

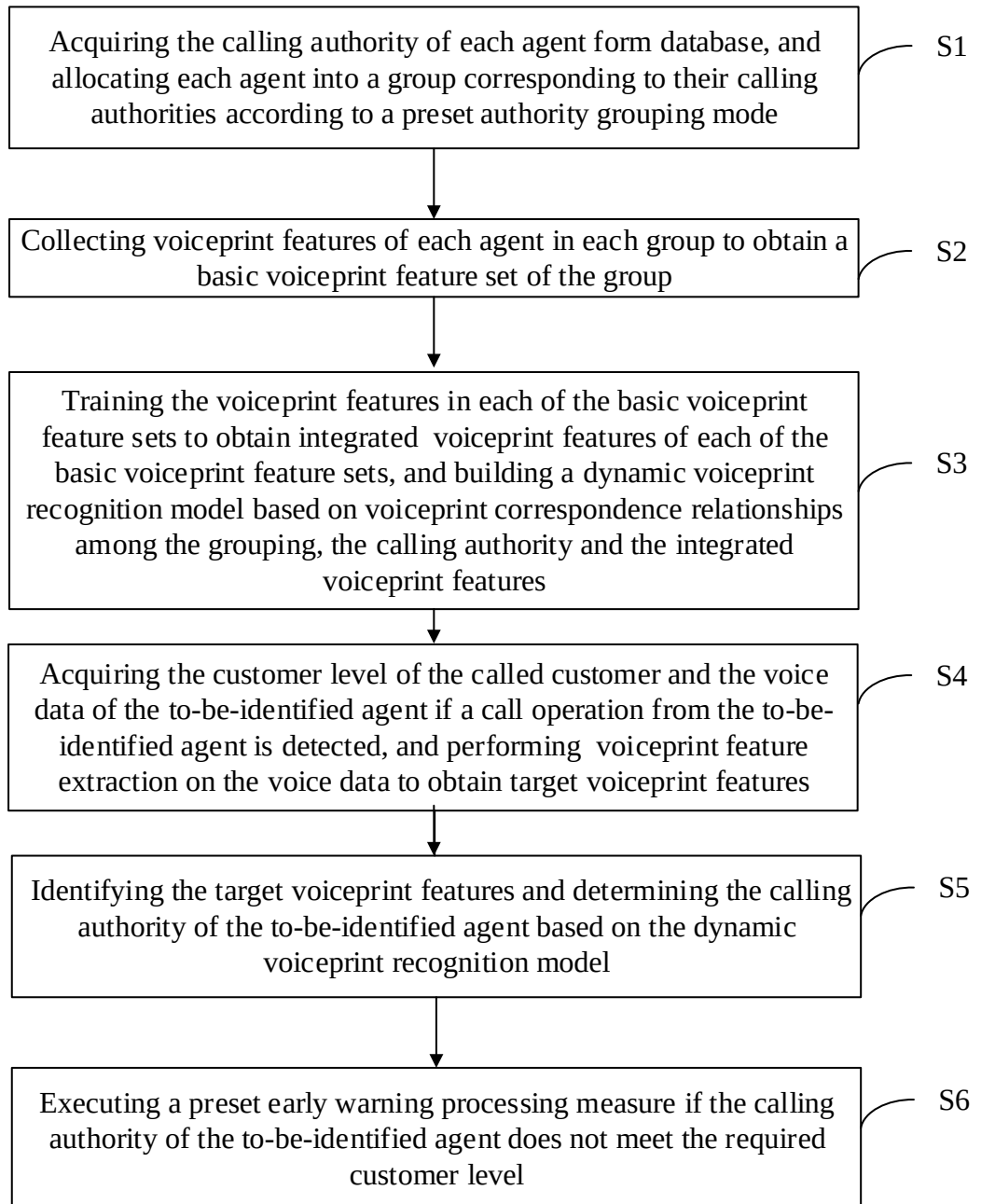


Fig. 1

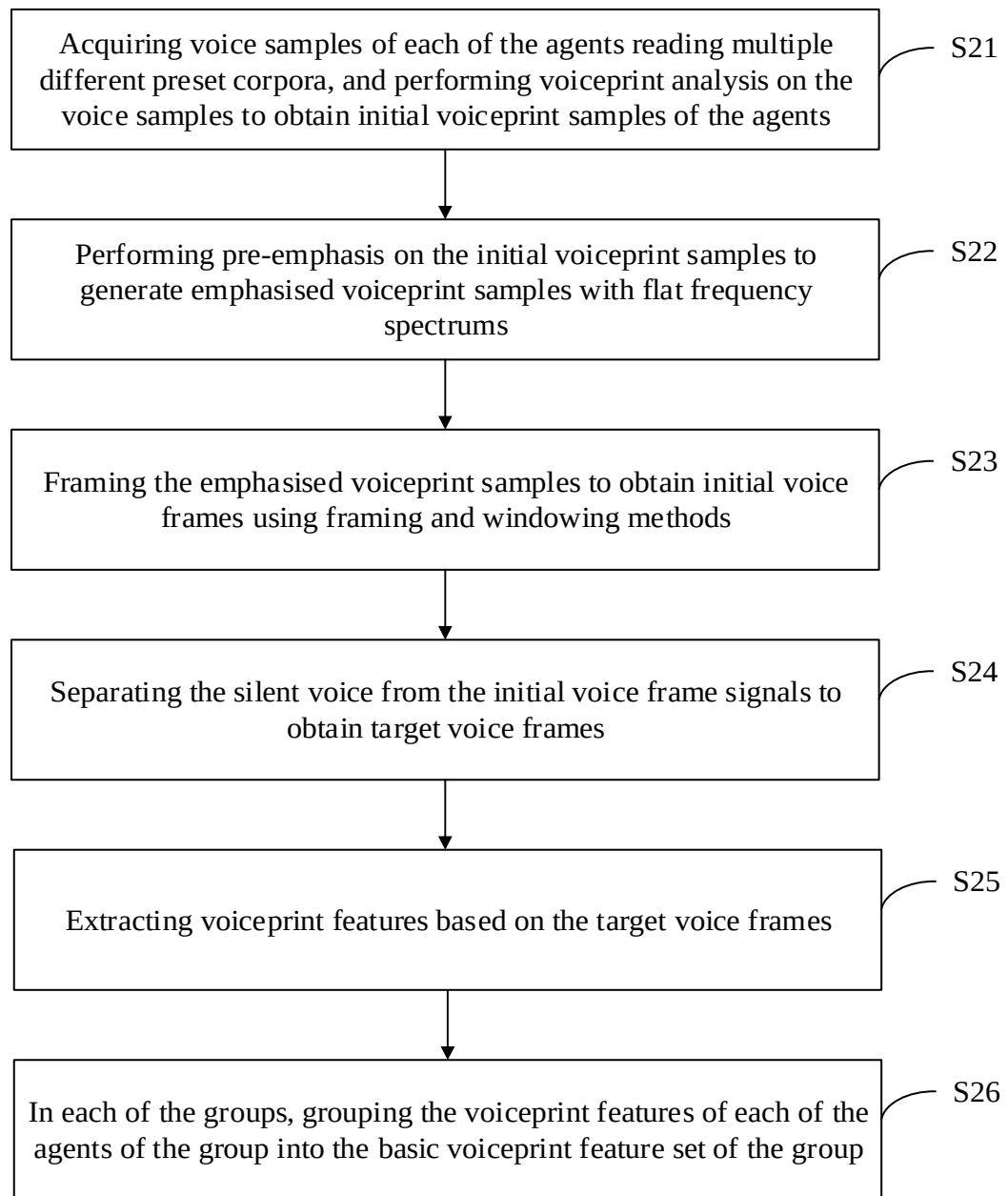


Fig. 2

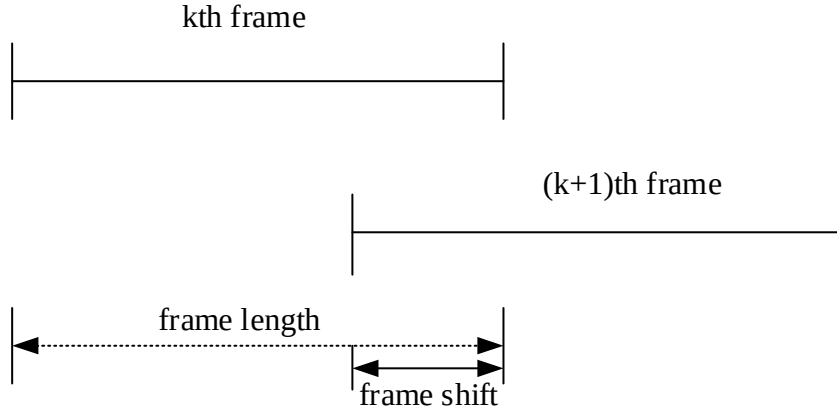


Fig. 3

Using the Levinson-Durbin algorithm to predict the linear prediction coefficient in the calculation formula (F1) of the prediction error of the target voice frame, and determining the target linear prediction coefficients $a'_1, a'_2, \dots, a'_p$ according to the prediction results:

$$e(n) = s(n) - \hat{s}(n) = s(n) - \sum_{i=1}^p a_i s(n-i) \quad \text{F1}$$

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wherein $e(n)$ is the prediction error, $\hat{s}(n)$ is a prediction value of the target voice frame sequence, n is the total number of points contained in the target voice frame sequence, $s(n-i)$ is the sum of the values of the previous points $n-i$ of the target voice frame sequence, a_i is the linear prediction coefficient of the point i in the target voice frame sequence, p is the preset order of linear prediction, $i \in [1, p]$, n is a positive integer

Calculating a linear prediction cepstrum coefficient of the target voice frame by formula (F2) according to the target linear prediction coefficient, and taking the linear prediction cepstrum coefficient as the voiceprint feature:

$$\hat{h}(n) = \begin{cases} a'_1 & n=1 \\ a'_n + \sum_{k=1}^{n-1} \left(1 - \frac{k}{n}\right) a'_k \hat{h}(n-k) & 1 < n \leq p \\ \sum_{k=1}^p \left(1 - \frac{k}{n}\right) a'_k \hat{h}(n-k) & n > p \end{cases} \quad \text{F2}$$

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wherein, $\hat{h}(n)$ is the linear prediction cepstrum coefficient

Fig. 4

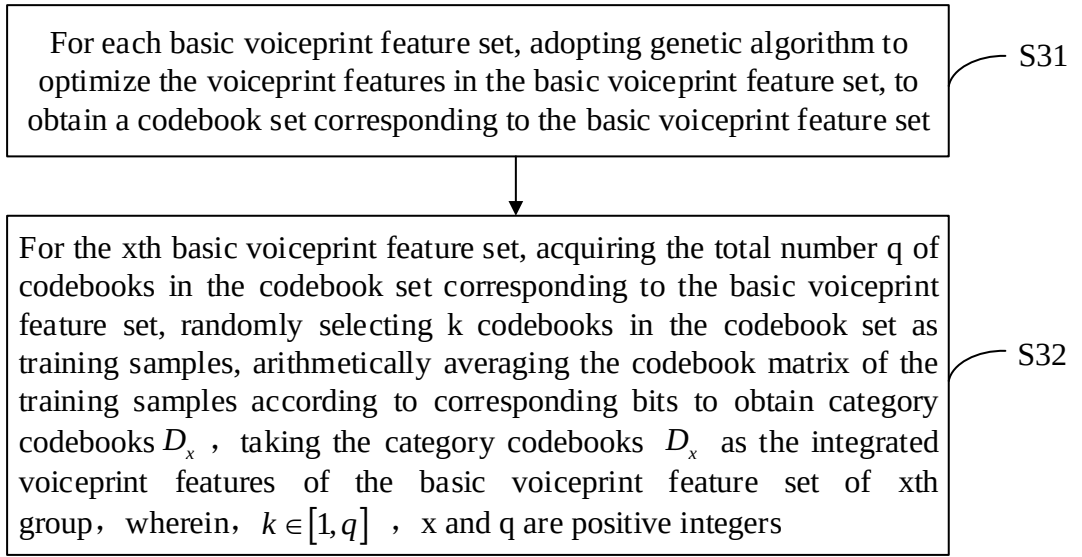


Fig. 5

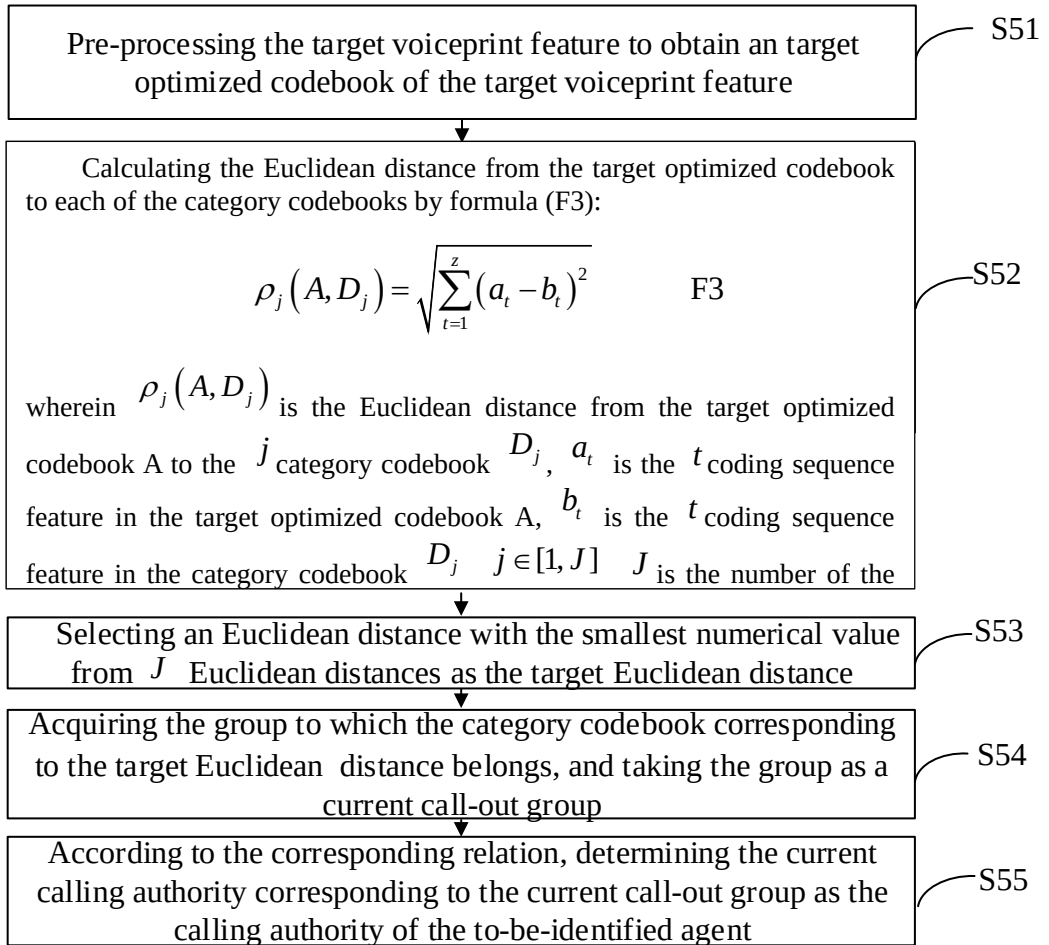


Fig. 6

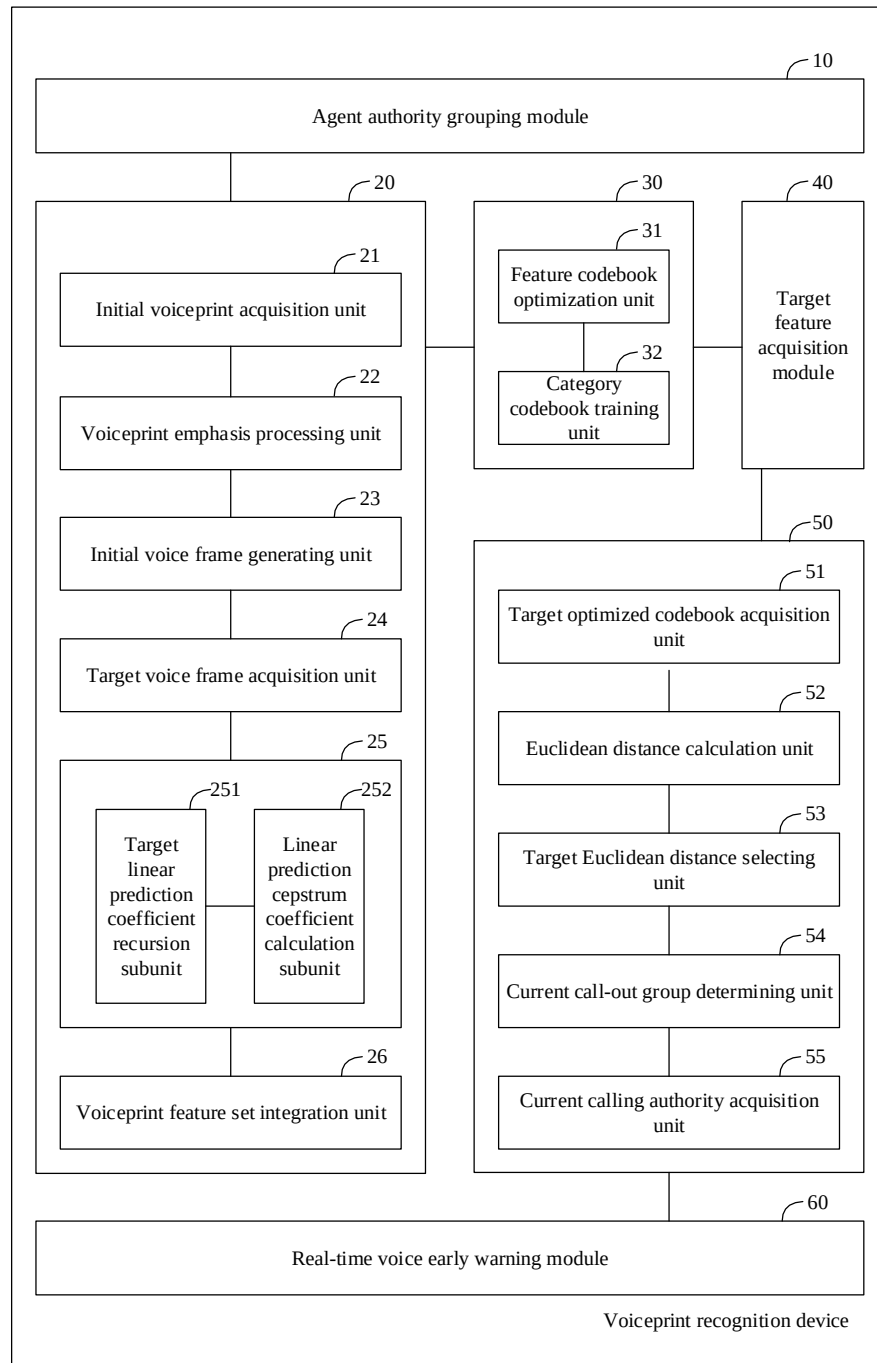


Fig. 7

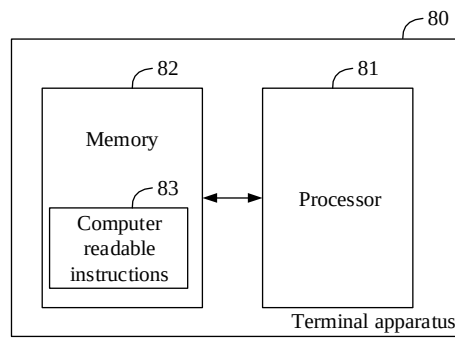


Fig. 8