

**Advanced Business Decision Support Systems**  
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**Lecture 43**  
**Summarizing the Course**

Welcome to the last lecture of the course Advanced Business Decision Support Systems. I am Dr. Amandeep Singh. We are only going to summarize this course in this lecture. I am just going to go through the topics that we have covered in the 12 weeks in the last few months. So, I am going to summarize the whole course in this lecture.

**Summarizing the Course**

**Week 1**

- Overview of Decision Support Systems *DSS configuration*
- Business DSS Subsystems
- Decision Support Taxonomy *DSS in BI*

**Week 2**

- Refined Decision Process with DSS *Seven steps (Five steps)*
- Basics of Modeling and Developing for DSS *Phases: 1. Decision recognition*
- Monte Carlo sampling and usages *2. Diagnosis*

Week 1 started with the overview of the Decision Support Systems where Professor Deepu Phillip introduced you to the Decision Support Systems overview, the Decision Support Systems taxonomy and business DSS subsystems in which various because the patterns of the Decision Support System that is the web-based Decision Support System course was done before.

So, you might have gone through that material which is expected at that precursor of this course is already taken. So, different DSS configurations were taken or given in this first week like management decision situation. Specific technologies used for decision support, then DSS basic components like Data, Model and Schematic representation of DSS configuration these were all taken in the first lecture.

Then, how is DSS important in business intelligence? This comparison was made that Decision Support Systems is typically created to support the solution of a certain business problem. However, business intelligence systems monitor situations and identify problems or opportunities through the use of various analytic models.

So, DSS often had its own database and models. BS could use the secondary data, there were certain features those were discussed and also the DSS architecture was discussed in the first week.

After discussing about the DSS in general the refined DSS models which are the modern or Advanced DSS models those were discussed in week 2 in which the DSS based systems and the general process for that was taken.

Then, basics of modelling and developing for DSS and Monte Carlo sampling is used was what taken in this week. The refined DSS process had 7 steps in which it was identifying the decision, gathering information, identifying the alternatives, then weigh the evidence against each estimate, then choosing amongst the right alternatives were taken, then we need to take action and finally review the decision. These 7 steps were taken.

Then, for actual problem solving, majorly 5 steps were taken out of it and this was all supported by various examples and broadening the steps like finding occasions for making a decision, finding possible course of action, choosing among the various courses of actions.

Then, various phases were also discussed. 2 broad phases like Decision Recognition and Diagnosis. This is phase 1, phase 2 was the diagnosis of the decision, these were taken in week 2.

So, then what are Suboptimal decisions and basics model for developing for DSS? What is the system? From the system, we need to understand the state of the system, the modelling in the system, broad classification of the system into 2 types that is Discrete and Continuous system. From there only, we took the Monte Carlo sampling and 3 major goals of modelling that is, Evaluating system performance, Predicting the performance, then Handling multiple designs. These were all discussed.

Then, what are different kinds of models? These were taken from like physical, mathematical, computer, descriptive, perspective model all were taken. Then, 8 steps from model building were discussed in the week 2 only.

## Summarizing the Course

### Week 3

- Tree Search and Alternatives in Decision Making *Node, Root, Child, Parent*
- Single Machine Sequencing Problem
- Tree Data Structure

### Week 4

- Decision Tree Algorithm for Business Decisions *AI Technique*
- Decision Trees
- How it Works?



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Then, week 3 focused on Tree Search and alternatives in decision making. So, when we say about Tree search, the problem statement, the computability in the problem and the approach to the problem was taken, then the various elements of tree like node, root, then we have child and parent. These were given small introduction to definition of each one was given and when we talk about the structure of the tree, the leaf of the tree, internal nodes, edge, depth, breadth, height, etcetera.

What is the Binary Tree also these are all discussed in the first lecture, then we had a lecture on Single Machine Sequencing Problem which was taken with an example of the processing time with due date and penalty weight.

If the processing is not done within time, this was taken as a full-fledged example by Professor Deepu Philip and this was enumerated further while showing you the different node and roots and try to make you understand that child parent relation or so. So, this was taken as a tree data structure example in week 3.

Then, came week 4, where Decision Tree Algorithm for business decision was taken that is different trees or different decision trees to be used as an AI technique. Then, how does this decision tree work, then also again examples were taken, illustrative examples on the weather, temperature, humidity, wind and whether; we should go for fishing or not. This was taken while understanding different terminology in the decision tree trying to understand the equations, how do the business tree models are also sometimes logarithmic sometime exponential or so these were all discussed.

Then, identifying the root node, some empirical formulas for that were discussed and taking this example of humidity, wind and whether to go for fishing or not this was taken in week 4 and how does it work a complete numerical was resolved while taking out small subsets of the tables from the big table on taking the fishing decision. Then, expanding the tree, finalizing the tree, the tree that is finally crucial or significant points in the tree which are to be taken these were all discussed in the example on the fishing only in week 4.

## Summarizing the Course

### Week 5

- Linear Programming Introduction
- Linear Programming Graphical Method
- Linear Programming Graphical Method, MS Excel Demonstration
- Linear Programming Graphical Method, MS Excel Demonstration

Deterministic Modeling

[Linearity, Additivity, Divisibility, Certainty]

### Week 6

- Transportation Model - Introduction
- Transportation Model - Solution approaches
- Transportation Model - Optimality test, MS Excel Demonstration
- Transportation Model - Assignment problem

MODI (last loop if close)

(Solution)

Then, came week 5, where we more focused on the Deterministic Modeling, where what is Linear Programming. This was taken first and linear programming and classification of different models of decisions was first taken and we picked the deterministic models as those were the degree of certainty of the model with based upon the degree of certainty, probabilistic and deterministic models were taken by Professor Deepu Philip, it is also taken by Dr. Prabal as well. So, this was taken by me in which deterministic models specifically the linear programming was discussed in detail.

So, when I say Linear Programming, different components of it like, Decision Variables, Constraints, Objective function; those are all introduced and few assumptions of that which was linearity, additivity, divisibility and certainty. These were discussed which make the model deterministic, it is deterministic modeling.

Then, we discussed about the formulation of the Linear Programming and from the Objective function, how do we define the constraints, different contribution, different decision variables, how do we finally formulate and we try to had an excel demonstration on the graphical model and also, we had an excel demonstration on the Simplex model.

An extended version of the linear programming problem was a Transportation model, which was taken in week 6, where transportation is expressed as a special case of the linear program and various pros and cons of linear programming were also discussed and transportation model methods specifically the solution approaches using Modi method was discussed.

Various solution approaches starting from the north west method, the least count method, Vogel approximation were taken then to optimize the solution we had to select one of the methods that is the modified distribution method was taken that is the Modi method and this full problem was solved and various variables or parameters in the problem while

forming the closed loop system. Closed loop of change in the transportation was taken and demonstration on the excel using the MS Excel solver was taken in week 6.

Lastly, we had a small discussion or one lecture on the assignment problem and assignment problem was taken as a special case of transportation problem where the assignment could be only one. Now this was also then taken to the MS Excel demonstration.

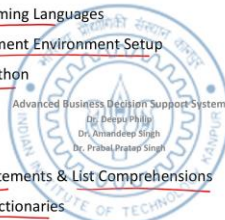
### Summarizing the Course

#### Week 7

- Python Programming Languages
- Python Development Environment Setup
- Data Types of Python

#### Week 8

- Control Flow Statements & List Comprehensions
- Tuples, Sets & Dictionaries
- Functions in Python *args and kwargs*



Then, came week 7, where Dr. Prabal Pratap Singh introduced you to the Python programming languages because python is one of the most widely used programming languages and what is the use of this language and different elements of the programming languages starting from the components of a general programming language and the paradigm or classification of programming languages was discussed.

So, python as an interpreted, object-oriented, high-level language with dynamic similarities was discussed a small introduction to this was given then practice sessions were also taken and how do we develop the environment setup for the python and data types of Python were discussed in the week 7; different compilers and interpreters. Then, the history of Python installation of the python into your windows using Visual Studio Code. Then, if starting program that is called as the 'Hello World' program. This was given by Dr. Prabal Pratap Singh in week 7.

In week 8, he further talked about the Control Flow statements and list comprehensions in the python program only Variable statements, Commands, the Data types that is the Numbers, Strings, Lists, Slicing, List method, etc. These are all discussed in the first lecture of week 8, where the loop control flow statements such as for Statement, While statement, If-else statements were there which were nested and these were all discussed in the week 8. Then, different sets that is two plates, Sets, Dictionaries.

These were discussed in the second lecture of week 8 different sets in Python, different operators like Union operator, Intersection operator, Difference operator or Symmetric

difference operator, etc. were taken or discussed and different dictionaries in python like how do we retrieve different command from the dictionary. These were all taken in the week 8 then functions in python that is the function arguments. Then, args and kwargs the global and local scope of python was also discussed in week 8.

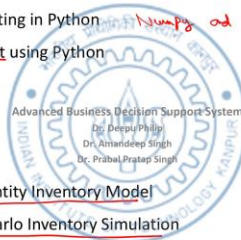
### Summarizing the Course

#### Week 9

- Scientific Computing in Python *NumPy and Scientific Computing*
- DSS Development using Python

#### Week 10

- Fixed-order Quantity Inventory Model
- DSS for Monte Carlo Inventory Simulation



Then, week 9 discussed about the Scientific Computing in python that is the different modules which helps us in extending the features that are already present in the python.

Then, we need to import the OS that is, a standard library then have different functions like import functions, then NumPy and Scientific Computing. This was taken in week 9 lecture one.

After discussing NumPy, Random Number Generation, the DSS development was demonstrated using python programming that is, how do we generate random number between 1 and 100? How do we decide whether the number generated is less than 50 or so these small examples were taken in week 9.

Week 10 then talked about the Fixed Order Quantity, the Inventory model that was discussed by Professor Deepu Phillip previously, this was detailed in the python program by Dr. Prabal Pratap Singh in which quantities of items which are kept by an organization for future usage.

This is in which what is inventory, the definition was given. Then, objective to minimize the cost of maintaining an inventory, this was listed there and different components of the inventory management system for example, Carrying cost, Ordering cost, Stock out cost, Purchasing cost; these were all discussed and fixed order quantity, when we are trying to order the inventory for this fixed order or the reorder level with what is to be kept this was all discussed in general about the inventory management system. There is an inventory

management system which tri-thrig as well which was not discussed here that is given to you as a self assignment or so to work.

So, DSS for Monte Carlo inventory simulation was also taken in this week only where Monte Carlo simulations which were discussed by Professor Deepu Phillip was taken into the python programming by Dr. Prabal Pratap Singh and the problem was taken for the inventory management only where week, demand, stock, order placed, delivery time. Then, we calculated the carrying cost based upon the data which is available like ordering cost, stock out cost and total cost and the total cost was to be overall minimized.

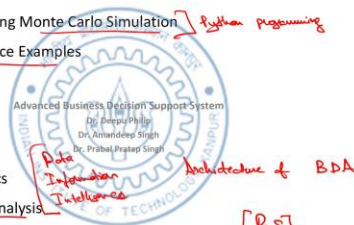
### Summarizing the Course

#### Week 11

- Financial DSS using Monte Carlo Simulation } Python Programming
- Additional Practice Examples

#### Week 12

- ✓ Big Data Analytics
- ✓ Market Basket Analysis } Intelligence
- ✓ Market Basket Analysis - MS Excel Demonstration } Post
- ✓ Course summary



This was taken in week 1, week 11 was the financial DSS using Monte Carlo simulation the additional practice examples were taken which were discussed by professor Deepu Phillip in week 2, those were taken into the python programming here in week 11.

Week 12 that is this week I gave you a small introduction to Big Data Analytics where what is Big Data Analytics and architecture of that, why do we really need the Big Data Analytics nowadays and the elements of that starting from data, information and we try to derive intelligence out of it and architecture of the big data analytics this is taken in week 12 and I discussed about a small big data analytics component that is Market Basket Analysis which is Data mining technique to decide the basket or the combination of the products which are more likely to be sold and we can also have its application in different fields in retail, in finance, in e-commerce. So, this was all discussed and an excel demonstration in the point of sales application in retailing was given and this lecture is just a course summary.

So, this course majorly covered the basics of the Python programming some advanced MS Excel demonstrations were also given so that is why we called it as an Advanced Business Decision Support Systems though very trivial or small examples were taken which could be understood by the amateurs as well you can extend the problem to the larger problem

wherever the big data is there not only a small problem with 5 rows or maybe 10 rows. If you have something data available of maybe 10,000 rows or so the processes or the procedures are always same. I hope this course has helped you to understand the basics and some advanced elements of the business Decision Support Systems and best of luck for the exams.

Thank you.