

BACKPROPAGATION IN CHAOTIC NEURAL NETWORKS

ZEYU XIE¹, ANGXIU NI^{2,3}

1. INTRODUCTION

1.1. Literature review.

1.2. Main results.

2. UNSTABLE NEURAL NETWORKS

2.1. Lyapunov spectrum.

2.2. Lyapunov vectors.

2.3. Adjoint Lyapunov spectrum and duality.

3. BACKPROPAGATION UNDER GRADIENT EXPLOSION

3.1. Conventional difficulty.

3.2. Backpropagation via adjoint shadowing.

3.3. Kernel differentiation method. [1][2][2][3]

REFERENCES

- [1] Mohammad Abu-Zurayk and Joël Brezillon. Development of the adjoint approach for aeroelastic wing optimization, 2013.
- [2] Marc Gerritsma, Peter Vos, and Jan Bart Van Der Steen. Time-dependent polynomial chaos. *AIP Conference Proceedings*, 1048:221–224, 2008.
- [3] Igor Baseski, Dorin Drignei, Zissimos P Mourelatos, Monica Majcher, and Rochester Mi. A new metamodeling approach for time - dependent reliability of dynamic systems with random parameters excited by input random processes. 2014.

¹ DEPARTMENT OF MATHEMATICS, TSINGHUA UNIVERSITY, BEIJING, CHINA.

² DEPARTMENT OF MATHEMATICS, UNIVERSITY OF CALIFORNIA, IRVINE, USA

³ YAU MATHEMATICAL SCIENCES CENTER, TSINGHUA UNIVERSITY, BEIJING, CHINA.

E-mail address: niangxiu@gmail.com.

Date: 2024 年 4 月 6 日.