Documentazione

Il progetto è stato realizzato da:

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Il software realizzato utilizza l'algoritmo Apriori per scoprire pattern frequenti e pattern emergenti elaborando dati estratti da tabelle di database utilizzando il servizio MySQL.

I dati di input dell'algoritmo sono:

- una collezione D di transazioni
- Ogni transazione è un vettore di coppie attributo-valore (item)
- Un minimo supporto minS

Lo scopo è identificare gli insiemi di item (itemset o pattern) che occorrono con una frequenza minima (>= minS) in D

L'algoritmo ha applicazione nella market basket analysis per scoprire ad esempio i prodotti che compaiono spesso in uno stesso scontrino

Scoperta di pattern frequenti

I dati che ho in input sono i seguenti

1. Tabella che contiene transazioni *target*
2. Tabella che contiene transazioni di *background*
3. Un valore minimo di supporto `0 < supporto <= 1`
4. Un valore minimo di grow rate `grow rate >= 1`

- Il valore di suppporto in una tabella è cosi calcolato :

$$s(x1, x2.. xh) = \frac{p(x1, x2.. xk)}{D}$$

In cui il valore del numeratore è pari al numero di osservazioni in cui si osserva x1,x2..xk mentre D è il numero totale di transazioni

- Il grow rate sulle tabelle target e beackground è cosi calcolato :

$$gr(x1, x2.. xh) = \frac{sTarget(x1, x2.. xh)}{sBackground(x1, x2.. xh)}$$

Una volta calcolati questi valori dalle due tabelle *target* e *background* il programma esegue due passi per la scopertaa di pattern frequenti:

1. Scoprire pattern di lunghezza k a partire da *pattern frequenti* di lunghezza k-1
2. Testare i pattern candidati in *Target*

Scoperta di pattern emergenti

 I pattern frequenti sono calcolati subito dopo i pattern emergenti, calcolando il grow rate in Target rispetto a Background.
   Infine sono selezionati solo i pattern con grow rate superiore alla soglia fissata.

Guida di Installazione

Requisiti server

Per utilizzare il server è necessario:

* Installare MySql sul proprio computer
* Eseguire lo script sql (mysqlScript.sql) presente nel percorso "../server/sql"
* Installare JRE 8
* *Nota: La porta 3306 è preimpostata nel programma per accedere al database*

Requisiti client ed estensione

* Server in ascolto
* Installare JRE 8

Guida utente

Avvio del server

* Nella cartella /jar sono presenti il file .jar e i due script per avviare il programma sia su sistemi GNU\Linux che su sistemi MS-Windows. Per il primo caso basta il comando da shell `bash EPserver.sh` mentre nel secondo caso basta cliccare sul file EPserver.bat

```
simone@simox-pc:~/epminer_2021/base/server/jar$ bash EPserver.sh
Started: ServerSocket[addr=0.0.0.0/0.0.0.0,localport=8080]
```

Avvio del client

* Nella cartella /jar sono presenti il file .jar e i due script per avviare il programma sia su sistemi GNU\Linux che su sistemi MS-Windows. Per il primo caso basta il comando da shell `bash EPclient.sh` mentre nel secondo caso basta cliccare sul file EPclient.bat

```
simone@simox-pc:~/epminer_2021/base/client/jar$ bash EPclient.sh
addr = localhost/127.0.0.1
port=8080
Socket[addr=localhost/127.0.0.1,port=8080,localport=58948]
Scegli una opzione:
1:Nuova scoperta
2: Risultati in archivio
1
```

Appena il client si connette, il server accetta la richiesta:

```
simone@simox-pc:~/epminer_2021/base/server/jar$ bash EPserver.sh
Started: ServerSocket[addr=0.0.0.0/0.0.0.0,localport=8080]
Socket[addr=/127.0.0.1,port=58948,localport=8080]
```

Avvio dell'estensione

- Nella cartella /jar sono presenti il file .jar e i due script per avviare il programma sia su sistemi GNU\Linux che su sistemi MS-Windows. Per il primo caso basta il comando da shell `bash EPgui.sh` mentre nel secondo caso basta cliccare sul file EPgui.bat

Guida utilizzo client

Appena avviato il client, il programma cheide se eseguire una nuova (1) scoperta oppure prendere delle computazioni già presenti in archivio (2)

Digitando 1 e selezionando una nuova scoperta sulle tabelle, il programma chiede di inserire un valore di minimo supporto (maggiore di zero e minore o uguale a uno), per poi chiedere in input un valore minimo di grow rate (maggiore di zero)

```
addr = localhost/127.0.0.1
port=8080
Socket[addr=localhost/127.0.0.1,port=8080,localport=43362]
Scegli una opzione:
1:Nuova scoperta
2: Risultati in archivio
1
Inserire valore minimo supporto (minsup>0 e minsup<=1):
0.3
Inserire valore minimo grow rate (minGr>0):
```

Dopodiché viene richiesto in input il nome della tabella target (playtennisTarget) ed il nome della tabella di background (playtennisBackground)

```
addr = localhost/127.0.0.1
port=8080
Socket[addr=localhost/127.0.0.1,port=8080,localport=35280]
Scegli una opzione:
1:Nuova scoperta
2: Risultati in archivio
1
Inserire valore minimo supporto (minsup>0 e minsup<=1):
0.3
Inserire valore minimo grow rate (minGr>0):
1
Tabella target:
playtennistarget
Tabella background:
playtennisbackground
```

In output avrò i prima i Pattern Emergenti e poi i Pattern Frequenti

```
Tabella target:
playtennisTarget
Tabella background:
playtennisBackground

Frequent patterns
(outlook=rain)[0.375]
(outlook=sunny)[0.375]
temperature in [0.0,6.06[[0.375]
temperature in [24.24,30.300098[[0.375]
(umidity=normal)[0.375]
(wind=strong)[0.375]
(outlook=sunny) AND (umidity=high)[0.375]
(outlook=sunny) AND (play=no)[0.375]
temperature in [0.0,6.06[ AND (umidity=normal)[0.375]
temperature in [24.24,30.300098[ AND (umidity=high)[0.375]
(umidity=high) AND (outlook=sunny)[0.375]
(umidity=high) AND temperature in [24.24,30.300098[[0.375]
(umidity=high) AND (play=no)[0.375]
(umidity=normal) AND temperature in [0.0,6.06[[0.375]
(wind=weak) AND (play=yes)[0.375]
(play=no) AND (outlook=sunny)[0.375]
(play=no) AND (umidity=high)[0.375]
(play=yes) AND (wind=weak)[0.375]
(outlook=sunny) AND (umidity=high) AND (play=no)[0.375]
(outlook=sunny) AND (play=no) AND (umidity=high)[0.375]
(umidity=high) AND (outlook=sunny) AND (play=no)[0.375]
(umidity=high) AND (play=no) AND (outlook=sunny)[0.375]
(play=no) AND (outlook=sunny) AND (umidity=high)[0.375]
(play=no) AND (umidity=high) AND (outlook=sunny)[0.375]
```

```
Emerging patterns
(outlook=rain)[0.375] [1.125]
(outlook=sunny)[0.375] [1.125]
(wind=weak)[0.625] [1.25]
(umidity=high)[0.625] [1.875]
temperature in [0.0,6.06[[0.375] [2.25]
temperature in [24.24,30.300098[[0.375] [2.25]
temperature in [0.0,6.06[ AND (umidity=normal)[0.375] [2.25]
(umidity=high) AND (play=no)[0.375] [2.25]
(umidity=normal) AND temperature in [0.0,6.06[[0.375] [2.25]
(play=no) AND (umidity=high)[0.375] [2.25]
(play=no)[0.5] [3.0]
(outlook=sunny) AND (umidity=high)[0.375] [Infinity]
(outlook=sunny) AND (play=no)[0.375] [Infinity]
temperature in [24.24,30.300098[ AND (umidity=high)[0.375] [Infinity]
(umidity=high) AND (outlook=sunny)[0.375] [Infinity]
(umidity=high) AND temperature in [24.24,30.300098[[0.375] [Infinity]
(play=no) AND (outlook=sunny)[0.375] [Infinity]
(outlook=sunny) AND (umidity=high) AND (play=no)[0.375] [Infinity]
(outlook=sunny) AND (play=no) AND (umidity=high)[0.375] [Infinity]
(umidity=high) AND (outlook=sunny) AND (play=no)[0.375] [Infinity]
(umidity=high) AND (play=no) AND (outlook=sunny)[0.375] [Infinity]
(play=no) AND (outlook=sunny) AND (umidity=high)[0.375] [Infinity]
(play=no) AND (umidity=high) AND (outlook=sunny)[0.375] [Infinity]
(umidity=high) AND (wind=weak)[0.5] [Infinity]
(wind=weak) AND (umidity=high)[0.5] [Infinity]
```

 Selezionando l'opzione 2 (risultati in archivio), i passi del programma sono gli stessi precredenti ma stavolta i risultati dati in output sono caricati da file presenti nella memoria secondaria

```
(wind=weak) AND (umidity=high)[0.5] [Infinity]

Vuoi ripetere?(s/n)
s
Scegli una opzione:
1:Nuova scoperta
2: Risultati in archivio
2
Inserire valore minimo supporto (minsup>0 e minsup<=1):
```

In entrambi i casi il programma chiede all'utente se vuole continuare per altre computazioni

Selezionando n (no) , il client termina l'esecuzione e viene chiuso

Guida utilizzo estensione

La finestra principale presenta tre bottoni: uno per avviare una nuova scoperta, uno per prendere dei risultati in archivio e l'ultimo per uscire dal programma. Il client stavolta si connette in automatico alla porta di default del server
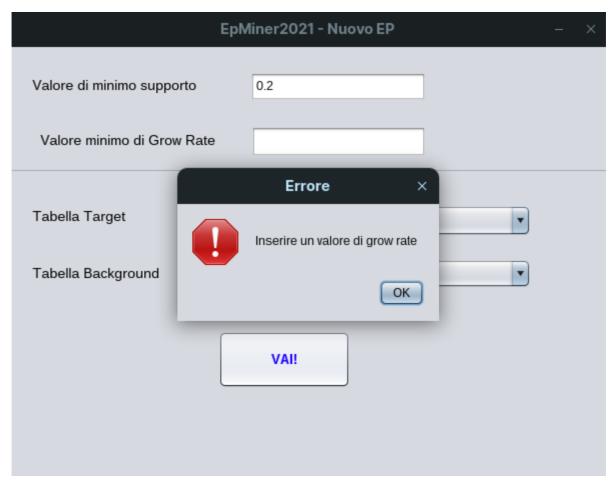

Cliccando sia su *Nuova scoperta* che su *Risultati in archivio* la finestra mostra una nuova schermata in cui è possibile inserire i valori di minimo supporto e di grow rate. Se i valori sono errati e non soddisfano l'intervallo richiesto, una serie di alert compaiono a video inoltre i due input sono resettati.
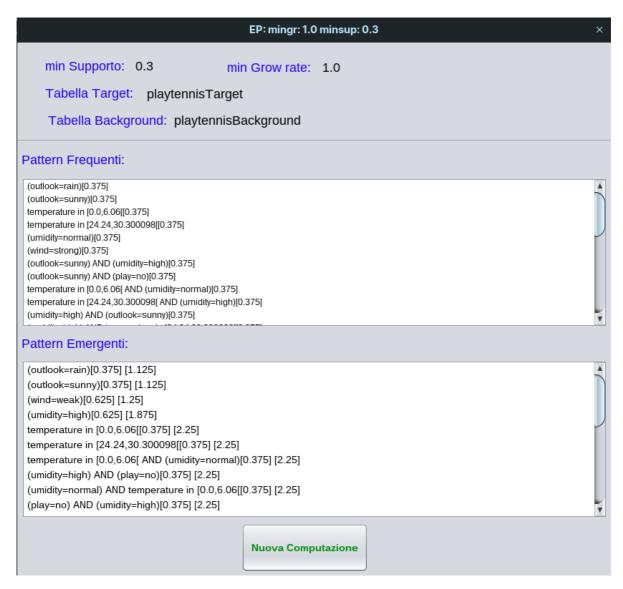Tramite due spinner è possibile selezionare le tabelle target e background già presenti

 Tramite il bottone in basso, i dati inseriti, se sono corretti, sono inviati al server, altrimenti compare un messaggio di errore

 Appena la computazione termina, si apre una finestra di dialogo che mostra i pattern frequenti, i pattern emeergenti inoltre i dati inseriti dall'utente e inviati al server

min Supporto: 0.3   min Grow rate: 1.0

Tabella Target: playtennisTarget

Tabella Background: playtennisBackground

Pattern Frequenti:

```
(outlook=rain)[0.375]
(outlook=sunny)[0.375]
temperature in [0.0,6.06[[0.375]
temperature in [24.24,30.300098[[0.375]
(umidity=normal)[0.375]
(wind=strong)[0.375]
(outlook=sunny) AND (umidity=high)[0.375]
(outlook=sunny) AND (play=no)[0.375]
temperature in [0.0,6.06[ AND (umidity=normal)[0.375]
temperature in [24.24,30.300098[ AND (umidity=high)[0.375]
(umidity=high) AND (outlook=sunny)[0.375]
```

Pattern Emergenti:

```
(outlook=rain)[0.375] [1.125]
(outlook=sunny)[0.375] [1.125]
(wind=weak)[0.625] [1.25]
(umidity=high)[0.625] [1.875]
temperature in [0.0,6.06[[0.375] [2.25]
temperature in [24.24,30.300098[[0.375] [2.25]
temperature in [0.0,6.06[ AND (umidity=normal)[0.375] [2.25]
(umidity=high) AND (play=no)[0.375] [2.25]
(umidity=normal) AND temperature in [0.0,6.06[[0.375] [2.25]
(play=no) AND (umidity=high)[0.375] [2.25]
```

Nuova Computazione

Tramite il bottone in basso è possibile avviare una nuova computazione, ritornando alla finestra principale

Esempi di test

Caso Test 1:

Opzione:Nuova scoperta

Valore di minimo supporto:0.2

Valore minimo di Grow Rate:4

Tabella Target:playtennisTarget

Tabella Background:playtennisBackground

Risultati:

```
Frequent patterns
(outlook=overcast)[0.25]
temperature in [12.12,18.18[[0.25]
(outlook=overcast) AND (play=yes)[0.25]
(outlook=rain) AND temperature in [0.0,6.06[[0.25]
(outlook=rain) AND (umidity=normal)[0.25]
(outlook=rain) AND (wind=weak)[0.25]
(outlook=rain) AND (play=yes)[0.25]
```

(outlook=sunny) AND temperature in [24.24,30.300098[[0.25]
(outlook=sunny) AND (wind=weak)[0.25]
temperature in [0.0,6.06[AND (outlook=rain)[0.25]
temperature in [0.0,6.06[AND (wind=strong)[0.25]
temperature in [0.0,6.06[AND (play=yes)[0.25]
temperature in [12.12,18.18[AND (umidity=high)[0.25]
temperature in [12.12,18.18[AND (wind=weak)[0.25]
temperature in [24.24,30.300098[AND (outlook=sunny)[0.25]
temperature in [24.24,30.300098[AND (wind=weak)[0.25]
temperature in [24.24,30.300098[AND (play=no)[0.25]
(umidity=high) AND temperature in [12.12,18.18[[0.25]
(umidity=high) AND (play=yes)[0.25]
(umidity=normal) AND (outlook=rain)[0.25]
(umidity=normal) AND (wind=strong)[0.25]
(umidity=normal) AND (play=yes)[0.25]
(wind=strong) AND temperature in [0.0,6.06[[0.25]
(wind=strong) AND (umidity=normal)[0.25]
(wind=strong) AND (play=no)[0.25]
(wind=weak) AND (outlook=rain)[0.25]
(wind=weak) AND (outlook=sunny)[0.25]
(wind=weak) AND temperature in [12.12,18.18[[0.25]
(wind=weak) AND temperature in [24.24,30.300098[[0.25]
(wind=weak) AND (play=no)[0.25]
(play=no) AND temperature in [24.24,30.300098[[0.25]
(play=no) AND (wind=strong)[0.25]
(play=no) AND (wind=weak)[0.25]
(play=yes) AND (outlook=overcast)[0.25]
(play=yes) AND (outlook=rain)[0.25]
(play=yes) AND temperature in [0.0,6.06[[0.25]
(play=yes) AND (umidity=high)[0.25]
(play=yes) AND (umidity=normal)[0.25]
(outlook=rain) AND temperature in [0.0,6.06[AND (umidity=normal)[0.25]
(outlook=rain) AND (umidity=normal) AND temperature in [0.0,6.06[[0.25]
(outlook=rain) AND (wind=weak) AND (play=yes)[0.25]
(outlook=rain) AND (play=yes) AND (wind=weak)[0.25]
(outlook=sunny) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25]
(outlook=sunny) AND temperature in [24.24,30.300098[AND (play=no)[0.25]
(outlook=sunny) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25]
(outlook=sunny) AND (umidity=high) AND (wind=weak)[0.25]
(outlook=sunny) AND (wind=weak) AND (umidity=high)[0.25]
(outlook=sunny) AND (wind=weak) AND (play=no)[0.25]
(outlook=sunny) AND (play=no) AND temperature in [24.24,30.300098[[0.25]
(outlook=sunny) AND (play=no) AND (wind=weak)[0.25]
temperature in [0.0,6.06[AND (outlook=rain) AND (umidity=normal)[0.25]
temperature in [0.0,6.06[AND (umidity=normal) AND (outlook=rain)[0.25]
temperature in [0.0,6.06[AND (umidity=normal) AND (wind=strong)[0.25]
temperature in [0.0,6.06[AND (umidity=normal) AND (play=yes)[0.25]
temperature in [0.0,6.06[AND (wind=strong) AND (umidity=normal)[0.25]
temperature in [0.0,6.06[AND (play=yes) AND (umidity=normal)[0.25]
temperature in [12.12,18.18[AND (umidity=high) AND (wind=weak)[0.25]
temperature in [12.12,18.18[AND (wind=weak) AND (umidity=high)[0.25]
temperature in [24.24,30.300098[AND (outlook=sunny) AND (umidity=high)[0.25]

temperature in [24.24,30.300098[AND (outlook=sunny) AND (play=no)[0.25]
temperature in [24.24,30.300098[AND (umidity=high) AND (outlook=sunny)[0.25]
temperature in [24.24,30.300098[AND (umidity=high) AND (wind=weak)[0.25]
temperature in [24.24,30.300098[AND (umidity=high) AND (play=no)[0.25]
temperature in [24.24,30.300098[AND (wind=weak) AND (umidity=high)[0.25]
temperature in [24.24,30.300098[AND (play=no) AND (outlook=sunny)[0.25]
temperature in [24.24,30.300098[AND (play=no) AND (umidity=high)[0.25]
(umidity=high) AND (outlook=sunny) AND temperature in [24.24,30.300098[[0.25]
(umidity=high) AND (outlook=sunny) AND (wind=weak)[0.25]
(umidity=high) AND temperature in [12.12,18.18[AND (wind=weak)[0.25]
(umidity=high) AND temperature in [24.24,30.300098[AND (outlook=sunny)[0.25]
(umidity=high) AND temperature in [24.24,30.300098[AND (wind=weak)[0.25]
(umidity=high) AND temperature in [24.24,30.300098[AND (play=no)[0.25]
(umidity=high) AND (wind=weak) AND (outlook=sunny)[0.25]
(umidity=high) AND (wind=weak) AND temperature in [12.12,18.18[[0.25]
(umidity=high) AND (wind=weak) AND temperature in [24.24,30.300098[[0.25]
(umidity=high) AND (wind=weak) AND (play=no)[0.25]
(umidity=high) AND (wind=weak) AND (play=yes)[0.25]
(umidity=high) AND (play=no) AND temperature in [24.24,30.300098[[0.25]
(umidity=high) AND (play=no) AND (wind=weak)[0.25]
(umidity=high) AND (play=yes) AND (wind=weak)[0.25]
(umidity=normal) AND (outlook=rain) AND temperature in [0.0,6.06[[0.25]
(umidity=normal) AND temperature in [0.0,6.06[AND (outlook=rain)[0.25]
(umidity=normal) AND temperature in [0.0,6.06[AND (wind=strong)[0.25]
(umidity=normal) AND temperature in [0.0,6.06[AND (play=yes)[0.25]
(umidity=normal) AND (wind=strong) AND temperature in [0.0,6.06[[0.25]
(umidity=normal) AND (play=yes) AND temperature in [0.0,6.06[[0.25]
(wind=strong) AND temperature in [0.0,6.06[AND (umidity=normal)[0.25]
(wind=strong) AND (umidity=normal) AND temperature in [0.0,6.06[[0.25]
(wind=weak) AND (outlook=rain) AND (play=yes)[0.25]
(wind=weak) AND (outlook=sunny) AND (umidity=high)[0.25]
(wind=weak) AND (outlook=sunny) AND (play=no)[0.25]
(wind=weak) AND temperature in [12.12,18.18[AND (umidity=high)[0.25]
(wind=weak) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25]
(wind=weak) AND (umidity=high) AND (outlook=sunny)[0.25]
(wind=weak) AND (umidity=high) AND temperature in [12.12,18.18[[0.25]
(wind=weak) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25]
(wind=weak) AND (umidity=high) AND (play=no)[0.25]
(wind=weak) AND (umidity=high) AND (play=yes)[0.25]
(wind=weak) AND (play=no) AND (outlook=sunny)[0.25]
(wind=weak) AND (play=no) AND (umidity=high)[0.25]
(wind=weak) AND (play=yes) AND (outlook=rain)[0.25]
(wind=weak) AND (play=yes) AND (umidity=high)[0.25]
(play=no) AND (outlook=sunny) AND temperature in [24.24,30.300098[[0.25]
(play=no) AND (outlook=sunny) AND (wind=weak)[0.25]
(play=no) AND temperature in [24.24,30.300098[AND (outlook=sunny)[0.25]
(play=no) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25]
(play=no) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25]
(play=no) AND (umidity=high) AND (wind=weak)[0.25]
(play=no) AND (wind=weak) AND (outlook=sunny)[0.25]
(play=no) AND (wind=weak) AND (umidity=high)[0.25]
(play=yes) AND (outlook=rain) AND (wind=weak)[0.25]

(play=yes) AND temperature in [0.0,6.06[AND (umidity=normal)[0.25]
(play=yes) AND (umidity=high) AND (wind=weak)[0.25]
(play=yes) AND (umidity=normal) AND temperature in [0.0,6.06[[0.25]
(play=yes) AND (wind=weak) AND (outlook=rain)[0.25]
(play=yes) AND (wind=weak) AND (umidity=high)[0.25]
(outlook=sunny) AND temperature in [24.24,30.300098[AND (umidity=high) AND (play=no)[0.25]
(outlook=sunny) AND temperature in [24.24,30.300098[AND (play=no) AND (umidity=high)[0.25]
(outlook=sunny) AND (umidity=high) AND temperature in [24.24,30.300098[AND (play=no)[0.25]
(outlook=sunny) AND (umidity=high) AND (wind=weak) AND (play=no)[0.25]
(outlook=sunny) AND (umidity=high) AND (play=no) AND temperature in [24.24,30.300098[[0.25]
(outlook=sunny) AND (umidity=high) AND (play=no) AND (wind=weak)[0.25]
(outlook=sunny) AND (wind=weak) AND (umidity=high) AND (play=no)[0.25]
(outlook=sunny) AND (wind=weak) AND (play=no) AND (umidity=high)[0.25]
(outlook=sunny) AND (play=no) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25]
(outlook=sunny) AND (play=no) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25]
(outlook=sunny) AND (play=no) AND (umidity=high) AND (wind=weak)[0.25]
(outlook=sunny) AND (play=no) AND (wind=weak) AND (umidity=high)[0.25]
temperature in [24.24,30.300098[AND (outlook=sunny) AND (umidity=high) AND (play=no)[0.25]
temperature in [24.24,30.300098[AND (outlook=sunny) AND (play=no) AND (umidity=high)[0.25]
temperature in [24.24,30.300098[AND (umidity=high) AND (outlook=sunny) AND (play=no)[0.25]
temperature in [24.24,30.300098[AND (umidity=high) AND (play=no) AND (outlook=sunny)[0.25]
temperature in [24.24,30.300098[AND (play=no) AND (outlook=sunny) AND (umidity=high)[0.25]
temperature in [24.24,30.300098[AND (play=no) AND (umidity=high) AND (outlook=sunny)[0.25]
(umidity=high) AND (outlook=sunny) AND temperature in [24.24,30.300098[AND (play=no)[0.25]
(umidity=high) AND (outlook=sunny) AND (wind=weak) AND (play=no)[0.25]
(umidity=high) AND (outlook=sunny) AND (play=no) AND temperature in [24.24,30.300098[[0.25]
(umidity=high) AND (outlook=sunny) AND (play=no) AND (wind=weak)[0.25]
(umidity=high) AND temperature in [24.24,30.300098[AND (outlook=sunny) AND (play=no)[0.25]
(umidity=high) AND temperature in [24.24,30.300098[AND (play=no) AND (outlook=sunny)[0.25]
(umidity=high) AND (wind=weak) AND (outlook=sunny) AND (play=no)[0.25]
(umidity=high) AND (wind=weak) AND (play=no) AND (outlook=sunny)[0.25]
(umidity=high) AND (play=no) AND (outlook=sunny) AND temperature in [24.24,30.300098[[0.25]
(umidity=high) AND (play=no) AND (outlook=sunny) AND (wind=weak)[0.25]
(umidity=high) AND (play=no) AND temperature in [24.24,30.300098[AND (outlook=sunny)[0.25]
(umidity=high) AND (play=no) AND (wind=weak) AND (outlook=sunny)[0.25]
(wind=weak) AND (outlook=sunny) AND (umidity=high) AND (play=no)[0.25]
(wind=weak) AND (outlook=sunny) AND (play=no) AND (umidity=high)[0.25]
(wind=weak) AND (umidity=high) AND (outlook=sunny) AND (play=no)[0.25]
(wind=weak) AND (umidity=high) AND (play=no) AND (outlook=sunny)[0.25]
(wind=weak) AND (play=no) AND (outlook=sunny) AND (umidity=high)[0.25]
(wind=weak) AND (play=no) AND (umidity=high) AND (outlook=sunny)[0.25]
(play=no) AND (outlook=sunny) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25]
(play=no) AND (outlook=sunny) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25]
(play=no) AND (outlook=sunny) AND (umidity=high) AND (wind=weak)[0.25]
(play=no) AND (outlook=sunny) AND (wind=weak) AND (umidity=high)[0.25]
(play=no) AND temperature in [24.24,30.300098[AND (outlook=sunny) AND (umidity=high)[0.25]
(play=no) AND temperature in [24.24,30.300098[AND (umidity=high) AND (outlook=sunny)[0.25]
(play=no) AND (umidity=high) AND (outlook=sunny) AND temperature in [24.24,30.300098[[0.25]
(play=no) AND (umidity=high) AND (outlook=sunny) AND (wind=weak)[0.25]
(play=no) AND (umidity=high) AND temperature in [24.24,30.300098[AND (outlook=sunny)[0.25]
(play=no) AND (umidity=high) AND (wind=weak) AND (outlook=sunny)[0.25]
(play=no) AND (wind=weak) AND (outlook=sunny) AND (umidity=high)[0.25]

(play=no) AND (wind=weak) AND (umidity=high) AND (outlook=sunny)[0.25]
(outlook=rain)[0.375]
(outlook=sunny)[0.375]
temperature in [0.0,6.06[[0.375]
temperature in [24.24,30.300098[[0.375]
(umidity=normal)[0.375]
(wind=strong)[0.375]
(outlook=sunny) AND (umidity=high)[0.375]
(outlook=sunny) AND (play=no)[0.375]
temperature in [0.0,6.06[AND (umidity=normal)[0.375]
temperature in [24.24,30.300098[AND (umidity=high)[0.375]
(umidity=high) AND (outlook=sunny)[0.375]
(umidity=high) AND temperature in [24.24,30.300098[[0.375]
(umidity=high) AND (play=no)[0.375]
(umidity=normal) AND temperature in [0.0,6.06[[0.375]
(wind=weak) AND (play=yes)[0.375]
(play=no) AND (outlook=sunny)[0.375]
(play=no) AND (umidity=high)[0.375]
(play=yes) AND (wind=weak)[0.375]
(outlook=sunny) AND (umidity=high) AND (play=no)[0.375]
(outlook=sunny) AND (play=no) AND (umidity=high)[0.375]
(umidity=high) AND (outlook=sunny) AND (play=no)[0.375]
(umidity=high) AND (play=no) AND (outlook=sunny)[0.375]
(play=no) AND (outlook=sunny) AND (umidity=high)[0.375]
(play=no) AND (umidity=high) AND (outlook=sunny)[0.375]
(play=no)[0.5]
(play=yes)[0.5]
(umidity=high) AND (wind=weak)[0.5]
(wind=weak) AND (umidity=high)[0.5]
(umidity=high)[0.625]
(wind=weak)[0.625]

Emerging patterns

(outlook=rain) AND temperature in [0.0,6.06[[0.25] [Infinity]
(outlook=sunny) AND temperature in [24.24,30.300098[[0.25] [Infinity]
temperature in [0.0,6.06[AND (outlook=rain)[0.25] [Infinity]
temperature in [0.0,6.06[AND (wind=strong)[0.25] [Infinity]
temperature in [12.12,18.18[AND (wind=weak)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (outlook=sunny)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (play=no)[0.25] [Infinity]
(wind=strong) AND temperature in [0.0,6.06[[0.25] [Infinity]
(wind=weak) AND temperature in [12.12,18.18[[0.25] [Infinity]
(wind=weak) AND (play=no)[0.25] [Infinity]
(play=no) AND temperature in [24.24,30.300098[[0.25] [Infinity]
(play=no) AND (wind=weak)[0.25] [Infinity]
(outlook=rain) AND temperature in [0.0,6.06[AND (umidity=normal)[0.25] [Infinity]
(outlook=rain) AND (umidity=normal) AND temperature in [0.0,6.06[[0.25] [Infinity]
(outlook=sunny) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25] [Infinity]
(outlook=sunny) AND temperature in [24.24,30.300098[AND (play=no)[0.25] [Infinity]
(outlook=sunny) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25] [Infinity]
(outlook=sunny) AND (umidity=high) AND (wind=weak)[0.25] [Infinity]
(outlook=sunny) AND (wind=weak) AND (umidity=high)[0.25] [Infinity]

(outlook=sunny) AND (wind=weak) AND (play=no)[0.25] [Infinity]
(outlook=sunny) AND (play=no) AND temperature in [24.24,30.300098[[0.25] [Infinity]
(outlook=sunny) AND (play=no) AND (wind=weak)[0.25] [Infinity]
temperature in [0.0,6.06[AND (outlook=rain) AND (umidity=normal)[0.25] [Infinity]
temperature in [0.0,6.06[AND (umidity=normal) AND (outlook=rain)[0.25] [Infinity]
temperature in [0.0,6.06[AND (umidity=normal) AND (wind=strong)[0.25] [Infinity]
temperature in [0.0,6.06[AND (wind=strong) AND (umidity=normal)[0.25] [Infinity]
temperature in [12.12,18.18[AND (umidity=high) AND (wind=weak)[0.25] [Infinity]
temperature in [12.12,18.18[AND (wind=weak) AND (umidity=high)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (outlook=sunny) AND (umidity=high)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (outlook=sunny) AND (play=no)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (umidity=high) AND (outlook=sunny)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (umidity=high) AND (wind=weak)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (umidity=high) AND (play=no)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (wind=weak) AND (umidity=high)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (play=no) AND (outlook=sunny)[0.25] [Infinity]
temperature in [24.24,30.300098[AND (play=no) AND (umidity=high)[0.25] [Infinity]
(umidity=high) AND (outlook=sunny) AND temperature in [24.24,30.300098[[0.25] [Infinity]
(umidity=high) AND (outlook=sunny) AND (wind=weak)[0.25] [Infinity]
(umidity=high) AND temperature in [12.12,18.18[AND (wind=weak)[0.25] [Infinity]
(umidity=high) AND temperature in [24.24,30.300098[AND (outlook=sunny)[0.25] [Infinity]
(umidity=high) AND temperature in [24.24,30.300098[AND (wind=weak)[0.25] [Infinity]
(umidity=high) AND temperature in [24.24,30.300098[AND (play=no)[0.25] [Infinity]
(umidity=high) AND (wind=weak) AND (outlook=sunny)[0.25] [Infinity]
(umidity=high) AND (wind=weak) AND temperature in [12.12,18.18[[0.25] [Infinity]
(umidity=high) AND (wind=weak) AND temperature in [24.24,30.300098[[0.25] [Infinity]
(umidity=high) AND (wind=weak) AND (play=no)[0.25] [Infinity]
(umidity=high) AND (wind=weak) AND (play=yes)[0.25] [Infinity]
(umidity=high) AND (play=no) AND temperature in [24.24,30.300098[[0.25] [Infinity]
(umidity=high) AND (play=no) AND (wind=weak)[0.25] [Infinity]
(umidity=high) AND (play=yes) AND (wind=weak)[0.25] [Infinity]
(umidity=normal) AND (outlook=rain) AND temperature in [0.0,6.06[[0.25] [Infinity]
(umidity=normal) AND temperature in [0.0,6.06[AND (outlook=rain)[0.25] [Infinity]
(umidity=normal) AND temperature in [0.0,6.06[AND (wind=strong)[0.25] [Infinity]
(umidity=normal) AND (wind=strong) AND temperature in [0.0,6.06[[0.25] [Infinity]
(wind=strong) AND temperature in [0.0,6.06[AND (umidity=normal)[0.25] [Infinity]
(wind=strong) AND (umidity=normal) AND temperature in [0.0,6.06[[0.25] [Infinity]
(wind=weak) AND (outlook=sunny) AND (umidity=high)[0.25] [Infinity]
(wind=weak) AND (outlook=sunny) AND (play=no)[0.25] [Infinity]
(wind=weak) AND temperature in [12.12,18.18[AND (umidity=high)[0.25] [Infinity]
(wind=weak) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25] [Infinity]
(wind=weak) AND (umidity=high) AND (outlook=sunny)[0.25] [Infinity]
(wind=weak) AND (umidity=high) AND temperature in [12.12,18.18[[0.25] [Infinity]
(wind=weak) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25] [Infinity]
(wind=weak) AND (umidity=high) AND (play=no)[0.25] [Infinity]
(wind=weak) AND (umidity=high) AND (play=yes)[0.25] [Infinity]
(wind=weak) AND (play=no) AND (outlook=sunny)[0.25] [Infinity]
(wind=weak) AND (play=no) AND (umidity=high)[0.25] [Infinity]
(wind=weak) AND (play=yes) AND (umidity=high)[0.25] [Infinity]
(play=no) AND (outlook=sunny) AND temperature in [24.24,30.300098[[0.25] [Infinity]
(play=no) AND (outlook=sunny) AND (wind=weak)[0.25] [Infinity]
(play=no) AND temperature in [24.24,30.300098[AND (outlook=sunny)[0.25] [Infinity]

(play=no) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25] [Infinity]

(play=no) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25] [Infinity]

(play=no) AND (umidity=high) AND (wind=weak)[0.25] [Infinity]

(play=no) AND (wind=weak) AND (outlook=sunny)[0.25] [Infinity]

(play=no) AND (wind=weak) AND (umidity=high)[0.25] [Infinity]

(play=yes) AND (umidity=high) AND (wind=weak)[0.25] [Infinity]

(play=yes) AND (wind=weak) AND (umidity=high)[0.25] [Infinity]

(outlook=sunny) AND temperature in [24.24,30.300098[AND (umidity=high) AND (play=no)[0.25] [Infinity]

(outlook=sunny) AND temperature in [24.24,30.300098[AND (play=no) AND (umidity=high)[0.25] [Infinity]

(outlook=sunny) AND (umidity=high) AND temperature in [24.24,30.300098[AND (play=no)[0.25] [Infinity]

(outlook=sunny) AND (umidity=high) AND (wind=weak) AND (play=no)[0.25] [Infinity]

(outlook=sunny) AND (umidity=high) AND (play=no) AND temperature in [24.24,30.300098[[0.25] [Infinity]

(outlook=sunny) AND (umidity=high) AND (play=no) AND (wind=weak)[0.25] [Infinity]

(outlook=sunny) AND (wind=weak) AND (umidity=high) AND (play=no)[0.25] [Infinity]

(outlook=sunny) AND (wind=weak) AND (play=no) AND (umidity=high)[0.25] [Infinity]

(outlook=sunny) AND (play=no) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25] [Infinity]

(outlook=sunny) AND (play=no) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25] [Infinity]

(outlook=sunny) AND (play=no) AND (umidity=high) AND (wind=weak)[0.25] [Infinity]

(outlook=sunny) AND (play=no) AND (wind=weak) AND (umidity=high)[0.25] [Infinity]

temperature in [24.24,30.300098[AND (outlook=sunny) AND (umidity=high) AND (play=no)[0.25] [Infinity]

temperature in [24.24,30.300098[AND (outlook=sunny) AND (play=no) AND (umidity=high)[0.25] [Infinity]

temperature in [24.24,30.300098[AND (umidity=high) AND (outlook=sunny) AND (play=no)[0.25] [Infinity]

temperature in [24.24,30.300098[AND (umidity=high) AND (play=no) AND (outlook=sunny)[0.25] [Infinity]

temperature in [24.24,30.300098[AND (play=no) AND (outlook=sunny) AND (umidity=high)[0.25] [Infinity]

temperature in [24.24,30.300098[AND (play=no) AND (umidity=high) AND (outlook=sunny)[0.25] [Infinity]

(umidity=high) AND (outlook=sunny) AND temperature in [24.24,30.300098[AND (play=no)[0.25] [Infinity]

(umidity=high) AND (outlook=sunny) AND (wind=weak) AND (play=no)[0.25] [Infinity]

(umidity=high) AND (outlook=sunny) AND (play=no) AND temperature in [24.24,30.300098[[0.25] [Infinity]

(umidity=high) AND (outlook=sunny) AND (play=no) AND (wind=weak)[0.25] [Infinity]

(umidity=high) AND temperature in [24.24,30.300098[AND (outlook=sunny) AND (play=no)[0.25] [Infinity]

(umidity=high) AND temperature in [24.24,30.300098[AND (play=no) AND (outlook=sunny)[0.25] [Infinity]

(umidity=high) AND (wind=weak) AND (outlook=sunny) AND (play=no)[0.25] [Infinity]

(umidity=high) AND (wind=weak) AND (play=no) AND (outlook=sunny)[0.25] [Infinity]

(umidity=high) AND (play=no) AND (outlook=sunny) AND temperature in [24.24,30.300098[[0.25] [Infinity]

(umidity=high) AND (play=no) AND (outlook=sunny) AND (wind=weak)[0.25] [Infinity]

(umidity=high) AND (play=no) AND temperature in [24.24,30.300098[AND (outlook=sunny)[0.25] [Infinity]

(umidity=high) AND (play=no) AND (wind=weak) AND (outlook=sunny)[0.25] [Infinity]

(wind=weak) AND (outlook=sunny) AND (umidity=high) AND (play=no)[0.25] [Infinity]

(wind=weak) AND (outlook=sunny) AND (play=no) AND (umidity=high)[0.25] [Infinity]

(wind=weak) AND (umidity=high) AND (outlook=sunny) AND (play=no)[0.25] [Infinity]

(wind=weak) AND (umidity=high) AND (play=no) AND (outlook=sunny)[0.25] [Infinity]

(wind=weak) AND (play=no) AND (outlook=sunny) AND (umidity=high)[0.25] [Infinity]

(wind=weak) AND (play=no) AND (umidity=high) AND (outlook=sunny)[0.25] [Infinity]

(play=no) AND (outlook=sunny) AND temperature in [24.24,30.300098[AND (umidity=high)[0.25] [Infinity]

(play=no) AND (outlook=sunny) AND (umidity=high) AND temperature in [24.24,30.300098[[0.25] [Infinity]

(play=no) AND (outlook=sunny) AND (umidity=high) AND (wind=weak)[0.25] [Infinity]

(play=no) AND (outlook=sunny) AND (wind=weak) AND (umidity=high)[0.25] [Infinity]

(play=no) AND temperature in [24.24,30.300098[AND (outlook=sunny) AND (umidity=high)[0.25] [Infinity]

(play=no) AND temperature in [24.24,30.300098[AND (umidity=high) AND (outlook=sunny)[0.25] [Infinity]

(play=no) AND (umidity=high) AND (outlook=sunny) AND temperature in [24.24,30.300098[[0.25] [Infinity]

(play=no) AND (umidity=high) AND (outlook=sunny) AND (wind=weak)[0.25] [Infinity]

(play=no) AND (umidity=high) AND temperature in [24.24,30.300098[AND (outlook=sunny)[0.25] [Infinity]

(play=no) AND (umidity=high) AND (wind=weak) AND (outlook=sunny)[0.25] [Infinity]

(play=no) AND (wind=weak) AND (outlook=sunny) AND (umidity=high)[0.25] [Infinity]

(play=no) AND (wind=weak) AND (umidity=high) AND (outlook=sunny)[0.25] [Infinity]

(outlook=sunny) AND (umidity=high)[0.375] [Infinity]

(outlook=sunny) AND (play=no)[0.375] [Infinity]

temperature in [24.24,30.300098[AND (umidity=high)[0.375] [Infinity]

(umidity=high) AND (outlook=sunny)[0.375] [Infinity]

(umidity=high) AND temperature in [24.24,30.300098[[0.375] [Infinity]

(play=no) AND (outlook=sunny)[0.375] [Infinity]

(outlook=sunny) AND (umidity=high) AND (play=no)[0.375] [Infinity]

(outlook=sunny) AND (play=no) AND (umidity=high)[0.375] [Infinity]

(umidity=high) AND (outlook=sunny) AND (play=no)[0.375] [Infinity]

(umidity=high) AND (play=no) AND (outlook=sunny)[0.375] [Infinity]

(play=no) AND (outlook=sunny) AND (umidity=high)[0.375] [Infinity]

(play=no) AND (umidity=high) AND (outlook=sunny)[0.375] [Infinity]

(umidity=high) AND (wind=weak)[0.5] [Infinity]

(wind=weak) AND (umidity=high)[0.5] [Infinity]

Caso Test 2:

Opzione:Nuova scoperta

Valore di minimo supporto:0.9

Valore minimo di Grow Rate:6

Tabella Target:playtennisTarget

Tabella Background:playtennisBackground

Risultati:

Frequent patterns

Emerging patterns
data.EmptySetException

Caso Test 3:

Opzione:Risultati in archivio

Valore di minimo supporto:0.5

Valore minimo di Grow Rate:0.5

Tabella Target:playtennisTarget

Tabella Background:playtennisBackground

Risultati:

Frequent patterns
java.io.FileNotFoundException: FP_playtennis_minSup0.5.dat (Impossibile trovare il file specificato)

La computazione deve essere già stata effettuata in precedenza, altrimenti non viene trovata, come in questo caso.