

HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY  
SCHOOL OF INFORMATION AND COMMUNICATION  
TECHNOLOGY

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**GRADUATION THESIS**  
**DEPARTMENT OF COMPUTER SCIENCE**

**Tiến hóa đa nhiệm trong huấn luyện mạng  
Neural nhân tạo**

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Hanoi, May 2020

# Graduation mission ticket

## Student information

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- **Class:** ICTx K6x
- **Duration:** From Month 202X to Month 202X

## Main purpose of the thesis

1. Research about
2. Research and apply

## Specific mission of the thesis

1. Research
2. Apply
3. Implement
4. Conduct the experiments, synthesize and analyze the result.

## Pledge of student

I am *Nguyen Van X* guarantee that this thesis is my own work under the supervision of Associate Professor X.

The proposals and results in this thesis are authentic and original. .

*Hanoi,  $xx^{th}$ , Month 202X*

Author of thesis

*Nguyen Van X*

## Confirmation for the completeness of the thesis and permission for the thesis to be defense from supervisor

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*Hanoi,  $xx^{th}$ , Month 202X*

Supervisor

*Assoc Prof. X*

# Acknowledgement

I would like to thanks

*Hanoi,  $xx^{th}$ , Month 202X*  
*Nguyen Van X*

# Abstract

Abstract of your thesis  
The thesis is organized as follows:

- **Chapter 1** provides
- **Chapter 2** introduces
- **Chapter 3** presents
- **Chapter 4** represents

# Preface

Describe overview of the field and your motivation why are you doing this topic

# Glossaries

Acronym	Full terminology
EA	Evolutionary Algorithm
GA	Genetic Algorithm
EP	Evolutionary Programming
GP	Genetic Programming
ES	Evolution Strategies
MFO	Multifactorial Optimization
MOO	Multi Objective Optimization
ANN	Artificial Neural Network
MFEA	Multi Factorial Evolutionary Algorithm
MDP	Markov Decision Process
RL	Reinforcement Learning
SL	Supervised Learning
SBX	Simulated Binary Crossover
FSM	Functional Synergies Measure

# Danh sách bảng

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## Danh sách hình vẽ

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# Chương 1

## Introduction

### 1.0.1 Deep Q-Network

Deep Q-network [1]

## Chương 2

### Problem formulation

## Chương 3

# Proposed method

### 3.0.1 New algorithm

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**Algorithm 1** Assortative mating

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Consider two parent candidates  $p_a$  and  $p_b$  randomly selected from *current – pop*

- 1: Generate a random number  $rand$  between 0 and 1
  - 2: **if** ( $\tau_a == \tau_b$ ) or ( $rand < rmp$ ) **then**
  - 3:     Parents  $p_a$  and  $p_b$  crossover to give two offspring individuals  $c_a$  and  $c_b$
  - 4: **else**
  - 5:      $p_a$  is mutated slightly to give an offspring  $c_a$
  - 6:      $p_b$  is mutated slightly to give an offspring  $c_b$
  - 7: **end if**
-

## Chương 4

## Result

### 4.0.1 Small instance

Gravity	EA				MFEA			
	Best	Mean	Std	Time (s)	Best	Mean	Std	Time
gravity=0.80	200.00	200.00	0.00	1.10	200.00	200.00	0.00	1.13
gravity=10.80	200.00	200.00	0.00	1.10	200.00	200.00	0.00	1.13
gravity=20.80	200.00	200.00	0.00	1.10	200.00	200.00	0.00	1.13
gravity=30.80	200.00	200.00	0.00	1.10	200.00	200.00	0.00	1.13
gravity=40.80	200.00	200.00	0.00	1.10	200.00	200.00	0.00	1.13
gravity=50.80	200.00	196.95	11.29	1.10	200.00	<b>200.00</b>	0.00	1.13
gravity=60.80	200.00	199.99	0.04	1.10	200.00	<b>200.00</b>	0.00	1.13
gravity=70.80	200.00	189.38	24.78	1.10	200.00	<b>200.00</b>	0.00	1.13
gravity=80.80	200.00	191.43	18.90	1.10	200.00	<b>199.31</b>	2.95	1.13
gravity=90.80	200.00	167.84	26.90	1.10	200.00	<b>193.62</b>	11.08	1.13

Bảng 4.1: some description

# Conclusion

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# Tài liệu tham khảo

- [1] Volodymyr Mnih, Koray Kavukcuoglu, David Silver, Andrei A. Rusu, Joel Veness, Marc G. Bellemare, Alex Graves, Martin Riedmiller, Andreas K. Fidjeland, Georg Ostrovski, Stig Petersen, Charles Beattie, Amir Sadik, Ioannis Antonoglou, Helen King, Dhharshan Kumaran, Daan Wierstra, Shane Legg, and Demis Hassabis. Human-level control through deep reinforcement learning. *Nature*, 518(7540):529–533, February 2015.