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Factored four-way conditional restricted Boltzmann machines (FFW-CRBMs) for activity recognition

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The Challenge

What the person is doing? (activity recognition)
What the person will do next? (prediction)

The Solution

FW-CRBM

FFW-CRBM

The FFW-CRBM model

Energy

Inference

Weights Update

The Exploitation

Example on Fibonacci Series

I. Exercise activities

"body squat" (EA1), "circular to horizontal hand movements" (EA2), "spinning and closing of arms while moving" (EA3), "peeping" (EA4), "big hugs" (EA5), "walking" (EA6)

Experiments and Results

I. Exercise activities

a. Classification accuracy [%]

II. Table activities: "planning", "typing", "using a spreadsheet", "using a knife and fork", "reading", and "writing" [1]

III. Berkeley multimodal human action database: 11 activities performed by 12 persons [1]

Conclusion

- Novel machine learning technique for activity recognition and prediction suitable for any time series in general.
- FFW-CRBM came together with an adapted training algorithm SMcCD.
- FFW-CRBMs are capable of: (1) classification, (2) prediction, and (3) self auto evaluation of their classification performance within one unified framework.

Reference