

Figure 1: Algorithms and arithmetic functions used in the builder and three visual validations.

1. Algorithms and Arithmetic Functions

See Figure 1 for details.

2. Standard Operation Panel and Custom Transformation Panel

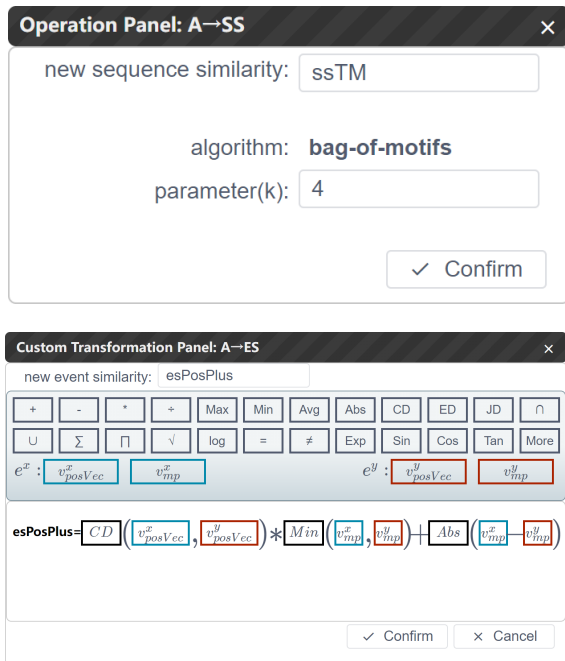


Figure 2: Standard operation panel (top) and custom transformation panel (bottom) for defining rules.

3. Detailed Tasks of User Study

Tasks of Part 1 (T1–T4): Developing four specified similarity measurements using the builder and programming, respectively.

T1: The similarity of administration type sequences (e.g., IV Bolus and IV Infusion) is calculated using the Bag-of-Events algorithm.

T2: The similarity of treatment unit sequences is calculated using the Levenshtein Distance.

T3: First, the similarity of medication administration events is calculated according to the following formula:

$$esTreatment = \begin{cases} |v_{dosedue}^x - v_{dosedue}^y|, v_{medication}^x = v_{medication}^y \\ \max(v_{dosedue}^x, v_{dosedue}^y), v_{medication}^x \neq v_{medication}^y \end{cases}$$

Then, the similarity of the medication administration sequences is calculated based on the event similarity using the DTW algorithm.

T4: The text vector attribute of medication description is derived from the description attribute using TF-IDF, then event similarity is calculated using the Cosine Distance, and finally sequence similarity is calculated using the DTW algorithm.

Tasks of Part 2 (T5–T8): Validating the similarity measurements of T1–T4 respectively by the projection view, pattern view and instance view.

T5: Validating the similarity measurement of administration type sequences in T1 by the projection view, pattern view and instance view.

T6: Validating the similarity measurement of treatment unit sequences in T2 by the projection view, pattern view and instance view.

Table 1: Detailed results of user study

Id	Grade	Familiarity	Group	Time for T1-T4(builder)	Time for T1-T4 (programming)	User Rating (T5-T8)
A1	senior	Yes	G1	5.27 minutes	18.97 minutes	Agree (6)
A2	senior	Yes	G1	6.62 minutes	21.38 minutes	Strongly Agree (7)
A3	senior	Yes	G1	5.52 minutes	22.27 minutes	Strongly Agree (7)
A4	senior	Yes	G1	4.75 minutes	15.53 minutes	Agree (6)
A5	senior	No	G2	7.08 minutes	20.92 minutes	Strongly Agree (7)
A6	senior	No	G2	10.83 minutes	18.12 minutes	Agree (6)
A7	senior	No	G2	8.25 minutes	19.47 minutes	Somewhat Agree (5)
A8	senior	No	G2	5.4 minutes	16.5 minutes	Strongly Agree (7)
A9	novice	No	G3	7.78 minutes	36.68 minutes	Neither Agree nor Disagree (4)
A10	novice	No	G3	9.08 minutes	36.82 minutes	Somewhat Agree (5)
A11	novice	No	G3	5.33 minutes	18.52 minutes	Strongly Agree (7)
A12	novice	No	G3	12.57 minutes	33.68 minutes	Somewhat Agree (5)

T7: Validating the similarity measurement of medication administration sequences in T3 by the projection view, pattern view and instance view.

T8: Validating the similarity measurement of medication description sequences in T4 by the projection view, pattern view and instance view.

4. Detailed Results of User Study

See Table 1 for details.

5. 7-point Likert scale in Part 2 of user study

- Strongly Disagree (1)
- Disagree (2)
- Somewhat Disagree (3)
- Neither Agree nor Disagree (4)
- Somewhat Agree (5)
- Agree (6)
- Strongly Agree (7)