Decision Support Tool for Optimal Beer Blending

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Presentation Outline

Introduction

Brewing industry has been hit by decrease in consumption of traditional beers.

Consumer are becoming adventurous in their choice of beer to drink.

Large diversity in the beer taste and preferences of consumers(by region, age group, etc).

Brewing companies are forced to propose more varieties of beers to suite various markets.

Beer varieties are uniquely blended to obtain different types of beer blends with each satisfying different attributes at specific levels.

Problem

The problem comes from a North American based brewing company, which is well established with concept of beer blending.

The company is in the process of having more varieties of beers on the market, they are considering a wider range of raw materials with wider range of attributes.

Blending has become a complex task since they have to process large raw material and attributes to produce quality beer blends at lowest cost.

Therefore, they are prompted to search for a user-friendly decision support tool that could assist them.

Problem

Optimize the beer blends based on the availability, price and attributes of the raw material.

Blends are 'finger printed' for different attributes.

Blends	Brightness	Colour	Thickness	Coarseness	Quality	Leaf p/kg		kg/wk
BK861	2,3	3,0	3,0	2,0	2,3	1,0	1,31	100 000
BK907	3,8	4,7	2,9	3,0	3,8	1,0	1,47	100 000
BK766	6,6	5,2	6,1	6,9	6,6	1,0	2,05	60 000
BK5014	6,2	5,2	5,3	6,4	6,2	1,0	1,80	100 000
BK636	4,7	5,1	4,5	5,0	4,7	1,0	1,61	100 000

Raw material are also 'finger printed' against the same attributes.Blends are 'finger printed' for different attributes.

Raw material	Brightness	Colour	Thickness	Coarseness	Quality	Leaf Price (p/kg	Availability (kg/wk)	
A5BC	5,0	4,0	9,0	6,0	5,0	5,0	2,40	5 000
A5D	5,0	3,0	9,0	4,0	5,0	1,0	1,67	1 000
A5DC	5,0	4,0	9,0	6,0	5,0	1,0	2,35	25 000
A5F	5,0	3,0	9,0	4,0	5,0	1,0	1,70	1 000
A5FC	5,0	4,0	9,0	6,0	5,0	1,0	2,30	25 000

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Objective

Find the cheapest possible combinations of raw materials to produce the blends to match their attributes score requirements.

Constrained to the availability of the given raw material and weekly demand of beer blends.

It is almost always impossible to exactly match the targeted attribute score of the final blends.

In that case, we aim at finding a solution that is the closest match to the targeted one.

Critical attributes.

AIM

Develop and solve the beer blending model that is able to

- determine the closest match of beer blends at the lowest cost.
- provide the user with a tool to analyse the existing trade-off between the quality achievement of the blends and the total cost of the raw material.

Notes Blending Problem

Concerned with mixing various raw materials with different attributes to produce one or more blends. The problems are often

formulated as linear programmes.

One of the oldest optimization problem to be solved by simplex methods.

Blending problems evolved over time.

Classical models are not suitable to many blending problems in different industries.

Thank you