95-771 – Data Structures and Algorithms for Information Processing
Homework #2

Name: Han Zhang ID: hanzhan2

Recursion:

P(i,j)	Value	Time(seconds)
P(2,3)	0.6875	0.002
P(4,7)	0.828125	0.001
P(7,6)	0.38720703125	0.003
P(10,12)	0.6681880950927734	0.007
P(20,23)	?	?
P(30,15)	?	?
P(50,40)	?	?

DP:

P(i,j)	Value	Time(seconds)
P(2,3)	0.6875	0.002
P(4,7)	0.828125	0.003
P(7,6)	0.38720703125	0.003
P(10,12)	0.6681880950927734	0.003
P(20,23)	0.6780155218148138	0.001
P(30,15)	0.011314420602957398	0.002
P(50,40)	0.14454804034803026	0.002

We computed P in two ways – by using recursion and by dynamic programming. Which of these was faster and why?

Dynamic programming was faster. During recursion, there may exist cases where same sub-problems are solved multiple times. So running time complexity will be O(n^2). However during dynamic programming the result of all sub-problems are cached for future use. So running time complexity will be much better than recursive. If we use DP with small gap, time complexity could be O(1).