

Nonlinear Analysis for Cardiogram

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Consider the pattern of cardiogram

Method

: Wavelet analysis

$$u(t) = \sum_{i=1}^n d_i f_i(t)$$

Characteristic

: d_1, d_2, \dots, d_n ($n = 40 \sim 60$)

Problems

: high dimensions (40 ~ 60-dimension)

Suggestion

: Learning algorithms

Our problem

: AMI (Acute Myocardial Infarction)

Consider $\{x_i\}$ be a time series

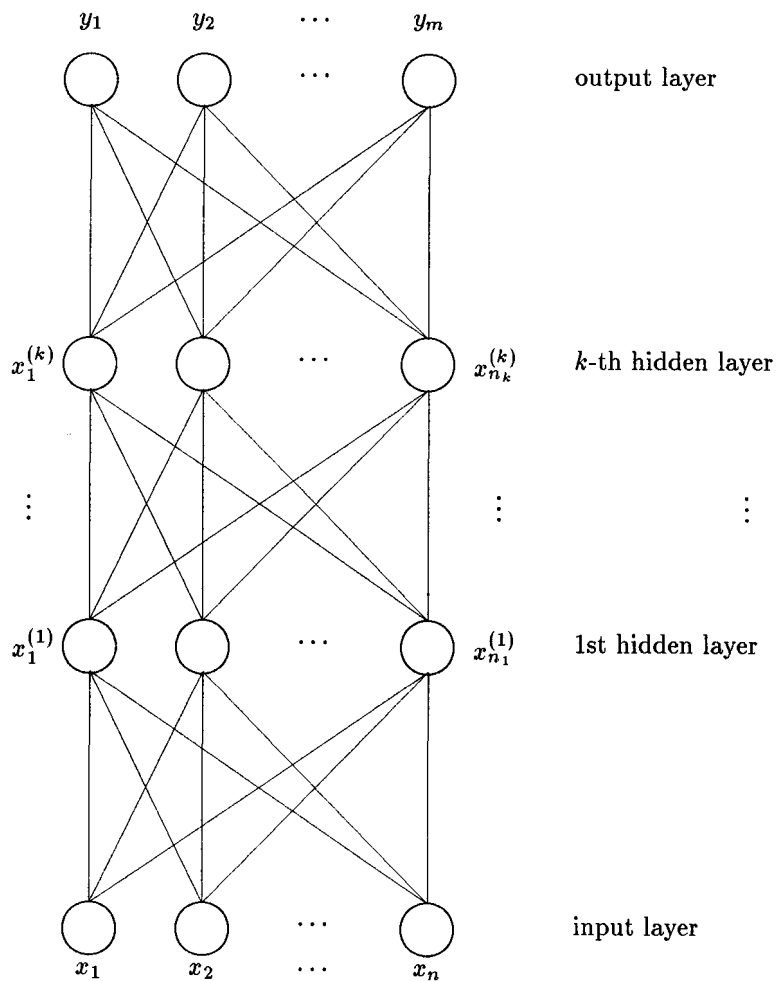
dynamic behavior of the series

Predictions can distinguish if the series is

periodic	predictable for long term
chaotic	predictable for short term but unpredictable for long run
random	unpredictable even for short period

Method

: neural network



$$\underbrace{x_1, \dots, x_n}_{\text{training set}}, \quad \underbrace{x_{n+1}, \dots, x_{2n}}_{\text{test set}}$$

$$\left. \begin{array}{cccc} y_{m+1} & y_{m+2} & \dots & y_n \\ x_{m+1} & x_{m+2} & \dots & x_n \end{array} \right\}$$

→ correlated coefficient

→ prediction

1-step prediction

n -step prediction