Dataset for a hybrid decision making framework under complex spherical fuzzy prioritized weighted aggregation operators*

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Abstract. We provide a numerical dataset that shows the applicability of a hybrid decision making framework under complex spherical fuzzy prioritized weighted aggregation operators. The dataset is related to the hiring of a marketing manager for an open position at a textile company.

Keywords: complex spherical fuzzy numbers · score function · prioritized weighted aggregation operators · boundedness · decision matrix

1 Marketing Manager Dataset

In this section, we show a dataset related to the hiring of a marketing manager for an open position at a textile company. It aims at illustrating the prioritization phenomenon among the decision makers and among the criteria. Within a relevant panel, each decision maker has a different priority level. Similarly, each criterion has its own priority within the set of criteria.[1]

1.1 Description

A textile company wants to hire a marketing manager for a vacant seat. For this purpose, the board of the company decides to appoint an interview panel

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[1] Other references can be found at [2, 5, 6, 8–10, 12, 1, 13, 14, 11, 4, 7, 3]

formed by three decision makers, namely $\mathbb{D}_1$: Owner of the textile industry, $\mathbb{D}_2$: General Manager, and $\mathbb{D}_3$: Marketing Executive. Four candidates, namely, $\mathtt{Q}_1, \mathtt{Q}_2, \mathtt{Q}_3$ and $\mathtt{Q}_4$ are considered for interview after preliminary screening. The prioritization among the decision makers is $\mathbb{D}_1 \succ \mathbb{D}_2 \succ \mathbb{D}_3$, which indicates that the decision maker $\mathbb{D}_1$ is at higher priority level than the other two, and that the decision maker $\mathbb{D}_2$ is at a higher priority level than $\mathbb{D}_3$. The appointment is totally unbiased, that is, it is free from political or any other kind of influence.

The interview panel made their evaluations among the four candidates for the position of Marketing Manager on the basis of the following three criteria:

1. $\widehat{C}_1$: Communication skills.
2. $\widehat{C}_2$: Competence.
3. $\widehat{C}_3$: Personal skills.

For the CSFNs, the above criteria can be divided into the following categories:

1. Communication skills, which include verbal skills and written skills.
2. Competence, which includes academic background and awareness.
3. Personal skills, which include analytical skills and adaptability.

The criterion $\widehat{C}_1$ is at higher priority level than the other criteria and $\widehat{C}_3$ has the lowest priority. Therefore, the prioritization among the criteria is $\widehat{C}_1 \succ \widehat{C}_2 \succ \widehat{C}_3$. The decision makers submit the information in the form of CSFNs. As all the criteria under consideration are of benefit type, normalization is not needed.

The CSF decision matrices $\mathbb{D}^a = (E^a)_{4\times 3}$ $(a = 1, 2, 3)$ are represented in the following Tables 1–3.

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Table 1. CSFDM from $\mathbb{D}^1 = (E^1_{pq})_{4\times 3}$

	$\widehat{C}_1$	$\widehat{C}_2$	$\widehat{C}_3$
$\mathtt{Q}_1$	$(0.8e^{i2\pi(0.9)}, 0.3e^{i2\pi(0.4)}, 0.5e^{i2\pi(0.3)})$	$(0.3e^{i2\pi(0.2)}, 0.4e^{i2\pi(0.3)}, 0.7e^{i2\pi(0.4)})$	$(0.6e^{i2\pi(0.9)}, 0.5e^{i2\pi(0.1)}, 0.5e^{i2\pi(0.2)})$
$\mathtt{Q}_2$	$(0.3e^{i2\pi(0.5)}, 0.7e^{i2\pi(0.6)}, 0.4e^{i2\pi(0.7)})$	$(0.8e^{i2\pi(0.9)}, 0.3e^{i2\pi(0.4)}, 0.5e^{i2\pi(0.3)})$	$(0.5e^{i2\pi(0.8)}, 0.4e^{i2\pi(0.3)}, 0.3e^{i2\pi(0.2)})$
$\mathtt{Q}_3$	$(0.8e^{i2\pi(0.7)}, 0.5e^{i2\pi(0.1)}, 0.3e^{i2\pi(0.8)})$	$(0.7e^{i2\pi(0.5)}, 0.5e^{i2\pi(0.2)}, 0.2e^{i2\pi(0.4)})$	$(0.7e^{i2\pi(0.4)}, 0.5e^{i2\pi(0.3)}, 0.4e^{i2\pi(0.3)})$
$\mathtt{Q}_4$	$(0.6e^{i2\pi(0.7)}, 0.6e^{i2\pi(0.2)}, 0.3e^{i2\pi(0.3)})$	$(0.9e^{i2\pi(0.6)}, 0.3e^{i2\pi(0.7)}, 0.2e^{i2\pi(0.1)})$	$(0.1e^{i2\pi(0.7)}, 0.6e^{i2\pi(0.5)}, 0.4e^{i2\pi(0.2)})$

Table 2. CSFDM from $\mathbb{D}^2 = (E^2_{pq})_{4\times 3}$

	$\widehat{C}_1$	$\widehat{C}_2$	$\widehat{C}_3$
$\mathtt{Q}_1$	$(0.5e^{i2\pi(0.7)}, 0.7e^{i2\pi(0.5)}, 0.3e^{i2\pi(0.2)})$	$(0.6e^{i2\pi(0.3)}, 0.3e^{i2\pi(0.4)}, 0.4e^{i2\pi(0.7)})$	$(0.9e^{i2\pi(0.5)}, 0.3e^{i2\pi(0.3)}, 0.1e^{i2\pi(0.3)})$
$\mathtt{Q}_2$	$(0.9e^{i2\pi(0.6)}, 0.2e^{i2\pi(0.5)}, 0.1e^{i2\pi(0.3)})$	$(0.3e^{i2\pi(0.2)}, 0.5e^{i2\pi(0.4)}, 0.6e^{i2\pi(0.3)})$	$(0.8e^{i2\pi(0.7)}, 0.5e^{i2\pi(0.3)}, 0.3e^{i2\pi(0.2)})$
$\mathtt{Q}_3$	$(0.3e^{i2\pi(0.1)}, 0.8e^{i2\pi(0.8)}, 0.3e^{i2\pi(0.6)})$	$(0.7e^{i2\pi(0.6)}, 0.4e^{i2\pi(0.5)}, 0.3e^{i2\pi(0.1)})$	$(0.7e^{i2\pi(0.8)}, 0.4e^{i2\pi(0.2)}, 0.2e^{i2\pi(0.1)})$
$\mathtt{Q}_4$	$(0.5e^{i2\pi(0.5)}, 0.4e^{i2\pi(0.3)}, 0.7e^{i2\pi(0.4)})$	$(0.5e^{i2\pi(0.6)}, 0.4e^{i2\pi(0.3)}, 0.2e^{i2\pi(0.2)})$	$(0.6e^{i2\pi(0.7)}, 0.4e^{i2\pi(0.2)}, 0.3e^{i2\pi(0.2)})$

Table 3. CSFDM from $\mathbb{D}^3 = (E^3_{pq})_{4\times 3}$

	$\widehat{C}_1$	$\widehat{C}_2$	$\widehat{C}_3$
$\mathtt{Q}_1$	$(0.7e^{i2\pi(0.7)}, 0.4e^{i2\pi(0.1)}, 0.4e^{i2\pi(0.8)})$	$(0.5e^{i2\pi(0.1)}, 0.3e^{i2\pi(0.3)}, 0.3e^{i2\pi(0.4)})$	$(0.5e^{i2\pi(0.8)}, 0.6e^{i2\pi(0.2)}, 0.6e^{i2\pi(0.3)})$
$\mathtt{Q}_2$	$(0.2e^{i2\pi(0.6)}, 0.6e^{i2\pi(0.1)}, 0.5e^{i2\pi(0.3)})$	$(0.8e^{i2\pi(0.8)}, 0.3e^{i2\pi(0.4)}, 0.5e^{i2\pi(0.3)})$	$(0.5e^{i2\pi(0.7)}, 0.4e^{i2\pi(0.4)}, 0.3e^{i2\pi(0.1)})$
$\mathtt{Q}_3$	$(0.7e^{i2\pi(0.4)}, 0.6e^{i2\pi(0.2)}, 0.3e^{i2\pi(0.3)})$	$(0.7e^{i2\pi(0.5)}, 0.5e^{i2\pi(0.2)}, 0.3e^{i2\pi(0.3)})$	$(0.7e^{i2\pi(0.3)}, 0.4e^{i2\pi(0.2)}, 0.5e^{i2\pi(0.3)})$
$\mathtt{Q}_4$	$(0.6e^{i2\pi(0.8)}, 0.6e^{i2\pi(0.1)}, 0.3e^{i2\pi(0.2)})$	$(0.9e^{i2\pi(0.6)}, 0.2e^{i2\pi(0.5)}, 0.3e^{i2\pi(0.2)})$	$(0.2e^{i2\pi(0.7)}, 0.5e^{i2\pi(0.4)}, 0.4e^{i2\pi(0.1)})$

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