

# 國立臺北大學自然資源與環境管理研究所

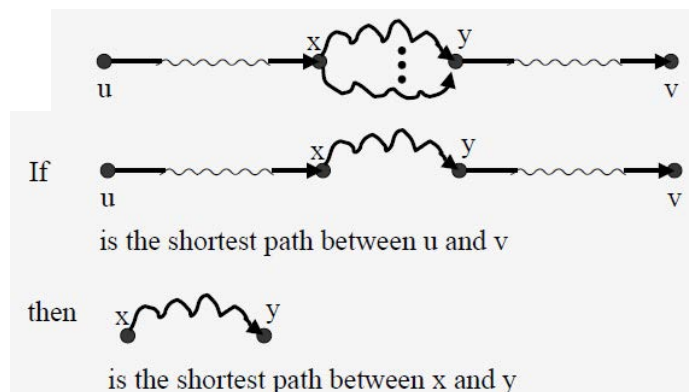
## 105 學年度第二學期 『環境系統分析專題』

### 課程講義(05)：動態規劃與目標規劃 Dynamic Programming and Goal Programming

Algorithms - Chapter 6: Dynamic Programming (<http://www.cs.berkeley.edu/~vazirani/algorithms/chap6.pdf>)  
Algorithms - Dynamic Programming (<http://www.csie.ntnu.edu.tw/~u91029/DynamicProgramming.html>)  
Data Clustering and Pattern Recognition - [Dynamic Programming](#) 動態規劃  
Research Gate - [An Introduction to Goal Programming](#)  
Linear Optimization - Handouts - [Goal Programming](#)

#### ● INTRODUCTION TO DYNAMIC PROGRAMMING

- Dynamic Programming = Divide and Conquer + Memoization
- No Specific Forms or Formulations=> Principle of Optimality
- Terminology: Stage, State, Decision, Return, Recursive Equation
- Dynamic programming is a technique for solving problems with a recursive structure with the following characteristics:
  - ⇒ Optimal substructure (principle of optimality): An optimal solution to a problem can be decomposed into optimal solutions for sub-problems.
  - ⇒ A small number of sub-problems: The total number of sub-instances to be solved is small.
  - ⇒ Overlapping sub-problems: During the computation same instances are referred to over and over again.



- An Example of Dynamic Programming: The Shortest Path Problem

#### ● GOAL PROGRAMMING

- Criteria for Decision-Making: Attribute, Objective, Target, and Goal
- Multiple Criteria Decision Making: Multiple Attribute and Multiobjective
- Classification of Goal Programming: Non-Preemptive vs. Preemptive
- Non-Preemptive Goal Programming
  - ⇒ Complementary relationship
  - ⇒ One-sided vs. Two-sided
- Preemptive Goal Programming or Lexicographic GP
- Drawbacks: Normalization and Weighting; Pareto Optimality?
- An Example of Dynamic Programming: Expansion of Production Lines