

Adaptive Collaborative Autonomous Wireless Networks

by

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MANUSCRIPT-BASED THESIS PRESENTED TO ÉCOLE DE
TECHNOLOGIE SUPÉRIEURE
IN PARTIAL FULFILLMENT FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
Ph.D.

MONTREAL, "DEPOSIT DATE"

ÉCOLE DE TECHNOLOGIE SUPÉRIEURE
UNIVERSITÉ DU QUÉBEC



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FOREWORD

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ACKNOWLEDGEMENTS

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French title

Aytac OZKAN

RÉSUMÉ

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Mots-clés: mot-clé1, mot-clé2

Adaptive Collaborative Autonomous Wireless Networks

Aytac OZKAN

ABSTRACT

Due to tremendous improvements of technology, the world is more connected than ever at the human history. Mobile devices, cell phones, smart home solutions, autonomous cars etc. These vehicles are usually using IEEE 802.15.4 communication protocols, the devices which uses this protocol has the limited number of communication channels and low transmit power, are especially susceptible for the jamming attacks. For example, some internet of things (IoT) devices (e.g., brain and heart inculcated IoT devices), jamming attacks can cause serous consequences for human health

Within this concern, to prevent this kind of intentional interference against the wireless networks, we are going to employ self learning algorithms such as deep reinforcement learning to develop resilient, intelligent, and self-supervised anti-jamming framework.

Since, The DeepMind has been introduced the Reinforcement Learning (RL) and Q-Learning algorithm H., A. & D. (2016), this tools become one of the major toolkit to develop mitigation and intelligent deceptions strategies to prevent against reactive jamming attacks. Despite it is a subset of machine learning Kasturi, Jain & Singh (2020),it is no need long training times and huge datasets, and this future is the key of its success at the field.

Keywords: reinforcement-Learning, transfer-learning,wireless-networks,anti-jamming,multi-agent, collaborative-learning

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LIST OF ABBREVIATIONS

ETS	École de Technologie Supérieure
ASC	Agence Spatiale Canadienne

LIST OF SYMBOLS AND UNITS OF MEASUREMENTS

a	Première lettre de l'alphabet
A	Première lettre de l'alphabet en majuscule

INTRODUCTION

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Figure 0.1 Test of a long caption, using a framebox and a parbox to constrain the caption

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CHAPTER 1

**LONG CHAPTER TITE, WITH LINEBREAK. LOREM IPSUM DOLOR SIT AMET,
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SAGITTIS FEUGIAT EGET, ORNARE RHONCUS LIGULA. NUNC NON ODIO SED
LACUS RUTRUM RHONCUS.**

1.1 Layout tests

In this sections, several environments are presented.

1.1.1 Listing tests

Presentation of the main listing environments: enumerations and lists.

1.1.1.1 Enumerations: `enum` environment

Enum environment test:

1. test 1
2. test 2

1.1.1.2 Lists: `itemize` environment

Test of the itemize environment

- test 1
- test 2

1.1.2 Equations tests

Layout of the equations:

$$\beta = 8$$

(1.1)

$$\gamma = \alpha \times 3 \quad (1.2)$$

1.2 Second section

Example of a second section, to test the layout in the table of contents.

Algorithm 1.1 Algorithm example

Input: Gallery with initial templates $\mathcal{G} = \{\mathbf{r}_1, \dots, \mathbf{r}_J\}$, unlabeled adaptation set $\mathcal{D} = \{\mathbf{d}_1, \dots, \mathbf{d}_L\}$	
Output: Updated Gallery $\mathcal{G}' = \{\mathbf{r}_1, \dots, \mathbf{r}_{J'}\}$, $J' \geq J$	
1	Estimate updating threshold $\gamma^u \geq \gamma^d$ from \mathcal{G} ;
2	$\mathcal{G} \leftarrow \mathcal{G}'$; /* update gallery */
3	for all samples $d_l \in \mathcal{D}$ ($l = 1, \dots, L$) do
4	for all references $r_j \in \mathcal{G}$ ($j = 1, \dots, J$) do
5	$s_j(\mathbf{d}_l) \leftarrow \text{similarity_measure}(\mathbf{d}_l, \mathbf{r}_j)$;
6	end for
7	end for
8	$S(\mathbf{d}_l) \leftarrow \max_{j \in [1, J]} \{s_j(\mathbf{d}_l)\}$;
9	if $S(\mathbf{d}_l) \geq \gamma_d$ then
10	Output positive prediction;
11	if $S(\mathbf{d}_l) \geq \gamma^u$ then
12	$\mathcal{G}' \leftarrow \mathcal{G}' \cup \mathbf{d}_l$;
13	end if
14	end if

CHAPTER 2

SECOND CHAPTER

2.1 Table layout tests

Tables have the same constraints than the figures, except for the caption that has to be on top.

Table 2.1 Test of a long table caption, with linebreak

titre	titre	titre	titre	titre	titre	titre	titre
blá	blá	blá	blá	blá	blá	blá	blá
blá	blá	blá	blá	blá	blá	blá	blá
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blá	blá	blá	blá	blá	blá	blá	blá
blá	blá	blá	blá	blá	blá	blá	blá

2.2 References test

2.2.1 References to the bibliography

2.2.2 References to the list of references "refs"

References from the list of references "refs", declared at the beginning of the document mAuth1 (2001).

2.2.3 References to a label of the document

Reference to a Figure associated to a label: Figure 0.1.

2.2.4 URL references

2.2.4.1 Test of "href"

Href is used to integrate a link to a text: Link to the template page..

2.2.4.2 Test de url

Url is used to format a clickable link: <http://www.etsmtl.ca/Etudiants-actuels/Cycles-sup/Realisation-etudes/Guides-gabarits>.

CHAPTER 3

EXAMPLE OF A THESIS BY ARTICLE, WITH INTEGRATED ARTICLE

First name Last name¹ , First name Last name¹

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Article soumis à la revue « Vecteur environnement » en septembre 2010.

3.1 Section 1

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CONCLUSION AND RECOMMENDATIONS

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APPENDIX I

APPENDIX EXAMPLE

1. First section of the appendix

1.1 Figures in annexes



Figure-A I-1 Figure in an appendix

In the annexes, the figures are declared in the same way. Their numbering changes automatically (e.g. Figure I-1).

1.1.1 Tables in annexes

Table-A I-1 Table in an appendix

titre	titre	titre	titre	titre	titre	titre	titre
blá	blá	blá	blá	blá	blá	blá	blá
blá	blá	blá	blá	blá	blá	blá	blá
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blá	blá	blá	blá	blá	blá	blá	blá
blá	blá	blá	blá	blá	blá	blá	blá

Same behaviour for the tables (e.g., Table I-1).



(a) first figure



(b) second figure



(c) third figure



(d) fourth figure

Figure-A I-2 Subfig example

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