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種別(和文)	要約
Type(English)	Outline

A Gaussian Process-based Incremental Neural Network

Chapter Ⅰ：Introduction

A. Introduce the research background (online machine learning, topology preservation, noise robustness, etc.)
B. Discuss some related artificial neural networks and their shortcomings
    1. Self-organizing map
    2. Two variants of the self-organizing incremental neural network
C. Describe the research questions addressed in the thesis (propose a general framework, design novel algorithms for different online machine learning tasks, and analyze the properties)

Chapter Ⅱ：A Gaussian Process-based Incremental Neural Network for Online Density Estimation

A. Propose a general framework
    1. Introduce Gaussian process
    2. Present a novel similarity measure to train an incremental neural network
B. Calculate the optimal bandwidth matrix
C. Analyze the asymptotic mean squared error
D. Conduct experiments to compare with previous methods

Chapter Ⅲ：A Gaussian Process-based Incremental Neural Network for Online Clustering

A. Investigate edge weight
B. Construct the minimum spanning tree to detect clusters
C. Conduct experiments to compare with previous methods

Chapter Ⅳ：A Gaussian Process-based Incremental Neural Network for Online Regression

A. Derive the approximate posterior over the regression function values at nodes
B. Calculate the optimal bandwidth matrix and the threshold region for each node
C. Analyze some properties of our approach (e.g., extend to an implicit feature space)
D. Unveil the relation with statistical ensembles of networks
E. Conduct experiments to compare with previous methods

Chapter Ⅴ：Conclusion

A. Thesis summary
    1. Propose the framework of a Gaussian process-based incremental neural network
    2. Provide the error analysis
    3. Design novel algorithms for 1) online density estimation, 2) online clustering, and 3) online regression, and achieve remarkable accuracy improvements
    4. Analyze the properties and advantages
B. Future work (e.g., online classification)