Very quick searching of audio and video signals
Global pruning technique enables searching through two weeks’ worth of audio/video data within only one second

Outline
A new method for quick searching through a long multimedia stream to detect and locate a known audio/video signal

Features
Super-high speed: The global pruning technique, that instantaneously looks over the whole data, enables to search a two weeks’ worth of audio/video recording in one second.

In the future
Develop an even faster search technique for audio/video data

We are looking around here …

Look! Here it is!
We can find easily by looking over the whole data.

a huge amount of audio / video data
Problem in Existing Methods

• Sequential matching method
  (= a conventional method)
  – compares features
    and slides an observation area
    □ requires a very long time

• Time-series Active Search (TAS)
  Learning-based Active Search (LAS)
  (= the methods that our laboratory developed in 1998 and 2000)
  – omits unnecessary matches around the matching window based on similarity
    □ can be inefficient in case stored signal includes few segments similar to
    the reference signal

Need to use similarity between the reference signal and the whole stored signal
Mechanisms of the Global Pruning Method

reference signal

1. Feature extraction

matching only histograms in the selected groups

stored signal

skip

1. Feature extraction

4. Histogram matching

sets of feature histograms

2. Classification

3. Global pruning

reference

representatives

matching

selecting

group 1

group 2

group k
Experimental Result Example

- Time required to search a 15-s reference signal from a 200-h audio stored signal (the average time for 1000 reference signals)

<table>
<thead>
<tr>
<th>Method</th>
<th>Time (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAS</td>
<td>2.85</td>
</tr>
<tr>
<td>Global Pruning</td>
<td>0.33</td>
</tr>
</tbody>
</table>

*1: Search time varies with many factors such as individual signals, signal quality, and parameter values.

Experiment conditions:
- CPU: PentiumIII 966MHz, dimension of histograms: 128, number of groups: 1024.
- The stored signal and the reference signals were the recording from different broadcasting stations (all were high quality recordings).
- In the global pruning method, both search accuracy and search speed depend on the values that yield the same accuracy as TAS were chosen to compare the search time.