Kitami Institute of Technology

THE USE OF GENETIC ALGORITHM TO OPTIMIZE QUANTITATIVE LEARNER'S MOTIVATION MODEL

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Agenda

- Related research
- Quantitative Learner's Motivation Model
- Genetic Algorithm
- Experiment
  - Data
  - Diagram of the Program
  - Results
- Conclusion
- Future Works

Related research

Genetic Algorithms in Natural Language Processing

- Dialogue systems
- Language generations
- Machine learning

Quantitative Learner's Motivation Model

Attitude of students towards the attended courses and their quantification represents the general level of learning motivation

Three elements of QLMM are:

- interest,
- usefulness in the future,
- and satisfaction.

Genetic Algorithm

- Simple Genetic Algorithm
- Genetic Algorithm with Asexual and Sexual reproduction
- Genetic Algorithm with mutation (Crossover)

- Number of chromosomes of the population is variable, depending on the value of the evaluation function of entire population.
- Parameter age in the range [0..max age]

Lifetime of the chromosome:

$$MinLT + (MaxLT - MinLT)\frac{eval(v_i(t)) - AbsFitMin}{AbsFitMax - AbsFitMin}$$

Experiment - Data

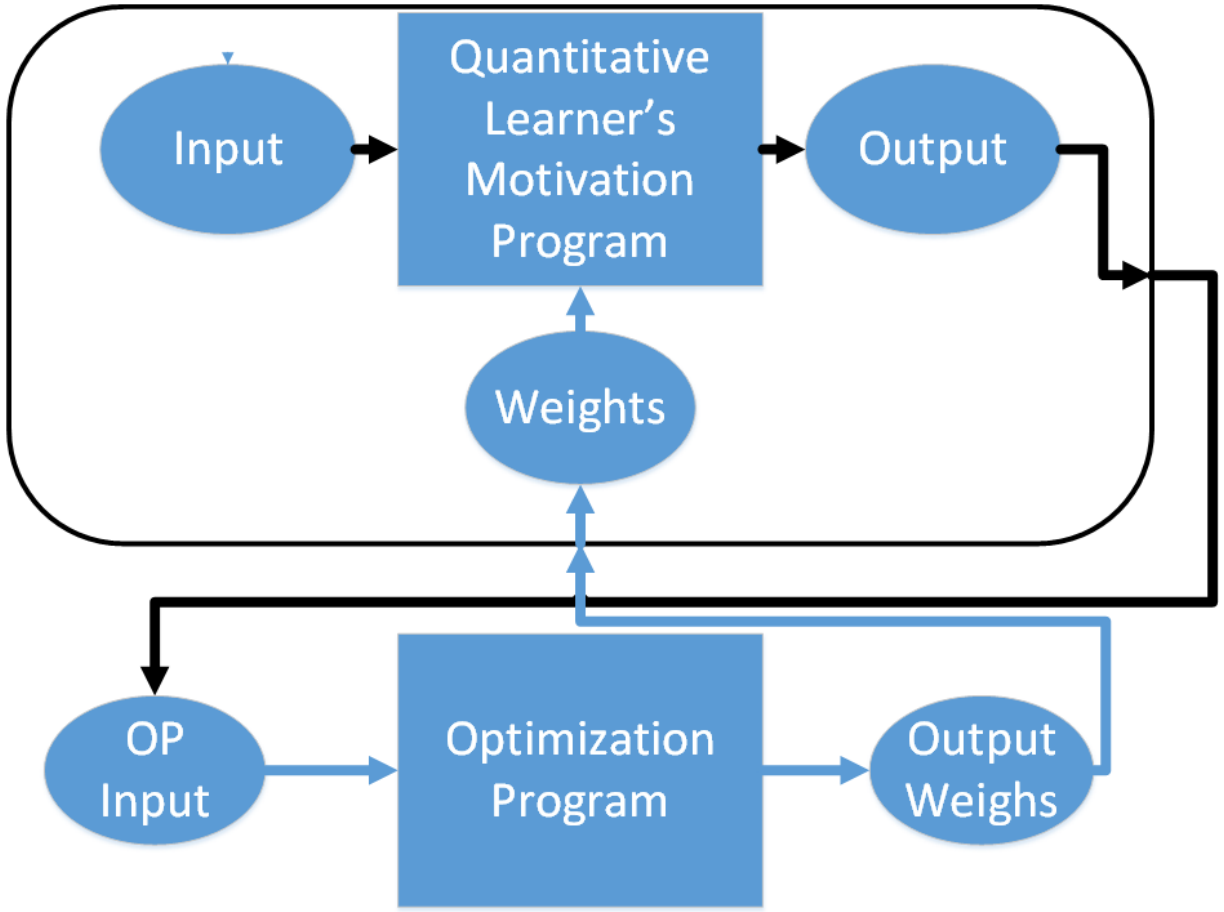
Questionnaires for:

- 9 different courses
- Undergraduates student of 1st to 3rd year

5,040 answers including those performed at the beginning and at the end of the school year

Range values for three elements of QLMM are from 1 to 5.

Experiment – Diagram of the Program



Experiment - Results

Genetic algorith type	Improvement in Precision	Improvement in Recall
Simple Genetic Algorithm (SGA)	6 %	7%
GA with limited liftime	13 %	15%
GA with sexual selection	11 %	11%
Ga with limitied liftime and sexual selecion	**17 %**	**21%**

Conclusion

- Succesfull otpimization of QLLM Model
- Fast and efficient way to optimize binary classifiers
- Possible application in other projects

Future Works

Optimization of binary classifiers

- Sentiment analysis
- Fake reviews detection
- Cyberbullying detection etc.

Thank you for your attention

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