

## Learning and Computational Finance and Economics

### Answers to Test 2010-11

#### Answer 1:

(a) The following matrix should be produced:

	Predicted F	Predicted T	Total
F in reality	3	1	4
T in reality	2	4	6
Total:	5	5	10

(b) Answers:

\* Accuracy (true positive + true negative divided by total number of cases):

$$(4+3) / 10 = 70\%$$

\* Precision (true positive divided by true positive + false positive):  $4/5 = 80\%$

\* Recall (true positive divided by true positive + false negative):  $4/6 = 66.7\%$

(c) If every position prediction has costly implications, then precision is more important than recall. Therefore, if one has a chance to improve precision or recall, the former is preferred.

(d) Precision will remaining the same, but recall will be reduced. Therefore, this is not a useful exercise.

**Answer 2:**

- (a) Having new indicators is useful, but they themselves do not help forecasting. EDDIE can help in two ways:
- (i) EDDIE will help you to create selectors from those indicators, e.g.  $R > 2.4$ ,  $K < 1.6$ , etc.
  - (ii) EDDIE will also help to combine those selectors into a tree. In other words, EDDIE helps to find the interaction between selectors.
- (b) Combinatorial explosion is a term that describes the computation cost grows exponentially as the size of the problem increases. It is possibly due to the exponential increase in the number of combinations.
- (c) There is no simple answer to this question. Marks will be given to any sensible answer provided that it is carefully justified. Here are two possible answers:
- In terms of run time, EDDIE does not suffer from combinatorial explosion. One can run EDDIE for as much iteration as one can afford to.
  - However, as the search space grows exponentially, EDDIE has less chance in finding good solutions. In that sense, EDDIE suffers from combinatorial explosion.

Answer 3:

- (a) Vernon Smith's idea is that economic policies should be tested through modeling and simulation. This would allow one to evaluate the policies before they are implemented.
- (b) All models are wrong, but some are useful. Models allow one to scientifically evaluate the policies, which is better than doing nothing. Besides, if the simulated results are different from the observed results, one can change the models, which will help future evaluations.
- (c) [This is the subject of Biliانا Alexandrova's PhD research. Students are not supposed to have seen it. However, students are taught what artificial markets, so they should be able to answer this part of the question. Marks will be given generously.]

There are many possible approaches. One approach is to build a model of the point-of-purchase. This models the merchants' and the customers' decision process on whether to accept/use a credit card or not. Their decisions are clearly affected by advertising and the fees.

With a model built, the experimenter can use machine-learning techniques (such as genetic programming) to find optimal values for the advertising budget and the fees. This approach allows one to explore many possible values, and use feedback to fine-tune them.