

Problemas teóricos del aprendizaje profundo en control automático

Las técnicas de aprendizaje profundo se han desarrollado en el procesamiento de señales y la minería de datos, en los últimos años se han aplicado con éxito a las áreas de control automático, como la identificación del sistema, el control adaptativo, las detecciones de fallas, etc. Sin embargo, aún quedan muchos problemas de teoría sin resolver.

En este seminario, se discutirán varios algoritmos recientes de aprendizaje profundo en control automático en el sentido del análisis teórico. Los temas específicos cubiertos incluyen muchos métodos populares de aprendizaje profundo, como LSTM, CNN, aprendizaje por refuerzo.

Contenido

1. Técnicas de aprendizaje profundo _ 6 hrs
2. Redes neuronales convolucionales (CNN) _ 6 hrs
3. Memoria a corto y largo plazo (LSTM) _ 6 hrs
4. Aprendizaje de refuerzo _ 4 hrs
5. Método bayesiano _ 2 hrs
6. Meta aprendizaje _ 2 hrs
7. Modelos ocultos de Markov _ 2 hrs
8. Máquina de vectores de soporte _ 2 hrs

Referencias

- [1] G.E.Hinton , R.R.Salakhutdinov, Reducing the dimensionality of data with neural networks, *Science*, 313(5786), 504-507, 2006
- [2] LeCun, Yann; Bengio, Yoshua; Hinton, Geoffrey, Deep learning, *Nature*, 521 (7553): 436-444, 2015
- [3] LeCun, Yann; Léon Bottou; Yoshua Bengio; Patrick Haffner, Gradient-based learning applied to document recognition, *Proceedings of the IEEE*. 86 (11): 2278-2324, 1998
- [4] V.James, G., Witten, D. Hastie, T. and Tibshirani, R. *An Introduction to Statistical Learning* Springer, 2014.
- [5] Ian Goodfellow, Yoshua Bengio, Aaron Courville, *Deep Learning*, MIT Press, 2016
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Theory problems of deep learning in automatic control

Deep learning techniques have been developed in signal processing and data mining, recent years they are successfully applied to the areas of automatic control, such as system identification, adaptive control, fault detections, etc. However, they are still many theory problems unsolved.

In this seminar, several recent deep learning algorithms in automatic control will be discussed in the sense of theory analysis. Specific topics covered include many popular deep learning methods, such as LSTM, CNN, reinforcement learning.

Content

1. Deep learning techniques
2. Convolutional neural networks (CNN)
3. Long-short term memory (LSTM)
4. Reinforcement learning
5. Bayesian method
6. Meta learning
7. Hidden Markov Models
8. Support Vector Machine

References

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- [9] LeCun, Yann; Bengio, Yoshua; Hinton, Geoffrey, Deep learning, *Nature*, 521 (7553): 436-444, 2015
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- [12] Vapnik, V. N., *Statistical Learning Theory* , Wiley-Interscience, 1998.
- [13] Jordan, M. and Bishop, C., *Introduction to Graphical Models* , UCB