participants submit code to solve a variety of problems. Solutions can be submitted in a range of languages, including Python. There is an associated training website

`https://orac.amt.edu.au/cgi-bin/train/hub.pl`

where you can find descriptions of past AIO problems, and submit proposed solutions that will be automatically evaluated for correctness.

Another website that allows you to submit solutions to informatics problems and have them evaluated, and that also facilitates many online competitions is

`https://codeforces.com/`

One of the main hurdles when beginning to tackle informatics problems in competitions is handling input and output. Competitions either work with

- standard input/output: where input/output is accomplished using certain built-in functions, or
- file input/output: where input/output is accomplished via reading and writing to files.

In the AIO they use file input/output, whereas at Codeforces they use standard input/output.

Stage III - Informatics Olympiads with C++. Python is an excellent language to learn at first, however, most Olympiad participants code in C++, since it is a faster, more efficient language. Competitions often come with time and memory constraints where it is advantageous to use C++. Once you have a good understanding of Python, it is not too hard to become proficient in C++. An introductory course is available at `https://www.sololearn.com/`, and the software needed to run C++ can be installed on your computer at:

`https://code.visualstudio.com/`

Arguably the best place for ongoing guidance on your informatics development is

`https://usaco.guide/`

This provides a comprehensive overview of the vast landscape, providing resources to guide you from your first steps, through to training for the International Olympiad in Informatics (IOI). I also highly recommend Introduction to the USA Computing Olympiad by Yao, available here:

`http://darrenyao.com/usacobook/cpp.pdf`