

Worker Pay Optimization

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ABC COMPANY



“ABC is a small company that helps in advertising by distributing FLYERS in and around THE USC area.

As the objective of any company is to increase profit, THE ABC company wants to do so by reducing the cost of its labor.

- As the frequency of the job varies weekly there are no permanent labors.**
- Once the company is all set to distribute flyers , notifications are put up on notice boards to let people know about the availability of jobs.**

INITIAL PROCESS



- **The interested people are requested to contact the company office on campus and give in their details.**

- **The details include the**

 - ✓ **Salary expected**

 - ✓ **Past / Related experience**

 - ✓ **Age**

- **The age and past/related experience is used to compute an weighted average for each employee.**

Parallel Processes



- **On previous experience** and asking a few of them who have distributed the flyers, the range of flyers distributed per minute 15-20/min on pedestrian pavements and around 45-55/min during a crowded fare.
- Considering distributing flyers in USC on a normal day $15*60=900$ to $20*60=1000$ an hour.
- This varies tremendously, EG. 12:00pm and 12 :20 pm OHE.

INPUT DATA



- **The no of flyers that need to be distributed is known.**
- **Using the no. of applications and the details of AGE and Past experience a relative grading can be given.**
- **A prediction of the no. of Flyers that can be distributed per person can be made and data is used to form different clusters.**
- **The California minimum wage is \$8/hr**
- **The maximum the company can offer is \$12/hr.(Beyond which will be a loss)**

Data Analysis



- **Consider the following:**

No of flyers to be distributed = 10,000

• **No of applications received = 135**

• **Distribution of flyers = 900-1100**

• **This varies tremendously, EG. 12:00pm and 12 :20 pm OHE.**

Data



Coil Challenge 2000

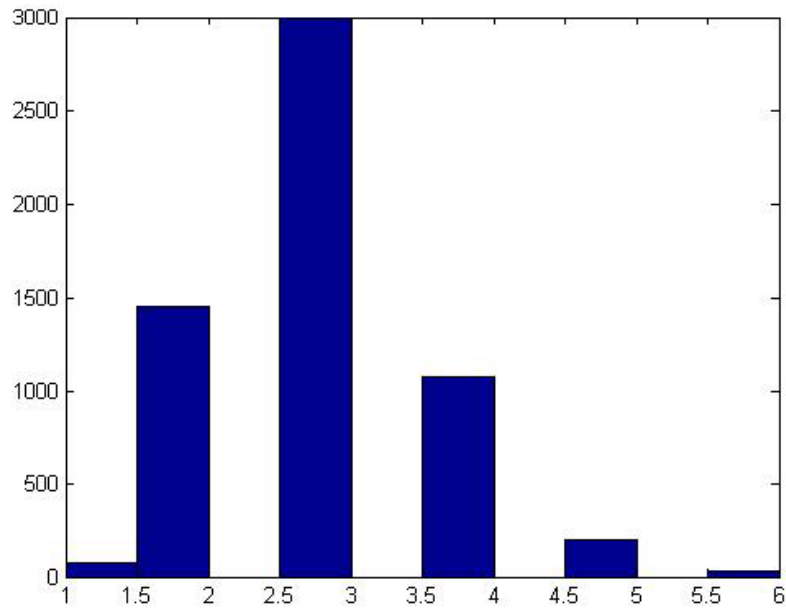
- **Real world business data**
- **5822 customer records**
 - ✓ **135 customer record (random)**
- **86 attributes (socio-demographic data, product ownership data)**
 - ✓ **2 attributes (age, unskilled labor)**

Data

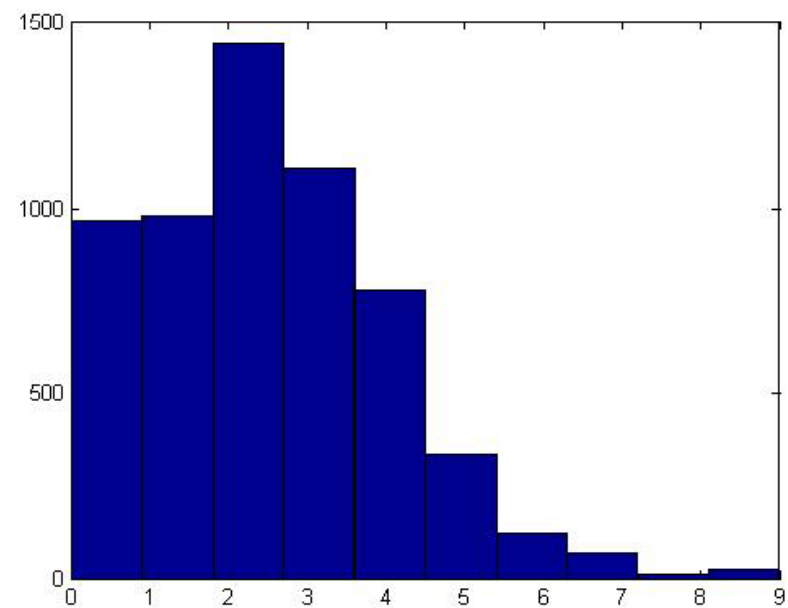


Coil Challenge 2000

Age



Experience



Data



Idx	Age	Experience
1	2	2
2	3	0
3	4	3
4	3	1
5	2	1
6	5	4
7	2	3
...
100	3	2

Age

- **2 (20 years old)**
- **3 (30 years old)**
- **5 (50 years old)**

Experience

- **1 time**
- **2 times**

Clustering (K-means)

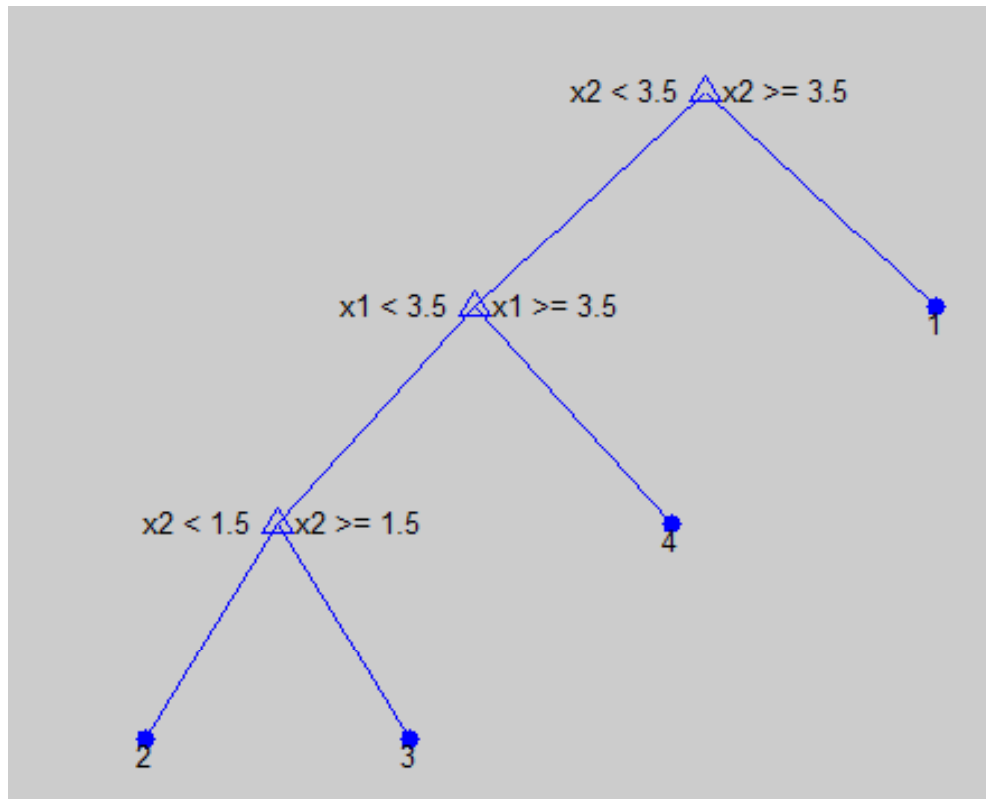


Idx	Age	Experience	Cluster
1	2	2	3
2	3	0	2
3	4	3	4
4	3	1	2
5	2	1	2
6	3	4	1
7	2	3	3
...
100	3	2	3

Interpreting the clustering results

- **Decision Tree**

Decision Tree



1 Cluster

- $X_2 \geq 3.5$

2 Cluster

- $X_1 < 3.5$ & $X_2 < 1.5$

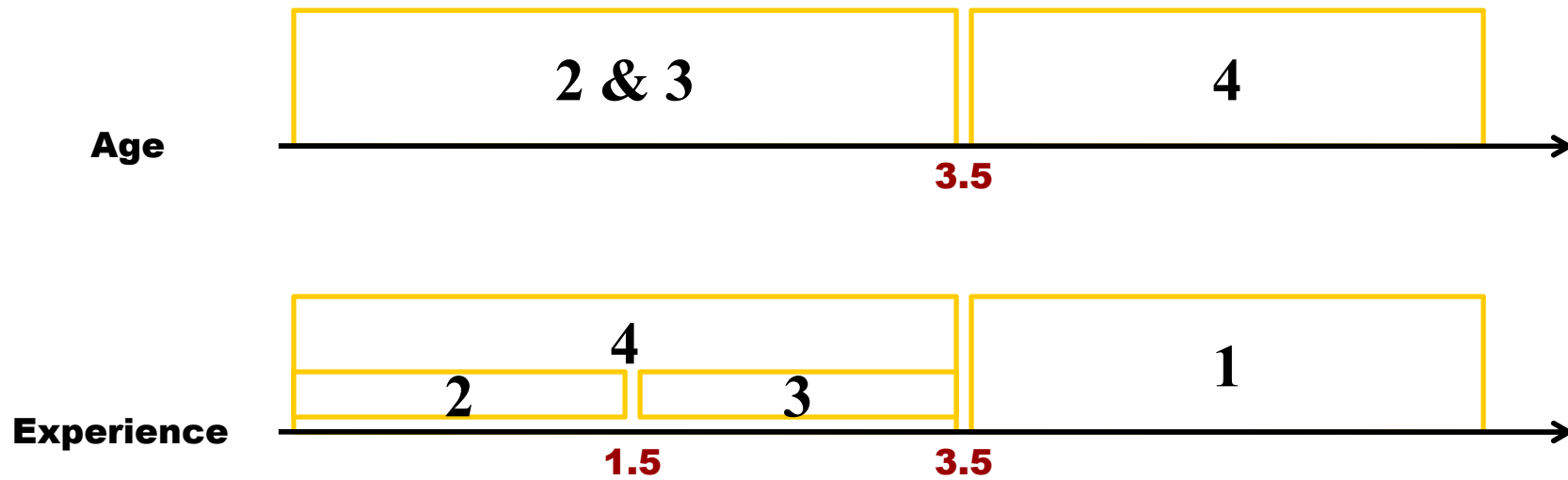
3 Cluster

- $X_1 < 3.5$ & $1.5 \leq X_2 < 3.5$

4 Cluster

- $X_1 \geq 3.5$ & $X_2 < 3.5$

Decision Tree



1 Cluster : High experience

2 Cluster : Low experience, young

3 Cluster : Medium experience, young

4 Cluster : Low and medium experience, old

► **Define Efficiency**

Optimum Solution



- **Range of pay possible** = \$8 to 12\$
- **Unit of optimum solution** = No of Hours (Excel)
- **Class 1** = 22 or 22
- **Class 2** = 27 0
- **Class 3** = 2 14.2
- **Class 4** = 0 11
- =
- **Develop a sensitivity analysis**

Range of Results for Dynamic Pricing

- **The sensitivity analysis obtained gives the various ranges of changeable cells as well as variable constraints.**
- **Dynamic Pricing is a procedure in which suppliers/producers charge different rates for given goods or service depending on time, day month.**
- **Develop a dynamic pricing Sheet for Optimal solution.**
- **The 2 Cases of dynamic pricing in real life.**
 1. **Supply \geq Demand**
 2. **Demand \geq Supply**

Supply \geq Demand Class 1

	⋮	⋮	⋮
n+3	8	8	8
n+2	8	8	8
n+1	8.5	8	8
n	9	8	8
	⋮	⋮	⋮
	D	D+1	D+2
			<u>Days left</u>

**$W(HR, T) =$
Expected Revenue**

Supply \geq/\leq Demand Class 4

	⋮	⋮	⋮
n+3	9.5	9	8
n+2	10	9.5	8
n+1	10.5	10	8
n	12	≤ 11	8
	⋮	⋮	⋮
	D	D+1	D+2

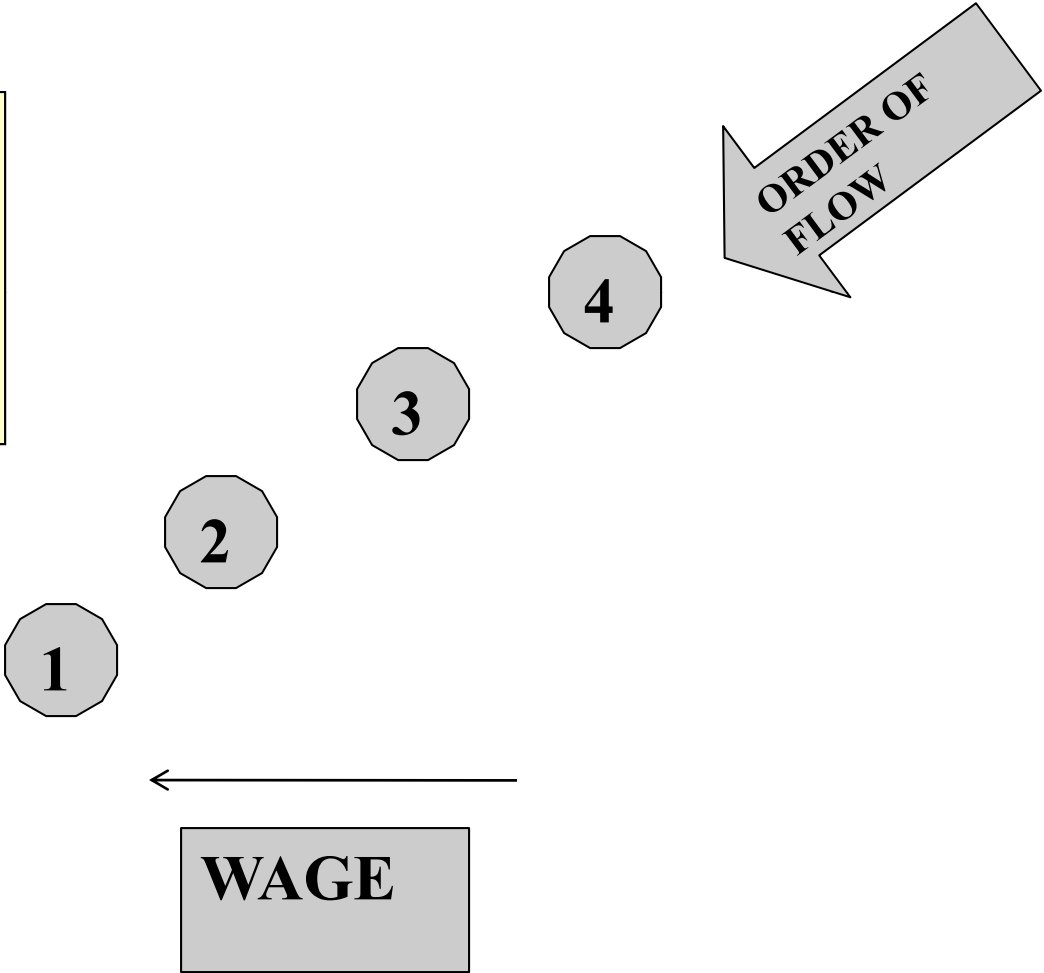
$W(HR, T) =$
Expected Revenue

All values are
 \leq
Less than equal
to

FLOW CHART



**START OFF WITH
MINIMUM WAGES FOR
MAXIMUM EXPERIENCE.**

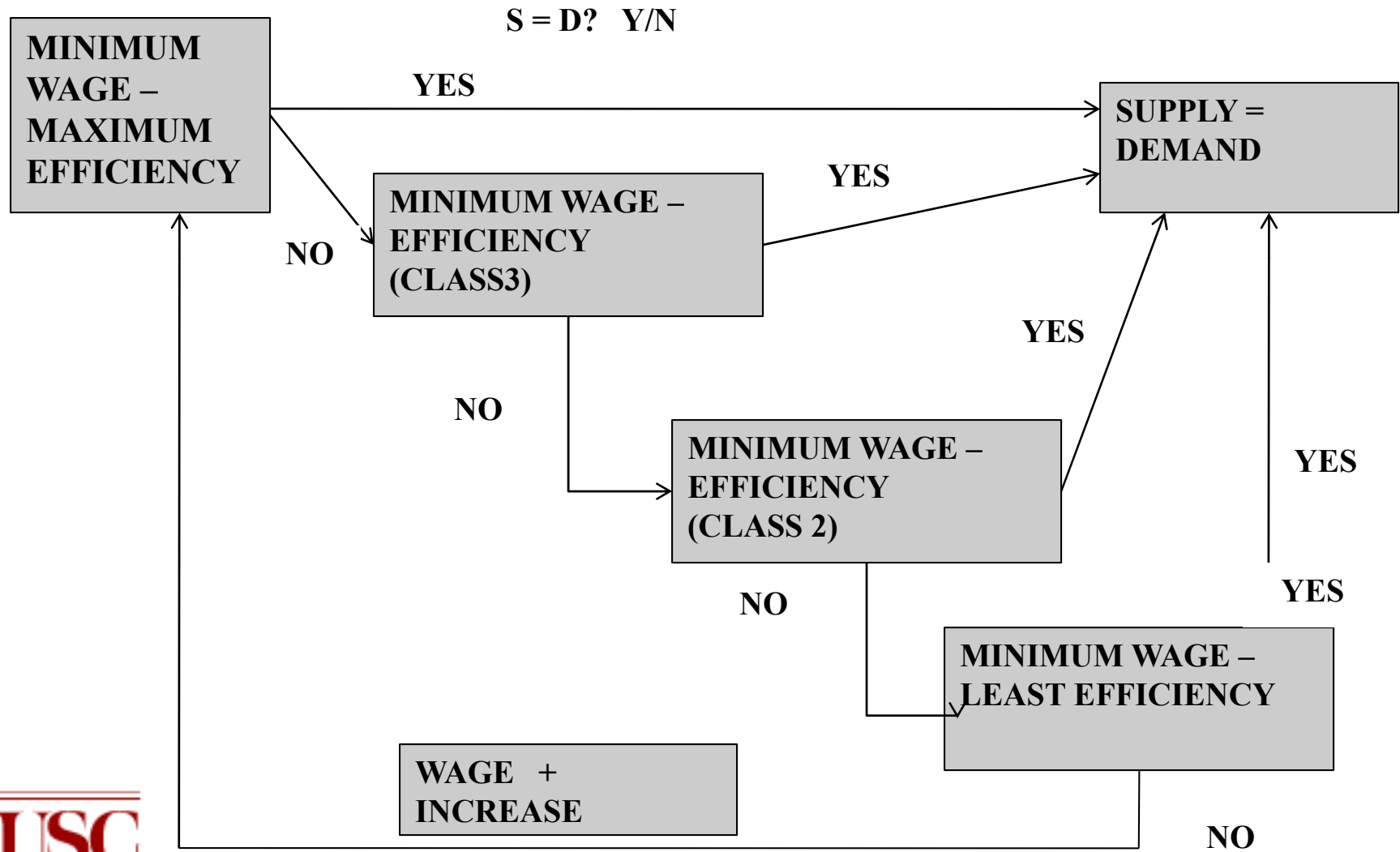


REAL LIFE SITUATION/ NEGOTIATION



- **SOME REALITIES**
- **A FRACTION, IS ALWAYS READY TO WORK FOR A LOWER WAGE.**
- **CLASS 4 PEOPLE MAY WORK FOR \$8.**
- **GET THE MAXIMUM OUT OF THEM.**

Optimum Solution



Answers



- **Class 4**
 $2 \times 11 = 22$
 $3 \times 10 = 30$
- **Class 3**
 $1 \times 10 = 10$
 $8 \times 9 = 72$
- **Class 2**
 $25 \times 9 = 225$
 $1 \times 8 = 8$
- **Class 1**
 $8 \times 8 = 64$

• **Total = \$ 431**
people

Since the time restriction is 1 hr = 48

Other Variations and Assumptions



- **The model can be changed for the no of hours to complete the job.**
- **The price may vary or reduce depending on the Supply and demand.**
- **Inverse Model (Air line ticketing)**
- **Breakeven Point.**
- **Priority (Seats to be filled or Cost) (Cost or Flyers to be distributed)**

Dynamic Pricing



- **Inventory**
- **Negoation**
- **To Maximize (X= what is required) Minimise (Y= Not required)**
- **Eg X= Profit Y= Cost**
- **Prediction Accuracy**

Q & A

