

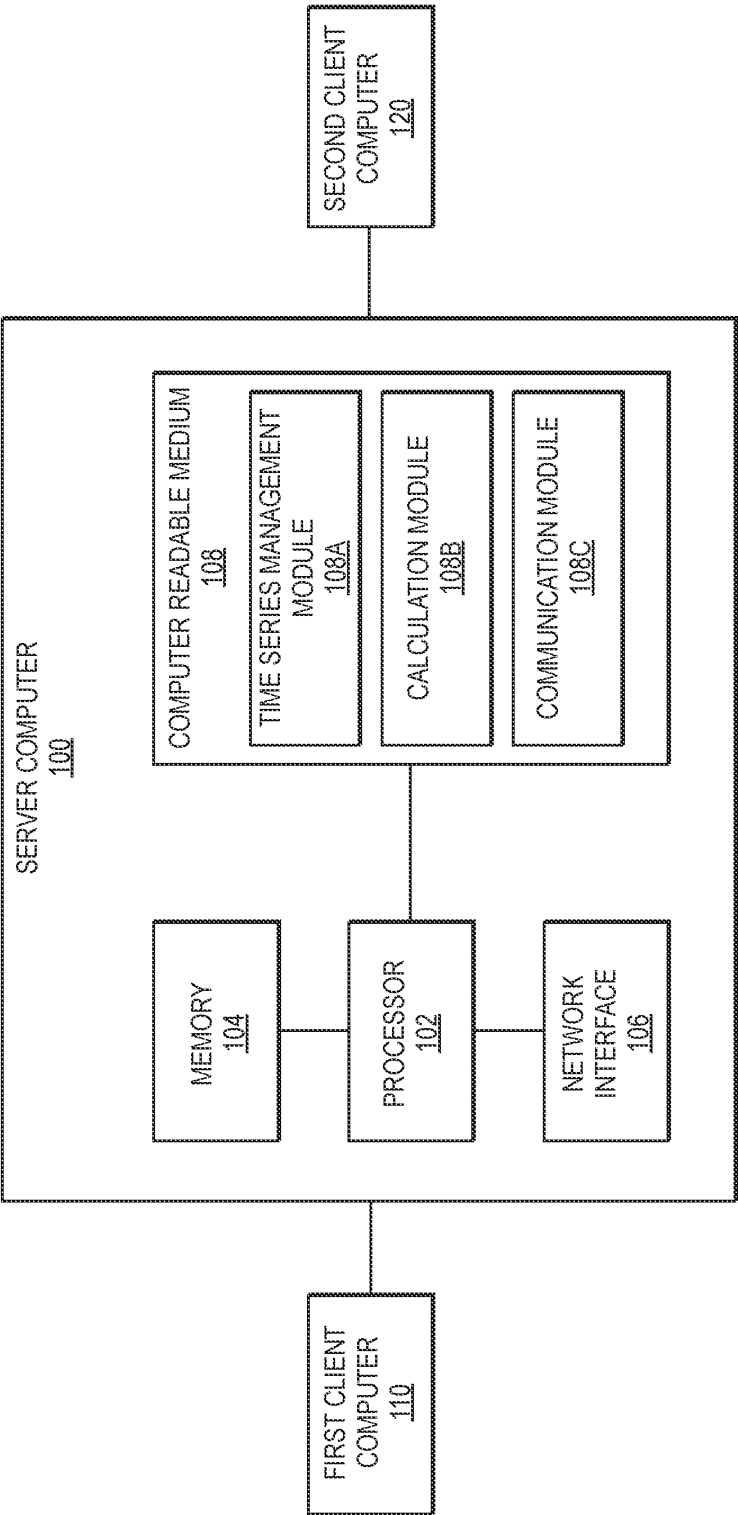


FIG. 1

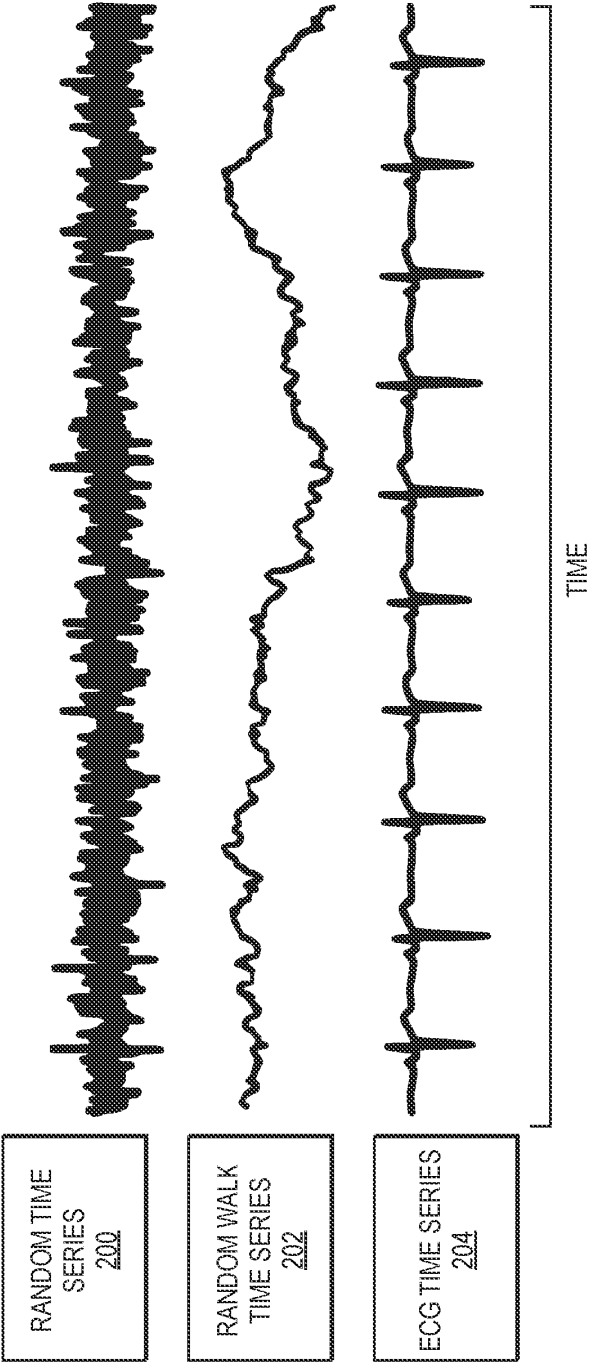


FIG. 2

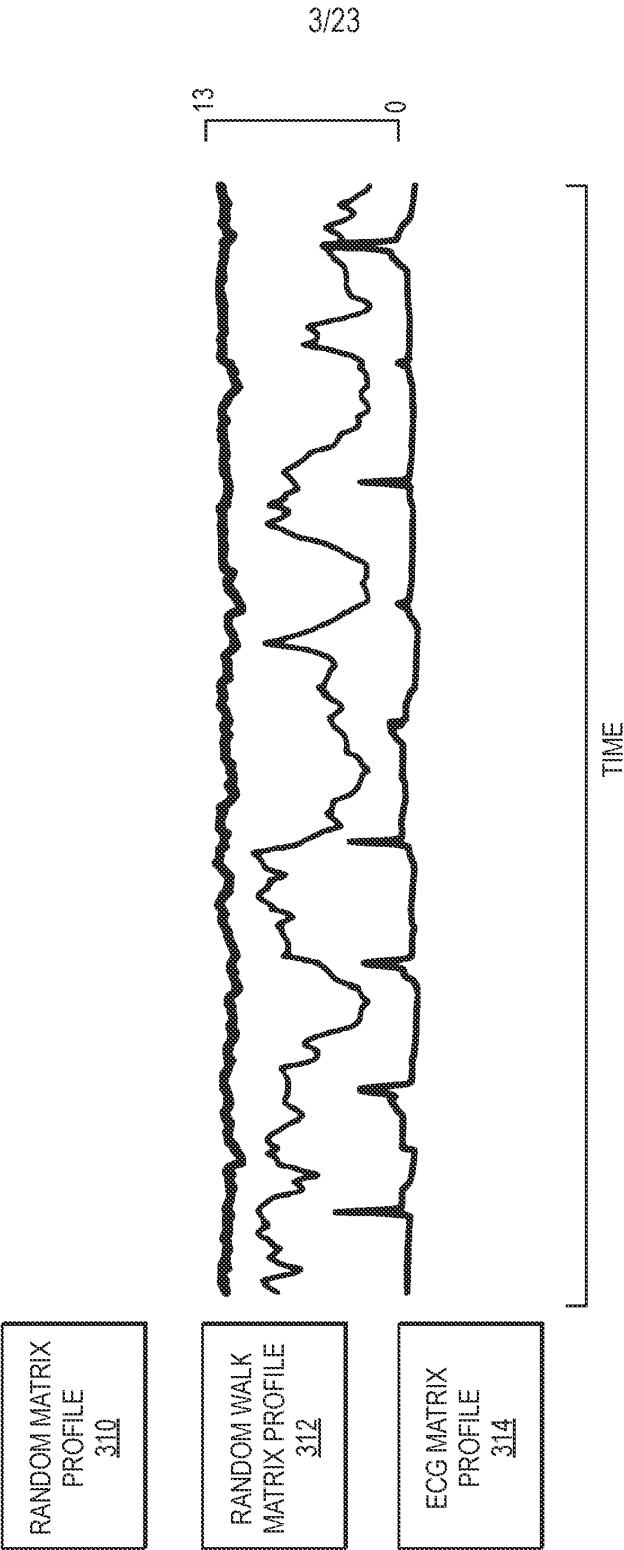


FIG. 2

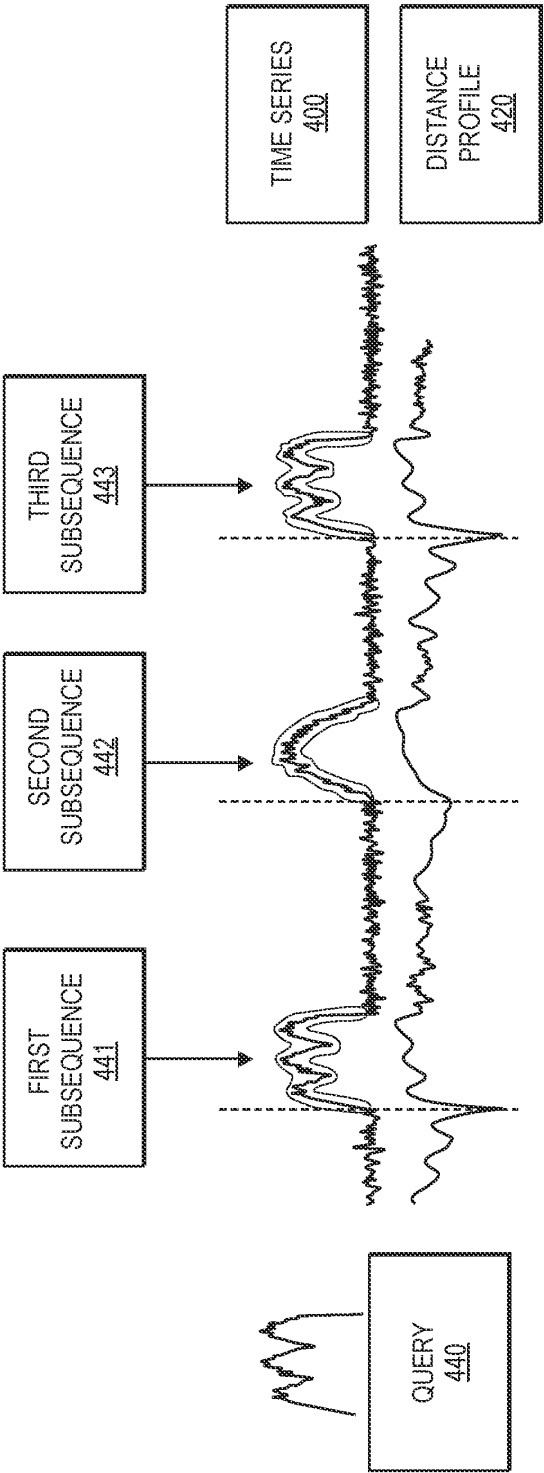


FIG. 4

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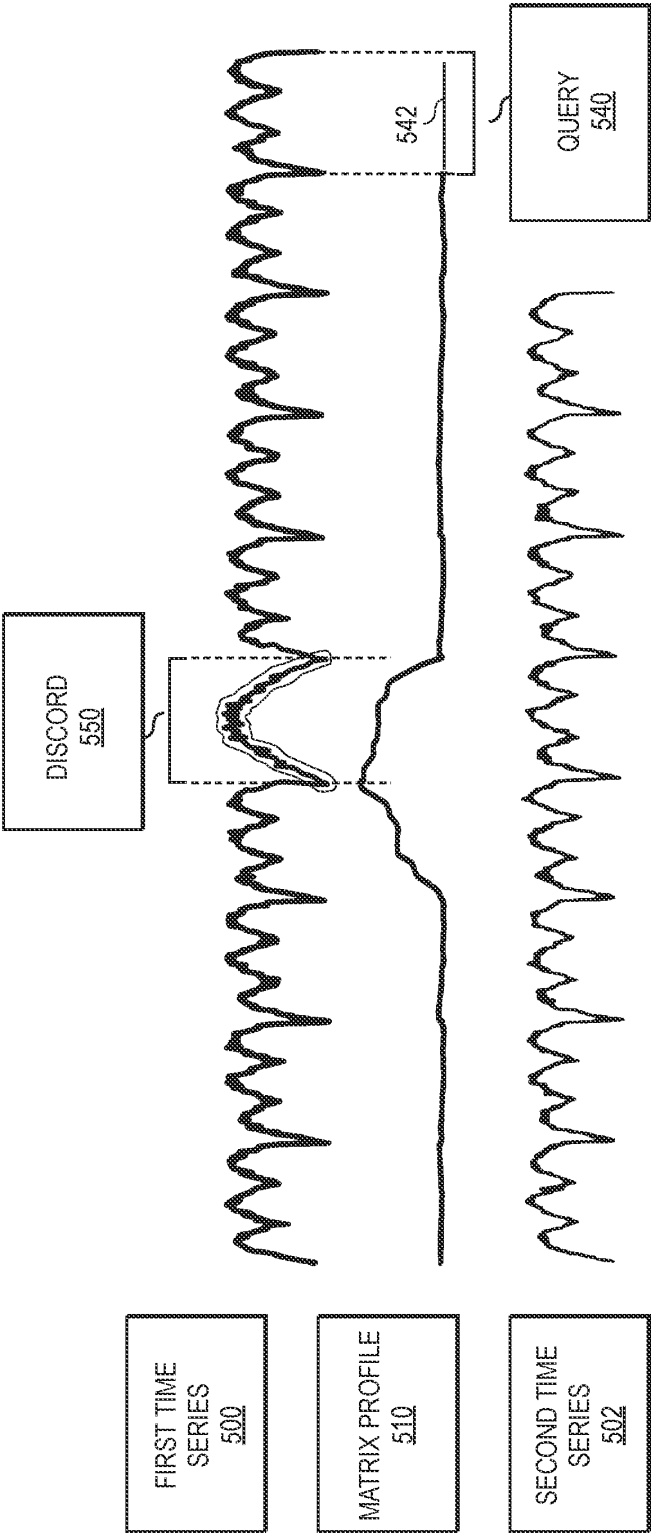


FIG. 5

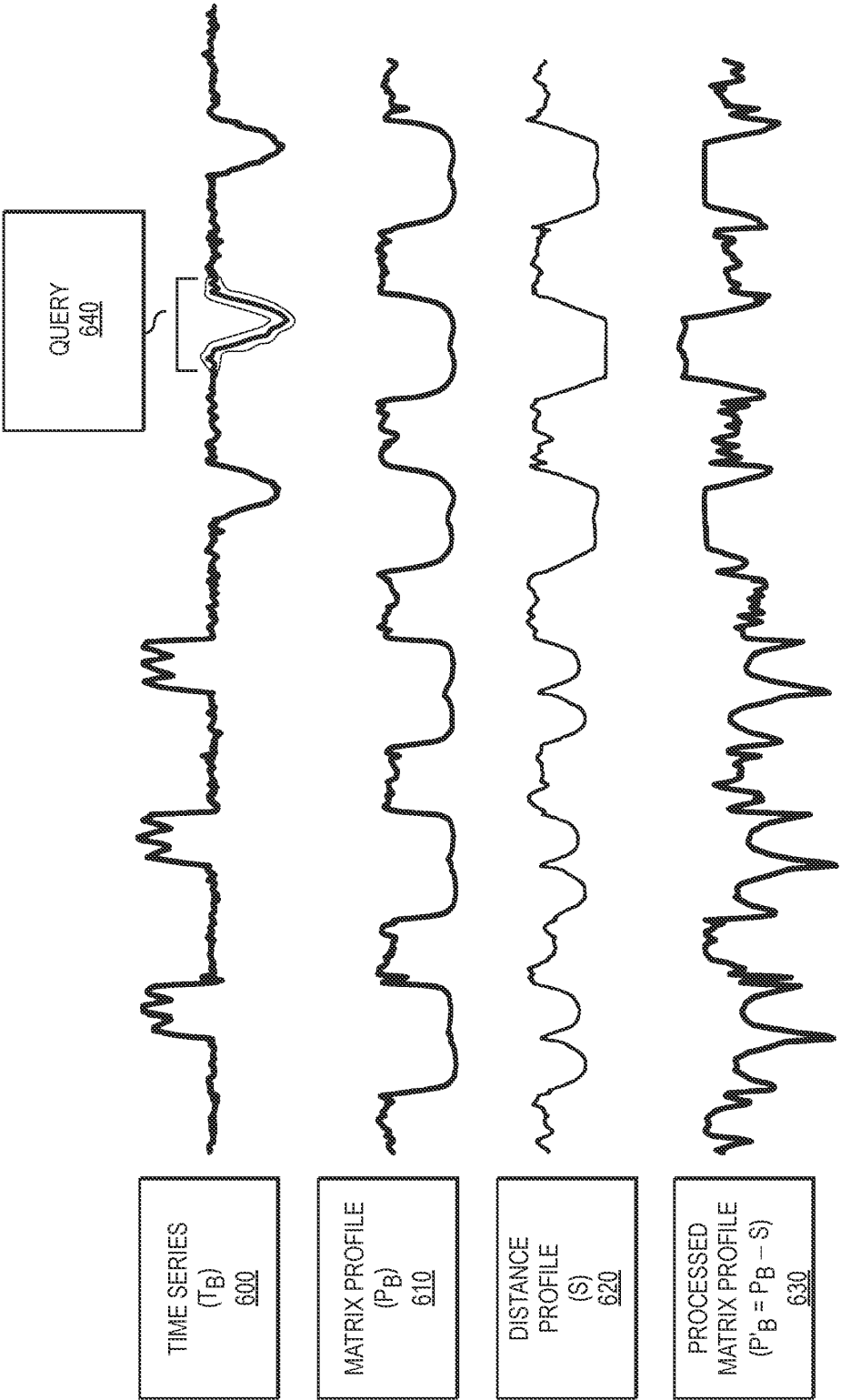


FIG. 6

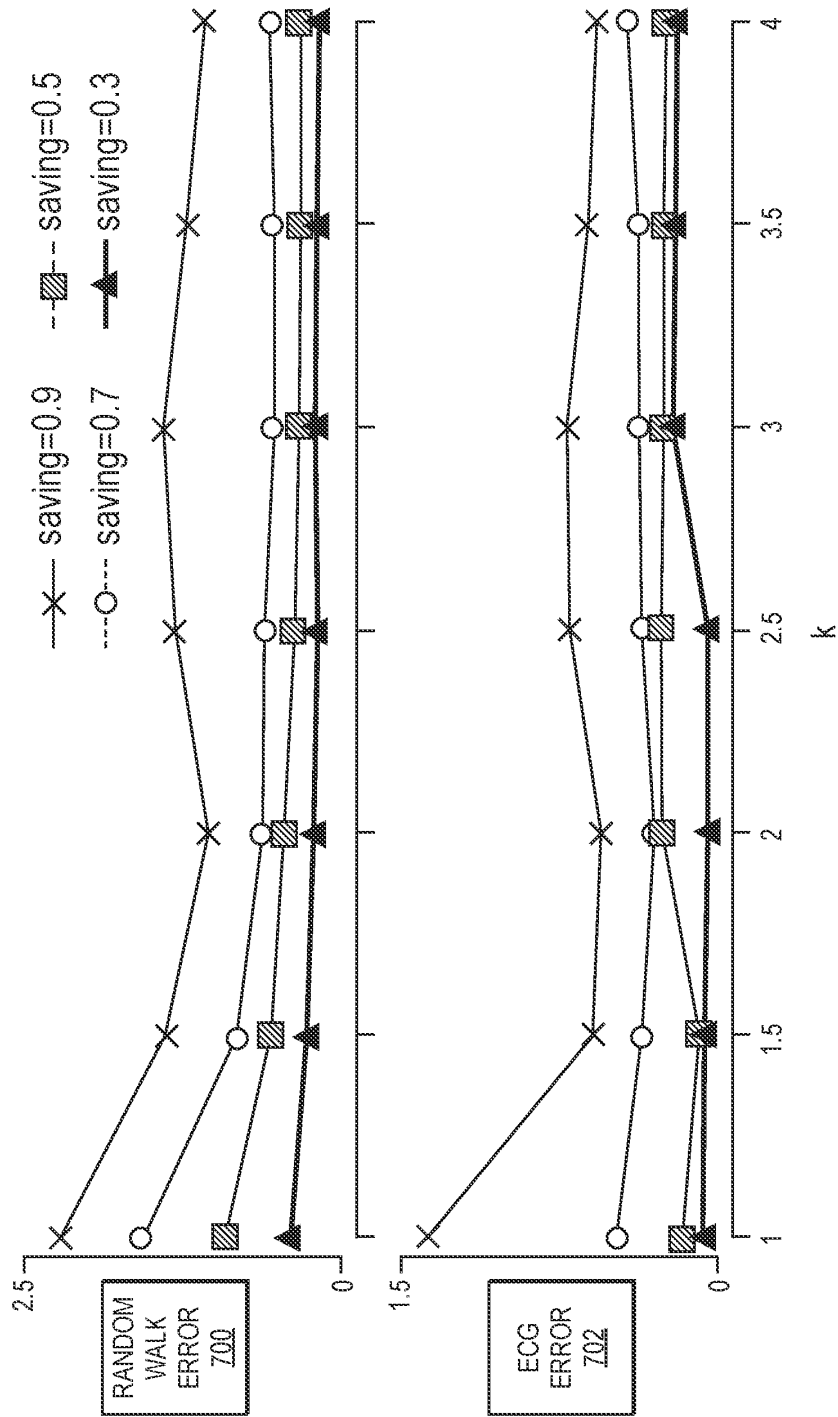


FIG. 7

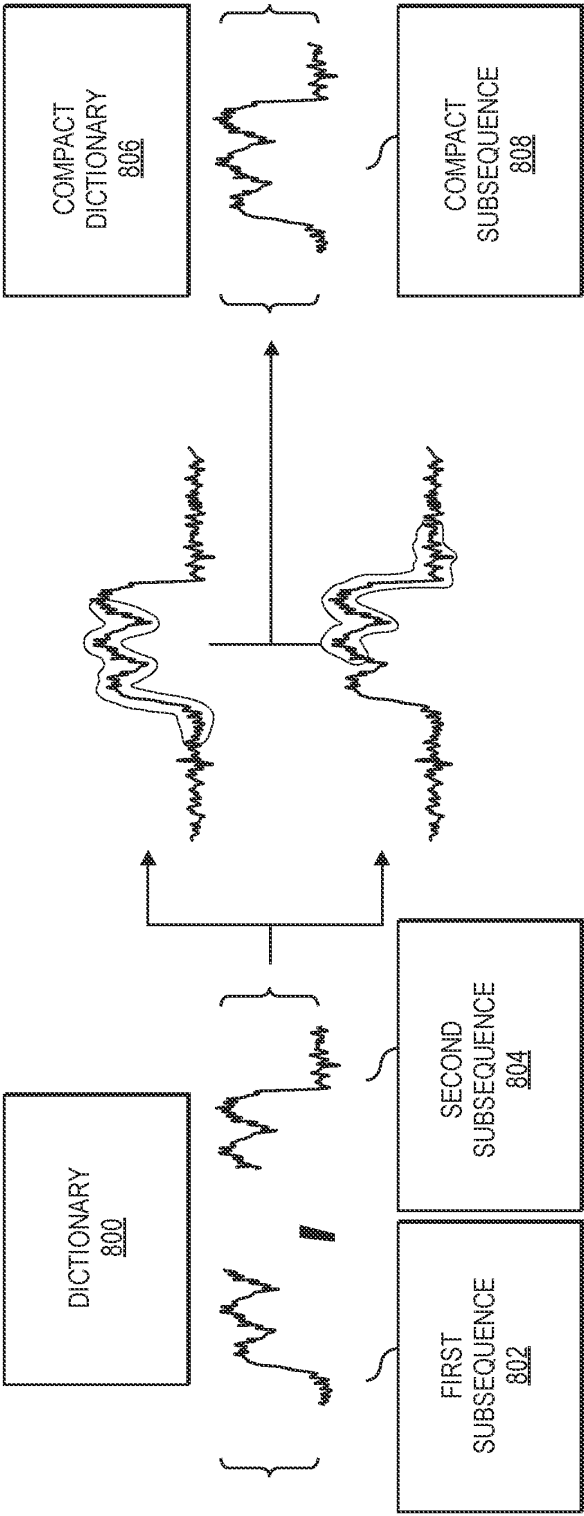


FIG. 8

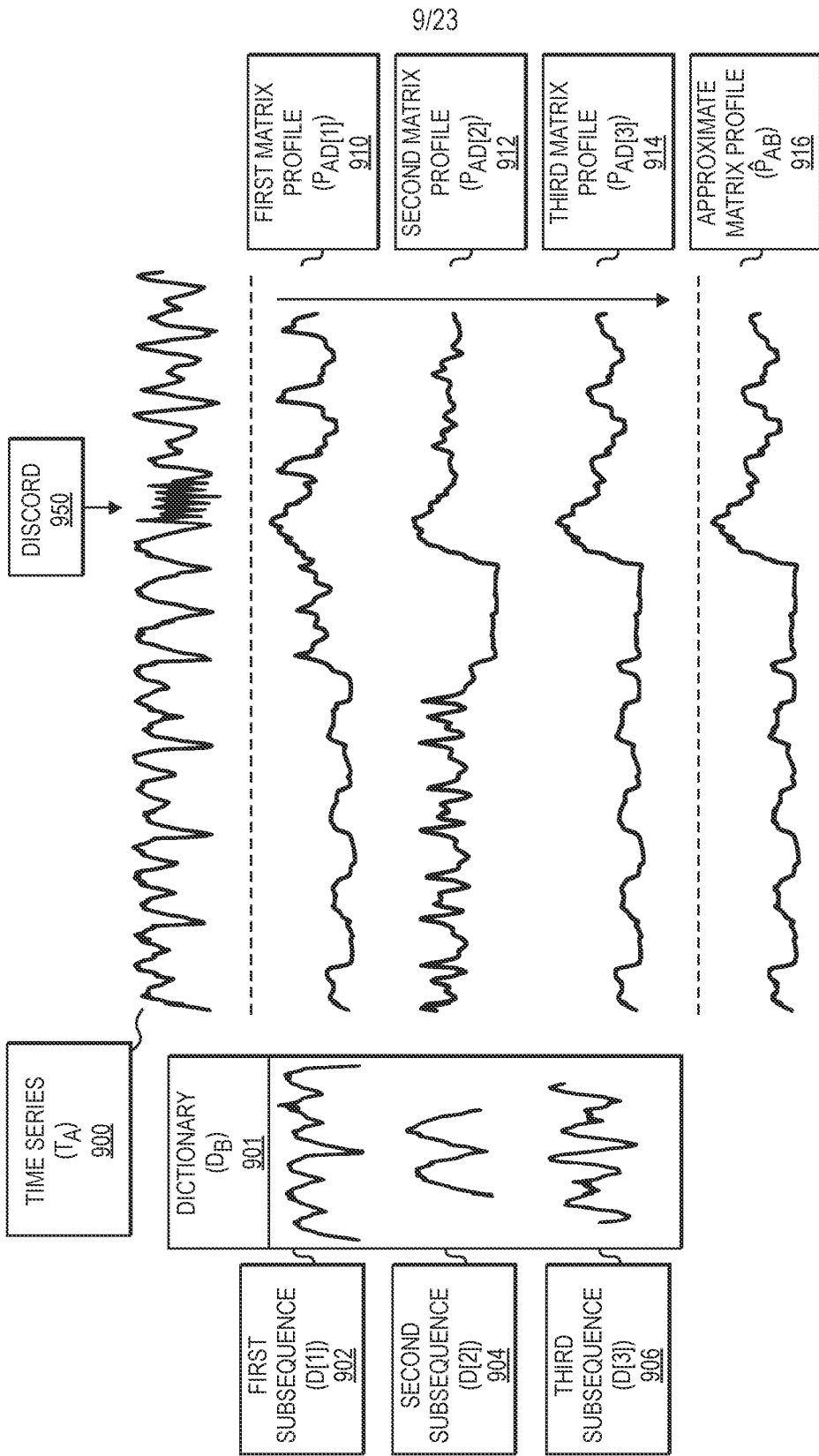


FIG. 9

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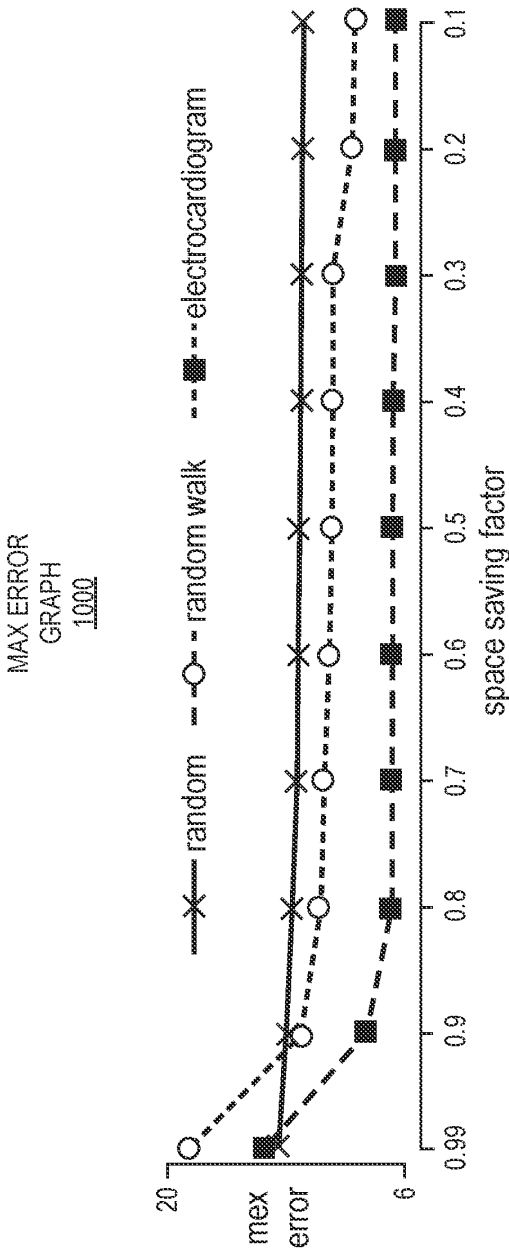


FIG. 10

ERROR GRAPH
1100

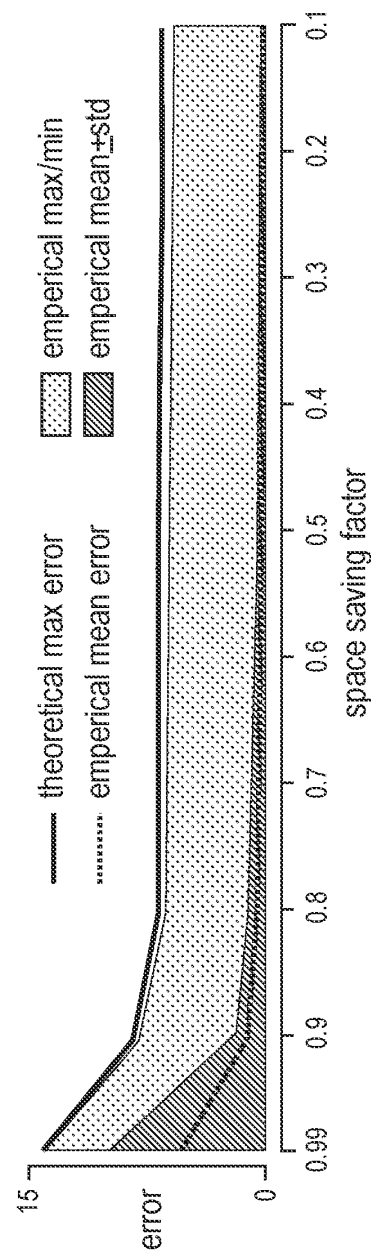


FIG. 11

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SAMPLE TIME
SERIES
1200

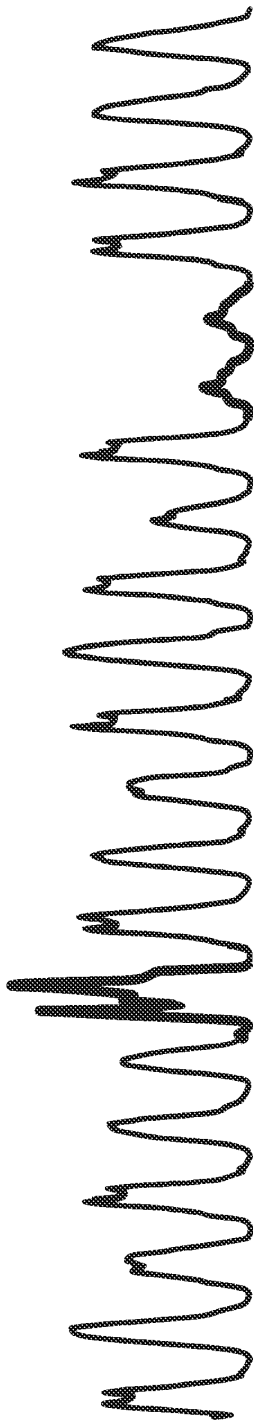


FIG. 12

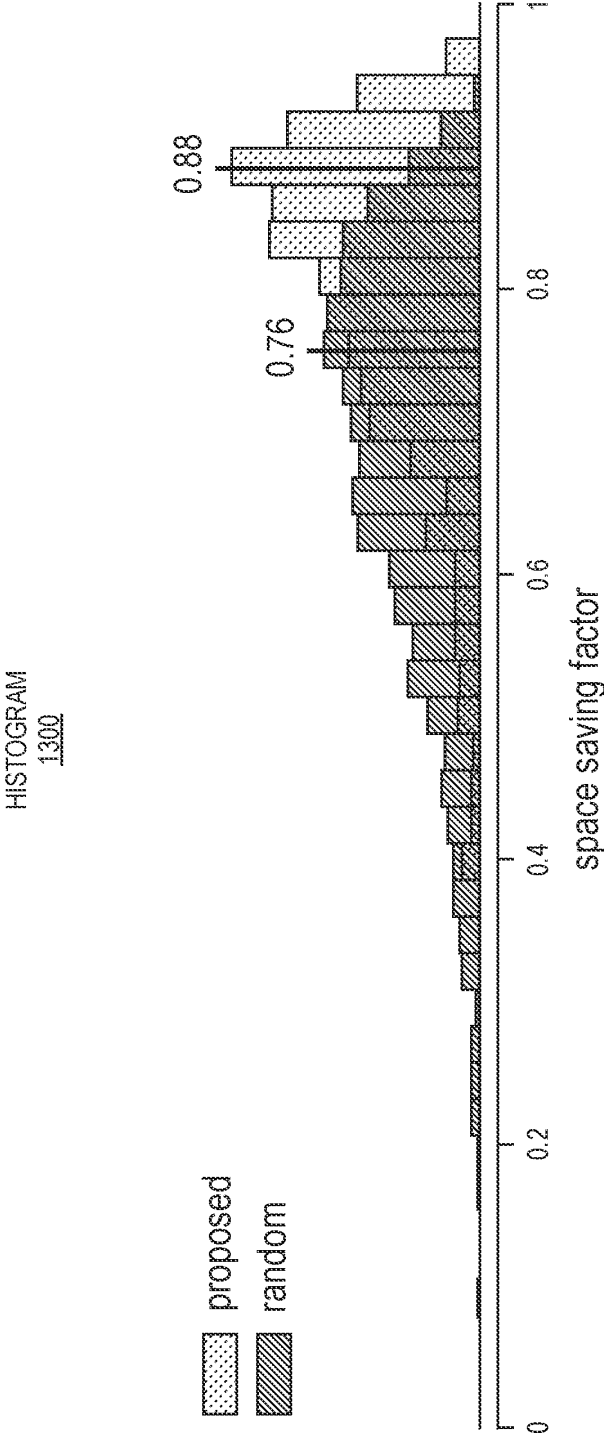


FIG. 13

FIRST DICTIONARY BUILDING RUNTIME GRAPH
1400

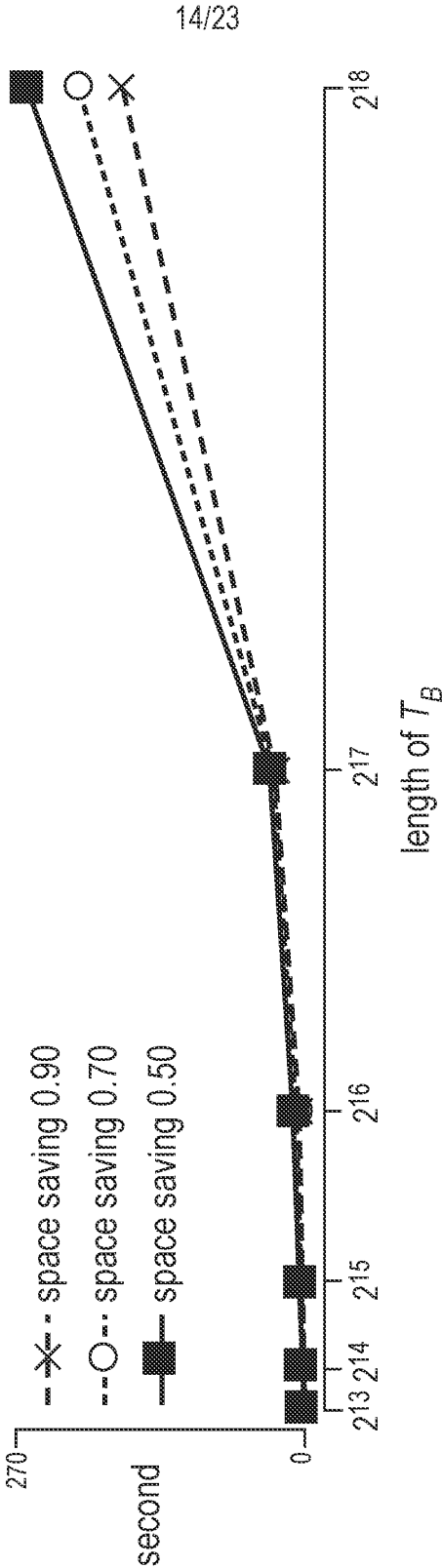


FIG. 14

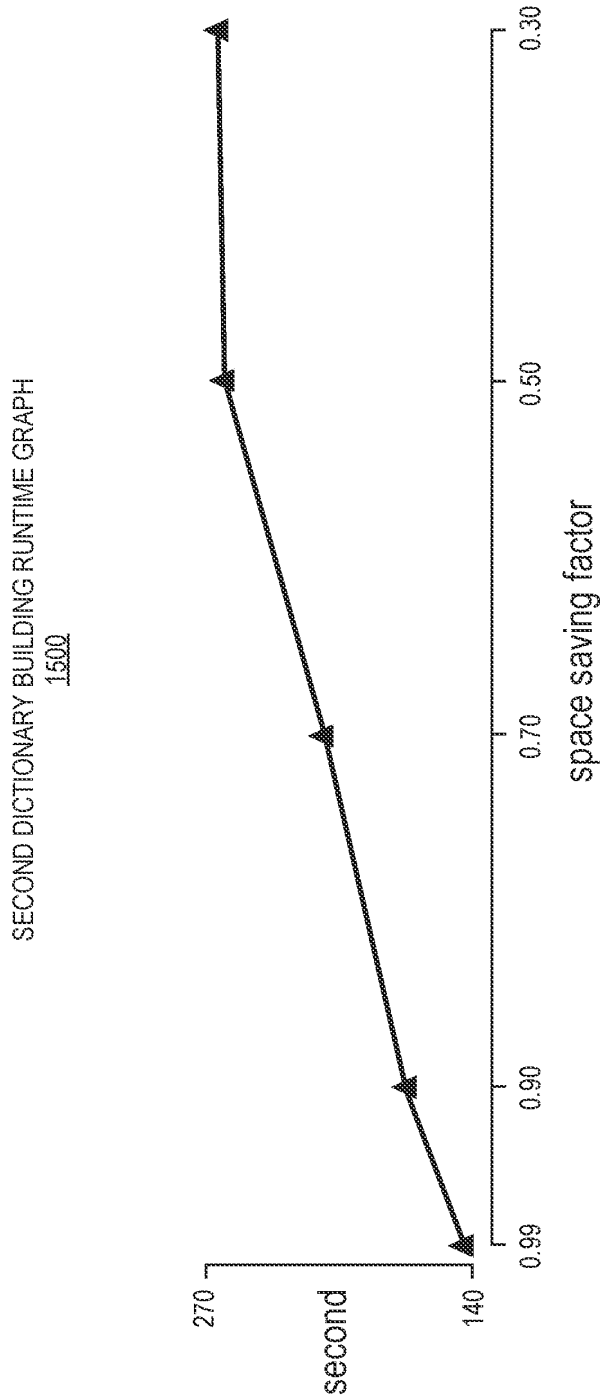
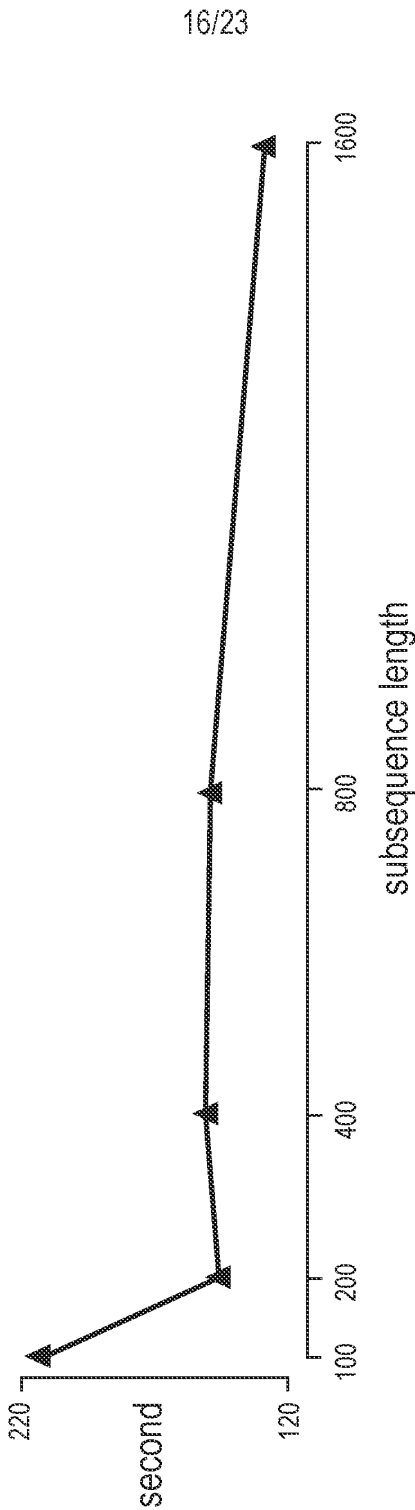


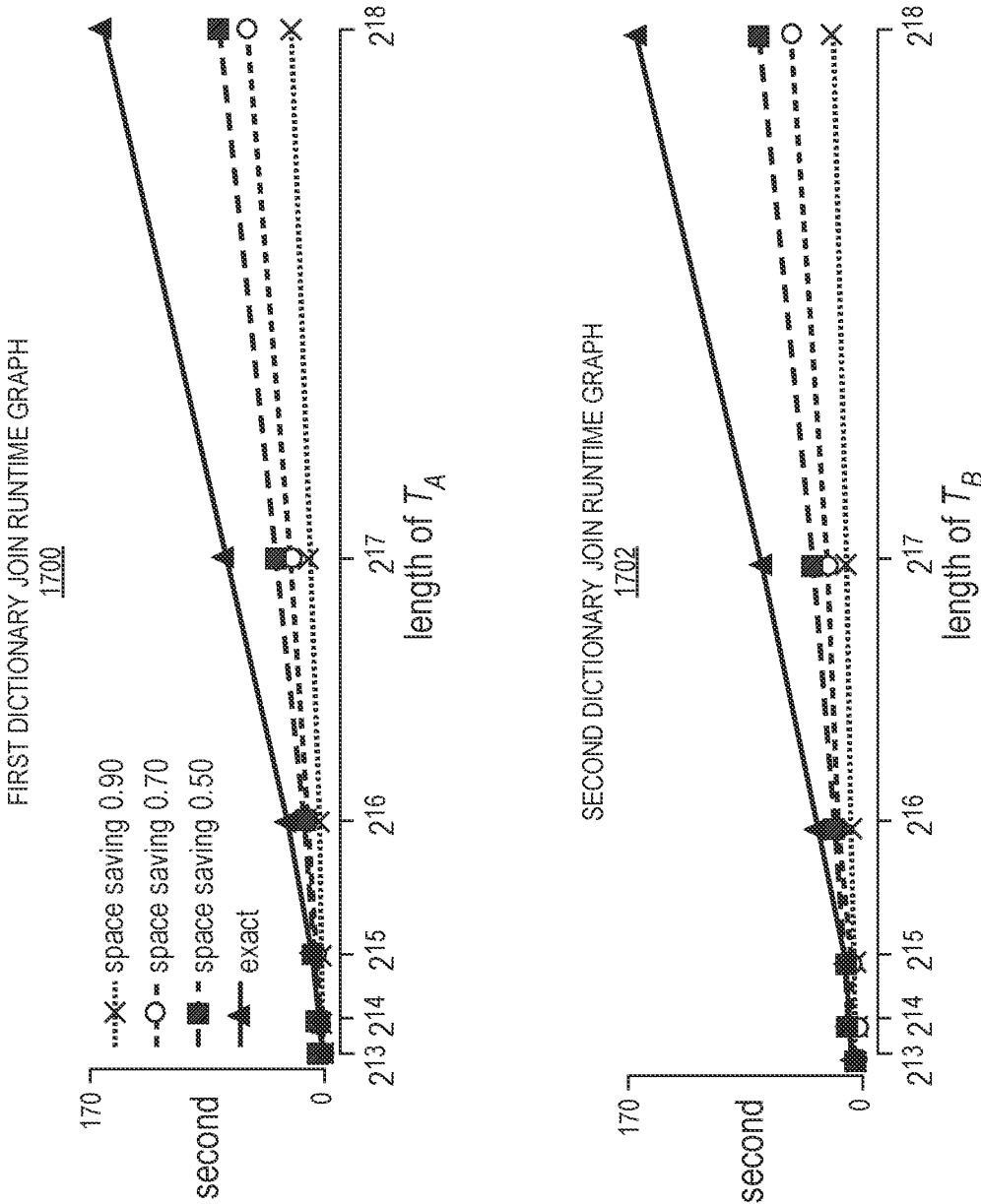
FIG. 15

THIRD DICTIONARY BUILDING RUNTIME GRAPH



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FIG. 16



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THIRD DICTIONARY JOIN RUNTIME GRAPH
1800

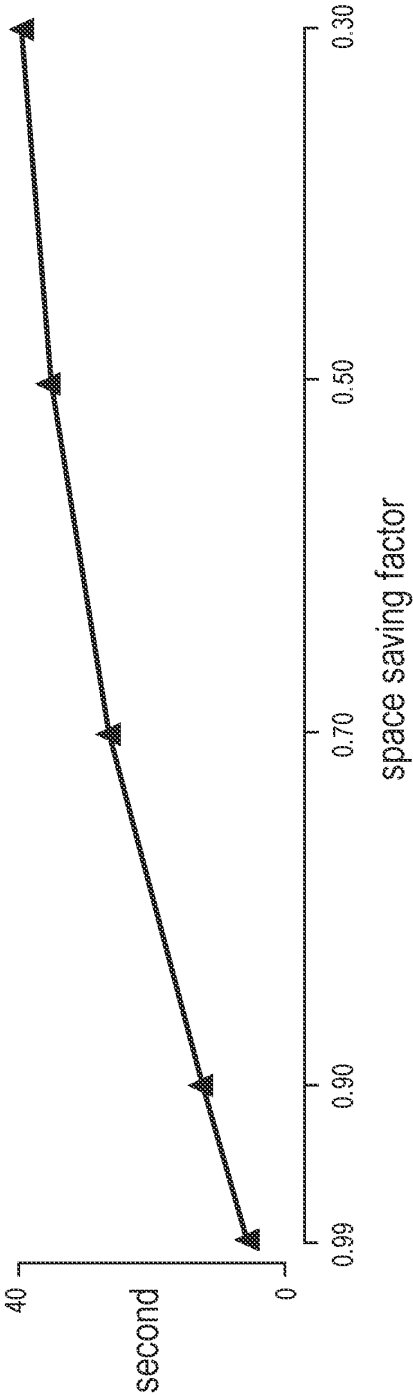


FIG. 18

FOURTH DICTIONARY JOIN RUNTIME GRAPH
1900

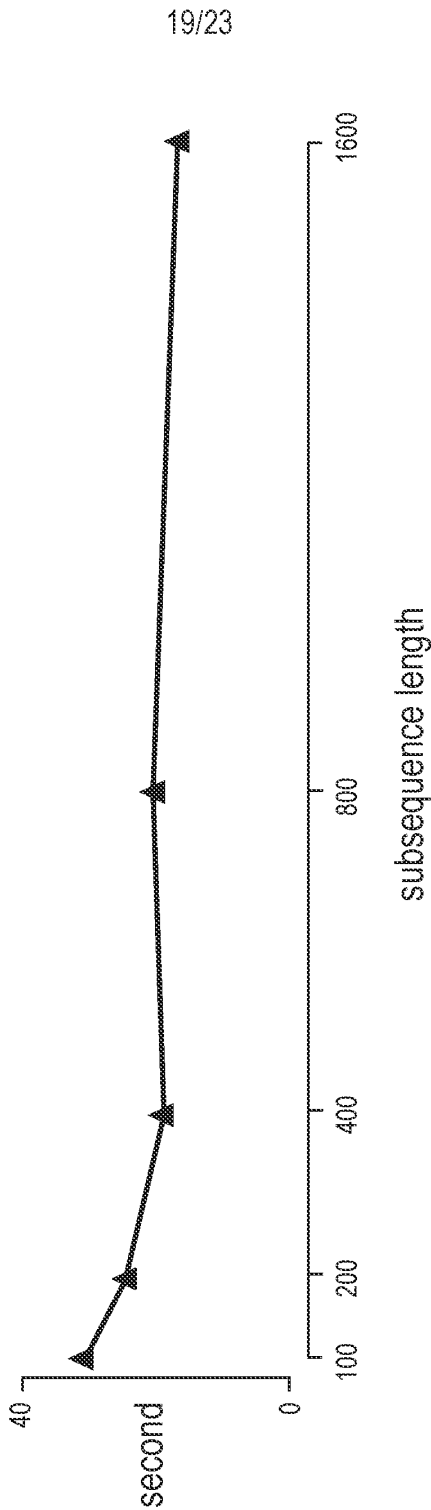


FIG. 19

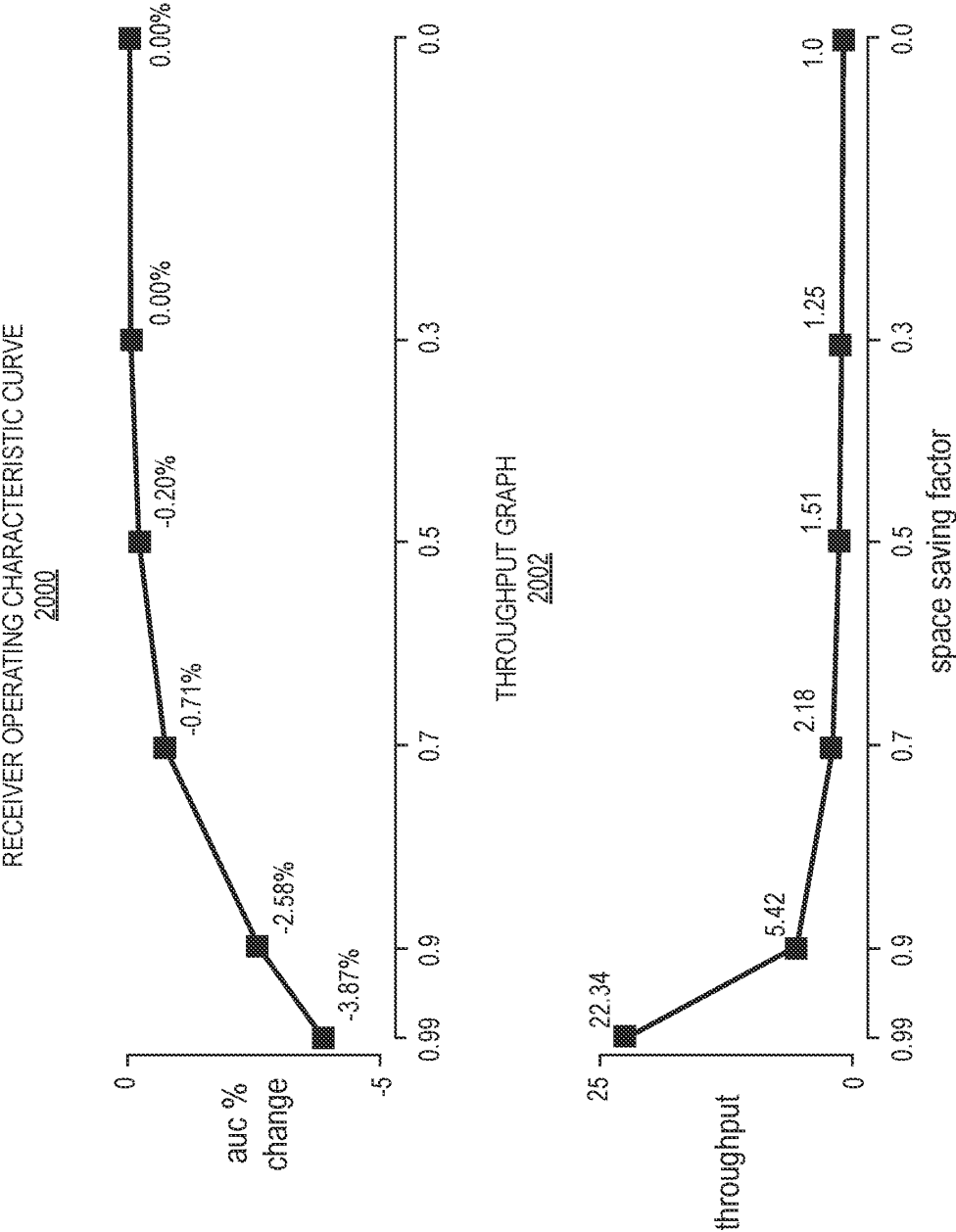


FIG. 20

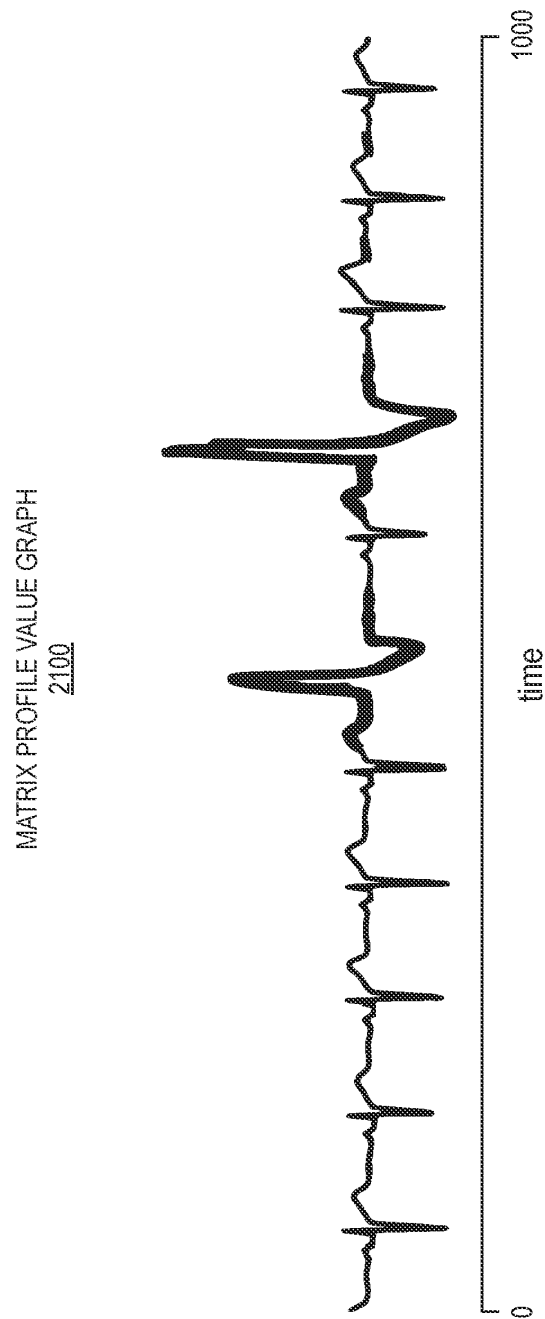


FIG. 21

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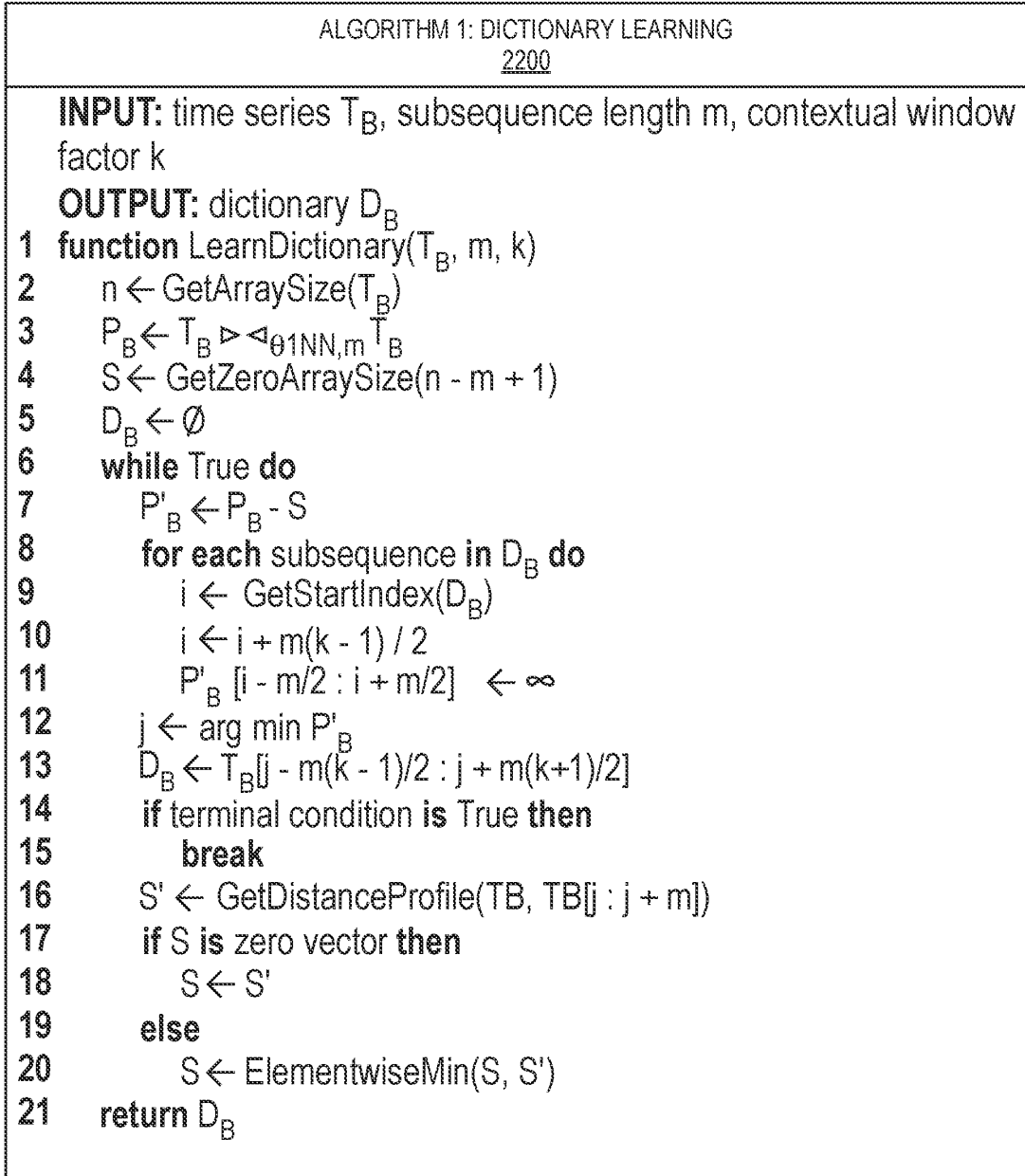


FIG. 22

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ALGORITHM 2: SIMILARITY JOIN WITH DICTIONARY
2300

INPUT: time series T_A , dictionary D_B , subsequence length m
OUTPUT: matrix profile $\hat{P}_{AB}$

```

1 function LearnDictionary( $T_A$ ,  $D_B$ ,  $m$ )
2    $n \leftarrow \text{GetArraySize}(T_A)$ 
3    $P_{AB} \leftarrow \text{GetInfArrayOfSize}(n - m + 1)$ 
4   for each subsequence in  $D_B$  do
5      $P_{AD} \leftarrow T_B \triangleright \triangleleft_{\theta 1NN, m} T_B$ 
6      $\hat{P}_{AB} \leftarrow \text{ElementwiseMin}(\hat{P}_{AB}, P_{AD})$ 
7   return  $\hat{P}_{AB}$ 

```

FIG. 23