LP Sport Consulting

Equestrian Schedule

MAS 632 – Management Science Models for Decision Making

Problem

- Top rider coming to Florida circuit for the first time
- 12 weeks of horse shows at different levels
  - Each week has a different schedule and prize money per event
- With a string of 5 horses find the optimal schedule to maximize prize money and participation
- Subject to:
  - Each horse can participate up to 6 weeks
  - Athlete must participate in every event at least with one horse
  - Horses cannot enter more than 2 weeks in a row
  - There cannot be more than 3 horses showing in the same week

Problem

- **Decision Variables:**

$$x_{ij} = \begin{cases} 1, & if\ horse\ j\ is\ participating\ in\ event\ i \\ 0, & otherwise \end{cases}$$

For *i* = *1, 2, 3, … , 19* and *j* = *1, 2, 3, …, 5*

- **Objective Functions:**

$$max\ prize\ money = \sum_{i=1}^{5} . \sum_{j=1}^{19} c_i x_{ij}$$

Where c_i is the prize money per event *i*

Problem

Constraints:

$events\ per\ horse: \sum_{i=1}^{19} x_{ij} \leq 6$

For all j in $j = 1, 2, 3, 4, 5$

$horses\ per\ event: \sum_{j=1}^{5} x_{ij} \geq 1\ and \sum_{j=1}^{19} x_{ij} \leq 3$

For all i in $i = 1, 2, 3, \dots, 19$

$weeks\ in\ a\ row: \sum_{i=w}^{w+2} x_{ij} \leq 2$

For all w in $w = 1, 2, 3, \dots, 10$

For all j in $j = 1, 2, 3, 4, 5$

$horses\ per\ week: w \leq 3$

where w equals the sum of horses per week

Process


Data Collection
Data Cleaning and Exploration
Data Modeling and Interpretation

Solution

To maximize the athlete's prize money to **$1.42M**, on average, his scheduling distribution per horse should be as follows:

- Horse 1 – Events 1, 4, 8, 11, 15, 18
- Horse 2 – Events 2, 5, 8, 12, 13, 17
- Horse 3 – Events 3, 9, 11, 14, 15, 19
- Horse 4 – Events 6, 7, 12, 14, 16, 19
- Horse 5 – Events 4, 6, 10, 12, 15, 17