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Master of Technology in Knowledge Engineering

Unit 7:

Developing Intelligent Systems for Performing Business Analytics

Optimisation Workshop

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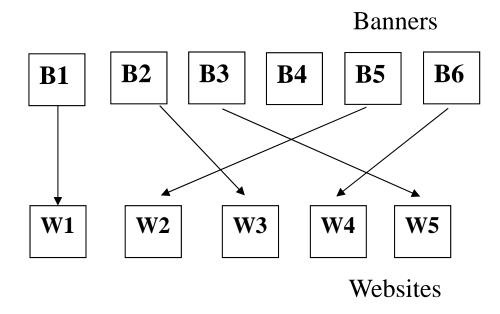




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Problem Description – Online Advertising

- The Company Milton advertises their new products through placing ad banners on five websites.
- The company has the task of selecting (on a daily basis) the most effective advertising plan to reach the largest audience, ie maximize the number of user clicks, at the same time meeting the daily budget.
- They have 6 ad banners (same size but with different designs) and 5 websites to choose from. The advertising plan needs to determine which type of ad banner is displayed on which website and for what duration.
- If selected, each website can only display one banner and each banner can only be assigned to one website on the same day.







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Factors Influencing User Clicks

- Factors influencing the user clicks
 - » The popularity of each website is different, hence the number of user clicks achieved may be different for each banner.
 - » The number of user clicks also depends on type of the ad banner, ie. the design of banner.
 - » The number of user clicks also depends to a lesser degree on the time of day that the banner is displayed. For example, the evening period from 7pm -10pm attracts more user clicks.
- Unfortunately, there is no known formula for computing the user clicks on the ad banners. In practice, the actual user clicks achieved is only known at the end of the day.
- Records have been kept over the last three years showing the actual user clicks associated with each daily advertising plan (assignment of banners to websites, display durations).





Ad Banner Cost

- The total advertising cost can be computed as

 TotalCost = sum (duration in hours * cost per hour)
- The cost table is shown below (measured in dollars per hour). The company typically has a budget of \$250 \$450 per day.

	W1	W2	W3	W4	W5
Cost (\$ /hour)	15	10	8	8	12



Example Advertising Plan

• An example advertising plan is

Website	Banner	Start Time	Duration (hrs)	Cost
W1	В5	5	19	285
W2	В6	14	5	50
W3	B4	10	3.5	28
W4	-	-	-	-
W5	B1	13	5	60

Total cost = \$423

Total User Clicks = 335540





Workshop 1A: Objective

• Develop a hybrid intelligent system that can find an assignment of banners to websites and start time & duration for each banner's display time which will maximize the user clicks while ensuring that budget requirement is met.

Constraints

- » Assume the company now has a budget of \$300 per day.
- **Each** banner can be displayed any time from 0.00 to 24.00 hours but we only consider a daily plan which means start time + duration must be ≤ 24.00 .
- » Each banner can be displayed only one continuous period a day.
- » Duration=0 means the banner is not displayed on the website.





Class Discussion

• Can you suggest architectures for solving the problem?



