CC484 - Constraint Satisfaction Problem

by

Edgar Galván López

Exercises

Graduate Teaching Assitant
University of Essex
egalva@essex.ac.uk

Professor Edward Tsang
University of Essex
edward@essex.ac.uk

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x_1	x_2	x_3
a	b	c
b	b	c
c	b	c
c	b	s

(a)

x_1	x_2	x_3
b	b	c
c	b	c
c	n	n

(b)

x_2	x_3	x_4
a	a	1
b	c	2
b	c	3

(c)

Figure 1: Three relations: (a) relation R, (b) relation R' and (c) relation R".

Exercises

1. Let $A = \{1, 2, 3, 4, 6\}$ and $B = \{2, 1, 3, 5, 7\}$.

   (a) Compute $A \cup B$

   (b) Compute $A \cap B$

2. Let $D_1 = \{$black, green$\}$ and $D_2 = \{$apple juice, coffee, tea$\}$.

   (a) Write the Cartesian product $D_1 \text{x} D_2$.

   (b) Given $R_1 = \{(x_1, x_2)|x_1 \in D_1, x_2 \in D_2,$ and x_1 is before x_2 in dictionary ordering$\}$. Write R_1.

3. Let $R_1 = \{(a, b), (c, d), (d, e)\}$ and $R_2 = \{(b, c), (e, a), (b, d)\}$.

   (a) Compute $R_2 \cup R_1$

   (b) Compute $R_1 \cap R_2$

4. Let the relations R, R' and R'' be as shown in Figure 1.

   (a) Compute $(\sigma_{x_3=c}(R'))$

   (b) Compute $(\pi_{\{x_2, x_3\}}(R'))$.

   (c) Compute $R' \bowtie R''$.

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x_1	x_2	x_3
b	b	c
c	b	c

(a)

x_2	x_3
b	c
n	n

(b)

x_1	x_2	x_3	x_4
b	b	c	2
b	b	c	3
c	b	c	2
c	b	c	3

(c)

Figure 2: Answer for (a) selection, (b) projection and (c) join.

Answers

1. Let $A = \{1, 2, 3, 4, 6\}$ and $B = \{2, 1, 3, 5, 7\}$.

   (a) $A \cup B = \{1, 2, 3, 4, 5, 6, 7\}$

   (b) $A \cap B = \{1, 2, 3\}$

2. Let $D_1 = \{$black, green$\}$ and $D_2 = \{$apple juice, coffee, tea$\}$.

   (a) $D_1 \mathrm{x} D_2$ = {(black, apple juice), (black, coffee), (black, tea), (green, apple juice), (green,coffee), (green, tea)}

   (b) R_1 = {(black, coffee), (black, tea), (green, tea)}

3. (a) $R_2 \cup R_1 = \{(a, b), (c, d), (d, e), (b, c), (e, a), (b, d)\}$

   (b) $\varnothing$

4. Refer to Figure 2.