

CPSC-406 Report

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Abstract

Consisting of CPSC 406 Material at Chapman University with Professor Alexander Kurz. This report will include an Introduction, Weekly Homework, and a Paper on the group project, which is done throughout the semester.

Contents

1	Introduction	1
2	Homework	1
2.1	Week 2 (Homework 1)	2
2.2	Week 3 (Homework 2)	3
2.2.1	Question 1	3
3	Paper	4
4	Conclusions	4

1 Introduction

This report...

2 Homework

This section contains solutions to homework.

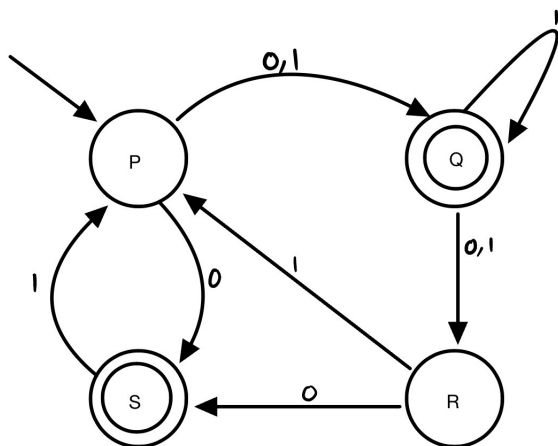
2.1 Week 2 (Homework 1)

This week's homework was to solve the following NFA:

Exercise 2.3.2: Convert to a DFA the following NFA:

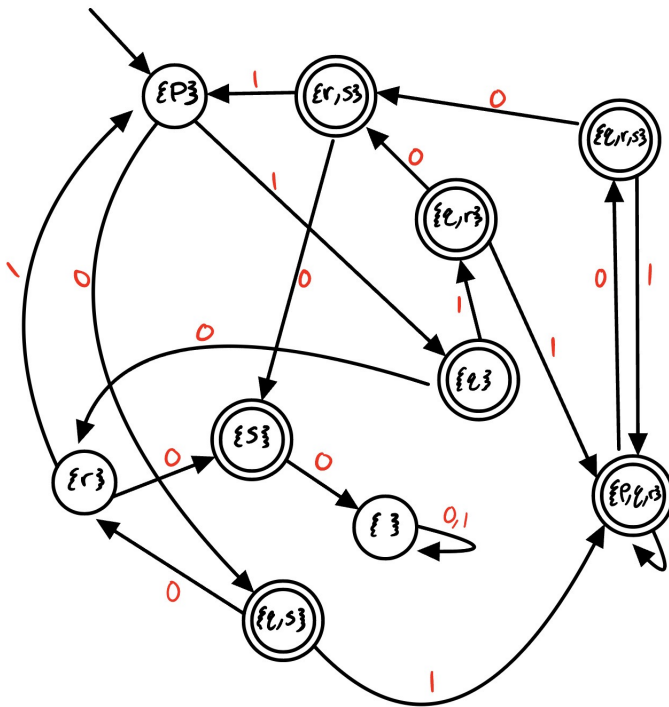
	0	1
$\rightarrow p$	$\{q, s\}$	$\{q\}$
$*q$	$\{r\}$	$\{q, r\}$
r	$\{s\}$	$\{p\}$
$*s$	\emptyset	$\{p\}$

This is the following NFA but drawn out:



From this NFA, the following DFA table can be made:

	0	1
$\rightarrow \{p\}$	$\{q, s\}$	$\{q\}$
$*\{p, s\}$	$\{r\}$	$\{p, q, r\}$
$*\{q\}$	$\{r\}$	$\{q, r\}$
$\{r\}$	$\{s\}$	$\{p\}$
$*\{p, q, r\}$	$\{q, r, s\}$	$\{p, q, r\}$
$*\{q, r\}$	$\{r, s\}$	$\{p, q, r\}$
$*\{s\}$	\emptyset	$\{p\}$
$*\{q, r, s\}$	$\{r, s\}$	$\{p, q, r\}$
$*\{r, s\}$	$\{s\}$	$\{p\}$
\emptyset	\emptyset	\emptyset



This DFA diagram will allow for the correct initial state, final states, and correct path for each input.

2.2 Week 3 (Homework 2)

Week 3 consisted of 2 Questions. They are in their respective sections.

2.2.1 Question 1

For Week 3 Question the object was to write the steps of the unification algorithm for each pair.

1. $f(X, f(X, Y)) \stackrel{?}{=} f(f(Y, a), f(U, b))$
2. $f(g(U), f(X, Y)) \stackrel{?}{=} f(X, f(Y, U))$
3. $h(U, f(g(V), W), g(W)) \stackrel{?}{=} h(f(X, b), U, Z)$

For number 1 of question 1 I got the following answer:

$$1. f(X, f(X, Y)) = f(f(Y, a), f(U, b))$$

$$1. X = f(Y, a)$$

$$o1 = [f(Y,a)/X]$$

$$2. f(X,Y) = f(U,b)$$

$$3. X = U$$

$$o3 = [U/X]$$

$$4. Y = b$$

$$o4 = [b/Y]$$

$$5. X(o3 * o4) = U, f(o3 * o4)(Y,a) = f(b,a)$$

$$U = f(b, a)$$

$$o5 = [f(b,a)/U]$$

$$o = o3 * o4 * o5 = [U/X, b/Y, f(b,a)/U]$$

$$X = U, Y = b, U = f(b,a)$$

Note: Sigma Symbol was not working in Verbatim, thus a simple lowercase o was substituted.

For number 2 of question 1 I got the following answer:

$$2. f(g(U), f(X,Y)) = f(X, f(Y,U))$$

$$1. g(U) = X$$

$$o1 = [g(U)/X]$$

$$2. f(X,Y) = f(Y,U)$$

$$3. X = Y$$

$$o3 = [Y/X]$$

$$4. Y = U$$

$$o4 = [U/Y]$$

$$o = o1 * o2 * o3 = [X/U, Y/X, g(Y)/Y]$$

For number 3 of question 1 I got the following answer:

$$3. h(U, f(g(V), W), g(W)) = h(f(X, b), U, Z)$$

$$1. U = f(X, b)$$

$$o1 = [f(X, b)/U]$$

$$2. f(g(V), W) = U$$

$$o2 = [f(g(V), W)/U]$$

$$3. g(W) = Z$$

$$o3 = [g(W)/Z]$$

$$4. U(o1 * o2) \rightarrow f(X, b) = f(g(V), W)$$

$$5. X = g(V)$$

$$o5 = [g(V)/X]$$

$$\begin{aligned} 6. \quad & b = W \\ & o6 = [b/W] \end{aligned}$$

$$\begin{aligned} 7. \quad & Z(o3 * o6) = g(W), \quad W = b \\ & o7 = [g(b)/Z] \end{aligned}$$

$$\begin{aligned} 8. \quad & U(o1 * o2 * o6) \rightarrow f(X, b) = f(g(V), b) \\ & o8 = [f(g(V), b)/U] \end{aligned}$$

$$o = o5 * o6 * o7 * o8 = [f(g(V), b)/U, g(V)/X, b/W, g(b)/Z]$$

$$U = f(g(V), b), \quad W = b, \quad X = g(V), \quad Z = g(b)$$

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3 Paper

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4 Conclusions

(approx 400 words) A critical reflection on the content of the course. Step back from the technical details. How does the course fit into the wider world of software engineering? What did you find most interesting or useful? What improvements would you suggest?

References

[ALG] [Algorithm Analysis](#), Chapman University, 2023.