Cyber Home School

Courseware --- Computer Graphics Collaborative Learning

Event types of nature

Nature Code	Functions
C = Collaboration	 Grouping  e-mail  Meeting room  Forum
I = Individual	 Profile  Polling  Self quiz  Submit works
D = Duration	 Logout **Timeout** **idle time** **Quick hits**
A = Concepts	T = Theory R = Reference W = Courseware Information
B = Technique	V = Video S = Skill

Session rate of event weights

Nature Code	Micro-session Rate
C = Collaboration	Grouping = 0.6 e-mail = 0.4 Meeting room = 0.8 Forum = 0.2
I = Individual	Profile = 0.4 Polling = 0.6 Self quiz = 0.8 Submit works = 0.2
D = Duration	Login = 0.2 Timeout = 0 idle time = 0 Quick hits = 0
A = Concepts	Theory = 0.6 Reference = 0.2 Courseware Information = 0.4
B = Technique	Video = 0.6 Skill = 0.4

Temporal Database of user-tracking

Event id	User id	Timestamp	Click from	Referrer
22345	101	20030620160000	S21	t12
22346	101	20030620160100	t12	cmi

NB:- S21, t12, … are HTML page codes.
cmi, cmo, … are communicative sessions.

Web log techniques

- Click tracking of user
- Timeout timestamp
- Referrer timestamp
- Full-loaded timestamp

Model domains

- Time: t(page, browsing duration) = t(p, b)
- Weight: W(page, frequency of hits) = w(p, f)
- Event structure: S(weight, time, nature) = S(w, t, n)
- Tri-event relationship: R(pre-event $\rightarrow$ event, event $\rightarrow$ post-event) = R(pe, ep)
- Mutual tri-event association: M(pre-event $\rightarrow$ post-event) = M(pp)
- e-sequence = $<e_1, e_2, e_3, \ldots >$, where $e_1(w_1), e_2(w_2)$, ...

  e.g. e-sequence = B A C C I ... , B(0.43) A(0.74) ...

Framework

Time partitioning and sequence weighting of temporal data by using fuzzy rules

- Multiple granularities
- Fuzzy Association Rules
- Preprocessing weblog data

  (Reduction of event sequence and weights assignment by using type-2 Fuzzy logic)

Event pattern matching of temporal sequence

- Sequence comparison
- Dynamic programming
- Multiple sequence alignment
- Shortest Superstring of SBH (*Sequencing by Hybridization*)
- Equivalent sequence transformations

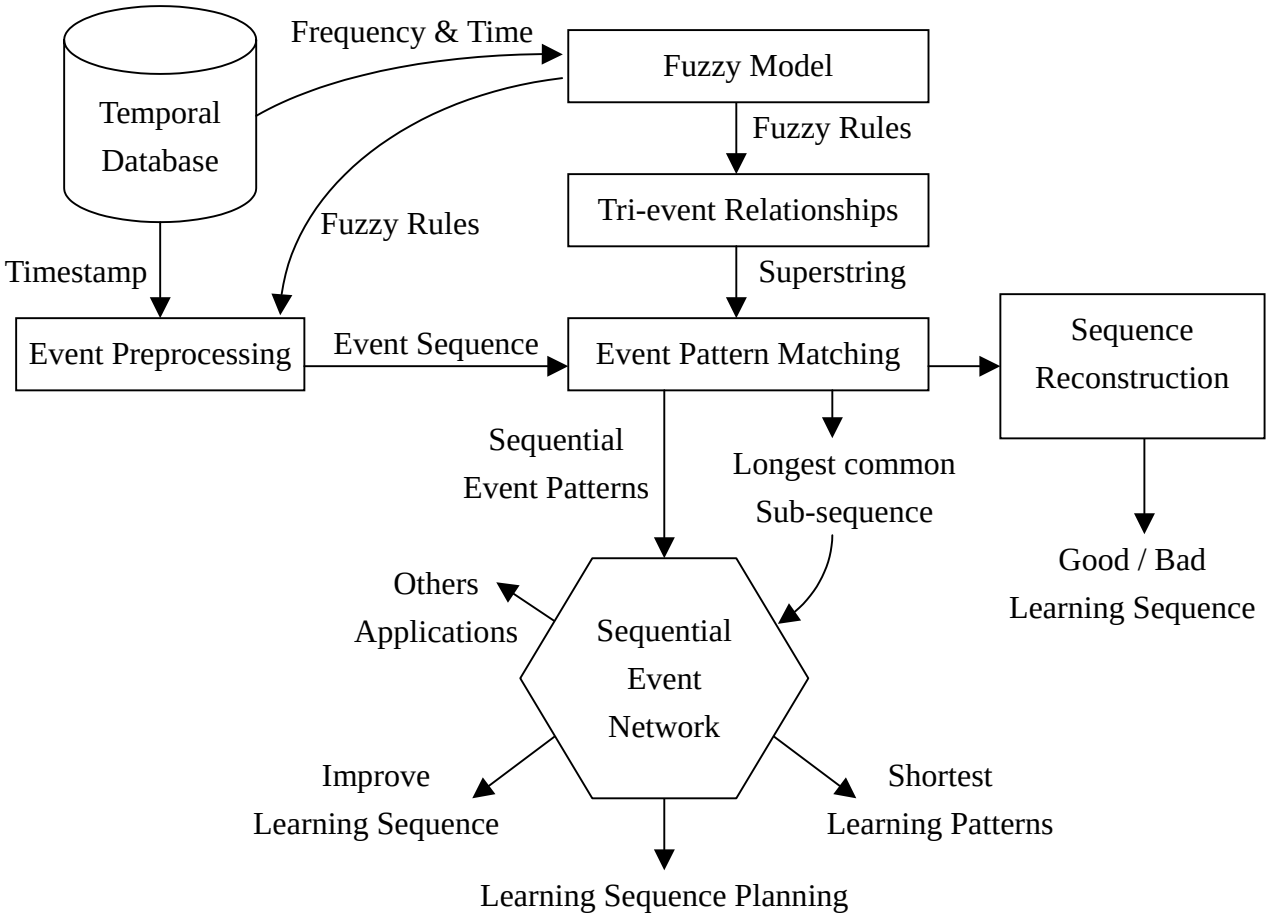
Mutual relationships of tri-event pattern in sub-sequence

- Comparison of good/bad tri-event patterns
- Frequent sequential pattern finding (tri-event)
- Longest common sub-sequence
- Sequential events prediction
- Sequence reconstruction (Hamiltonian path, Eulerian path, False negative errors)
- Viterbi algorithm (hamming distance) + Transformational grammar
- Sequential event network (Scoring paths in spectrum graphs)

Keywords:

Temporal data, Evolutionary Codes = Artificial DNA, Sequencing by Hybridization (SBH), Bioinformatics Computing, DNA array, Viterbi algorithm, Transformational grammar, Superstring, Fuzzy Association Rules, Personalization,

Strategy of temporal mining



Tri-event codes: {A, B, C, D, I} 125triplets

A					B	C	D	I	B	C	D	I
AAA	AAB	AAC	AAD	AAI	B	C	D	I				
ABA	ABB	ABC	ABD	ABI								
ACA	ACB	ACC	ACD	ACI								
ADA	ADB	ADC	ADD	ADI								
AIA	AIB	AIC	AID	AII								

Shortest Superstring

e.g. set of strings: {000, 001, 010, 011, 100, 101, 110, 111}

concatenation superstring: 000 001 010 011 100 101 110 111

Shortest Superstring: 0001110100

```
      010
    110
  011
000
   001
     111
       101
         100
```

Shortest Superstring of {ABCDI}?