

Coursework 3

The coursework should be handed into the Documentation Administrator (Wendy Field) by 3:00pm on Tuesday 26th May 1998 (this gives you the bank holiday weekend to finish it!).

Every page should have on it

- The page number
- Your name
- Your login
- The course code and name (i.e. G5BAIM – Artificial Intelligence Methods (AIM)).
- The lecturers name (i.e. Graham Kendall)

Assignment

1) Given the following parents

P₁	A	B	C	D	E	F	G	H	I	J
P₂	E	F	J	H	B	C	I	A	D	G

And the following template

1	0	1	1	0	0	0	1	0	1
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Show examples of one point, two point, uniform and order-based crossover

2) Orders are received throughout the day from the customers of a glass supply company. Each order represents a number of glass shapes that are to be supplied. The shapes can be considered as convex polygons. These shapes are cut overnight from large stock sheets and delivered the next day to the customer.

It is in the suppliers interest to minimise the amount of glass that is wasted (that is glass that is thrown away after the cutting process). Therefore, the problem faced by the supplier is to arrange the glass shapes on the stock sheet in such a way so as to minimise the waste.

Suggest a way that this problem could be encoded so that a solution could be evolved by a genetic algorithm. In doing this you can assume the following

- All the shapes to be cut can fit onto one stock sheet
- All the shapes are convex polygons
- You are allowed any types of cut (see guillotine cuts below)
- The shapes, in the final configuration, are not allowed to overlap.
- You are **not** required (but can if you wish) implement your solution.

There is no correct answer to this question. Marks will be awarded using the following criteria (and I suggest you lay out your answer under these headings)

- Your understanding of the problem (that is a summary of the problem in your own words).
- The encoding scheme you would use.
- The crossover and mutation operators you would use.
- How you would handle constraints (such as not allowing overlap in the final configuration).

Limit your answer to two A4 sheets.

Note : This type of problem (known as two-dimensional bin packing) has many real world applications. In addition there are many more complexities such as the supplier can only do guillotine cuts (or not) - that is cuts must go from one edge of a stock sheet to another, there can be many different sizes of stock sheet and non-convex polygons are allowed.