技術英語

Technical English

CUTURI, 高木, 中澤

Course Objective

- Scientific/Technical English is **not** English.
  - There are **many dialects of English**, and emotions can run high in the pursuit of protecting them. People can also get very worked up about differences in spelling between UK and US English.
  - **But for science, what matters is accurate and consistent use of words, and I'm afraid that very few people – even scientists – seem to care enough about that.**
  - This isn't a pedantic point, because natural language suffers from enough **intrinsic inaccuracy** and **inconsistency** as it is [...]; it is, therefore, not the best potential way of expressing science.
  - However, it is the **only way of communicating complicated scientific concepts between humans**.
  - When English is used in science, a much higher threshold for accuracy and precision needs to be set in order that concepts are communicated as accurately and precisely as possible.
  - There are many types of English recognized on our planet: perhaps we need to recognize 'Scientific English' as one of them.

Andrew Moore, Editor-in-Chief of BioEssays

Course Objective

- Scientific/Technical English is **not taught** before university.
  - Scientific english is used to communicate advanced concepts, technologies, tools.
  - To **write** in scientific english, you need to have advanced content to write about
- Scientific English is **indispensable** (不可欠) to be a successful engineer/scientist today.
- **The goal of this course is to familiarize and introduce you to scientific english**

Course Organization

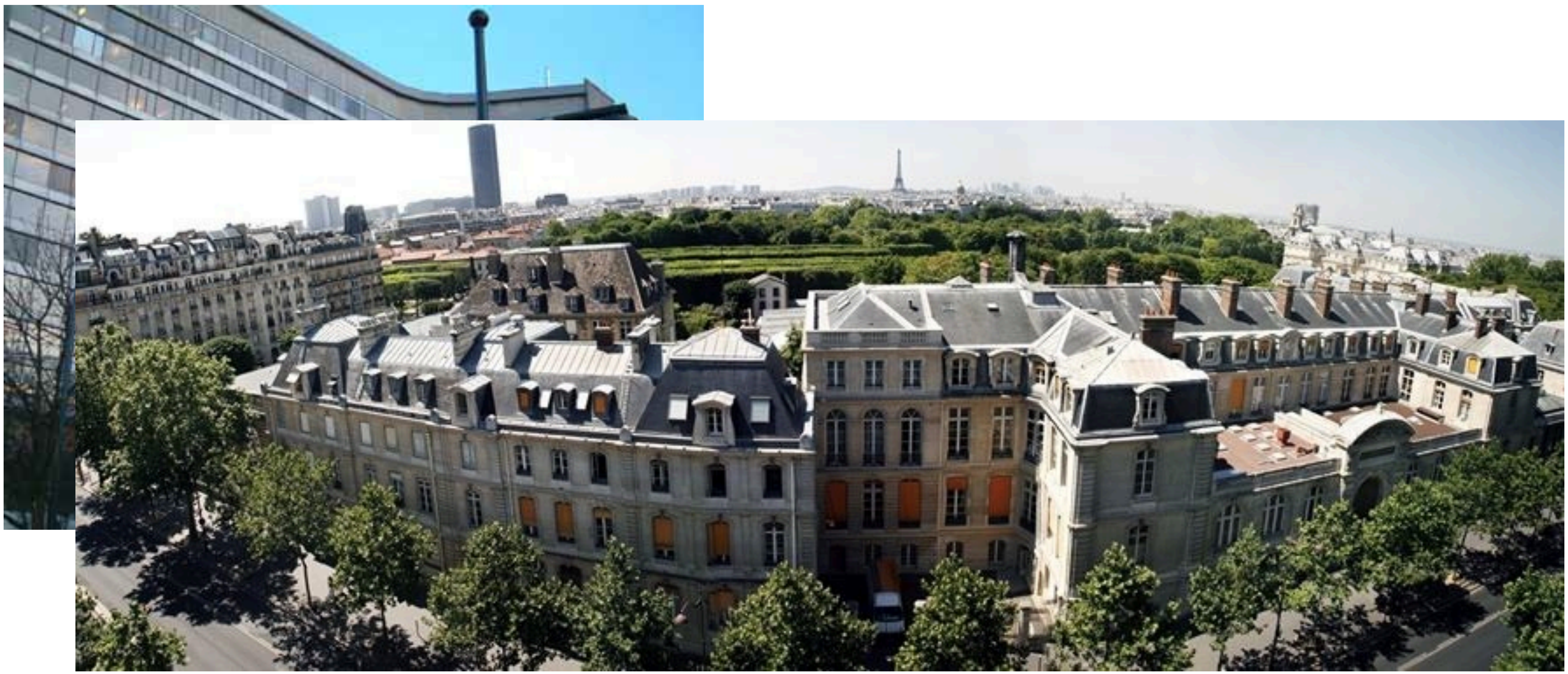
- English Technical Writing (4 lectures, Cuturi)
- English Scientific Paper Reading (5 lectures,高木)
- Technical Presentations Skills (5 lectures,中澤)
- TA: Divesh LALA

Self Introduction

Me : Paris’98


MALAKOFF
CONSEIL NATIONAL
Ville Fleurie
DES VILLES ET VILLAGES FLEURIS

Me : Paris'98



Came to Japan in ’03

Brain Science Institute
RIKEN

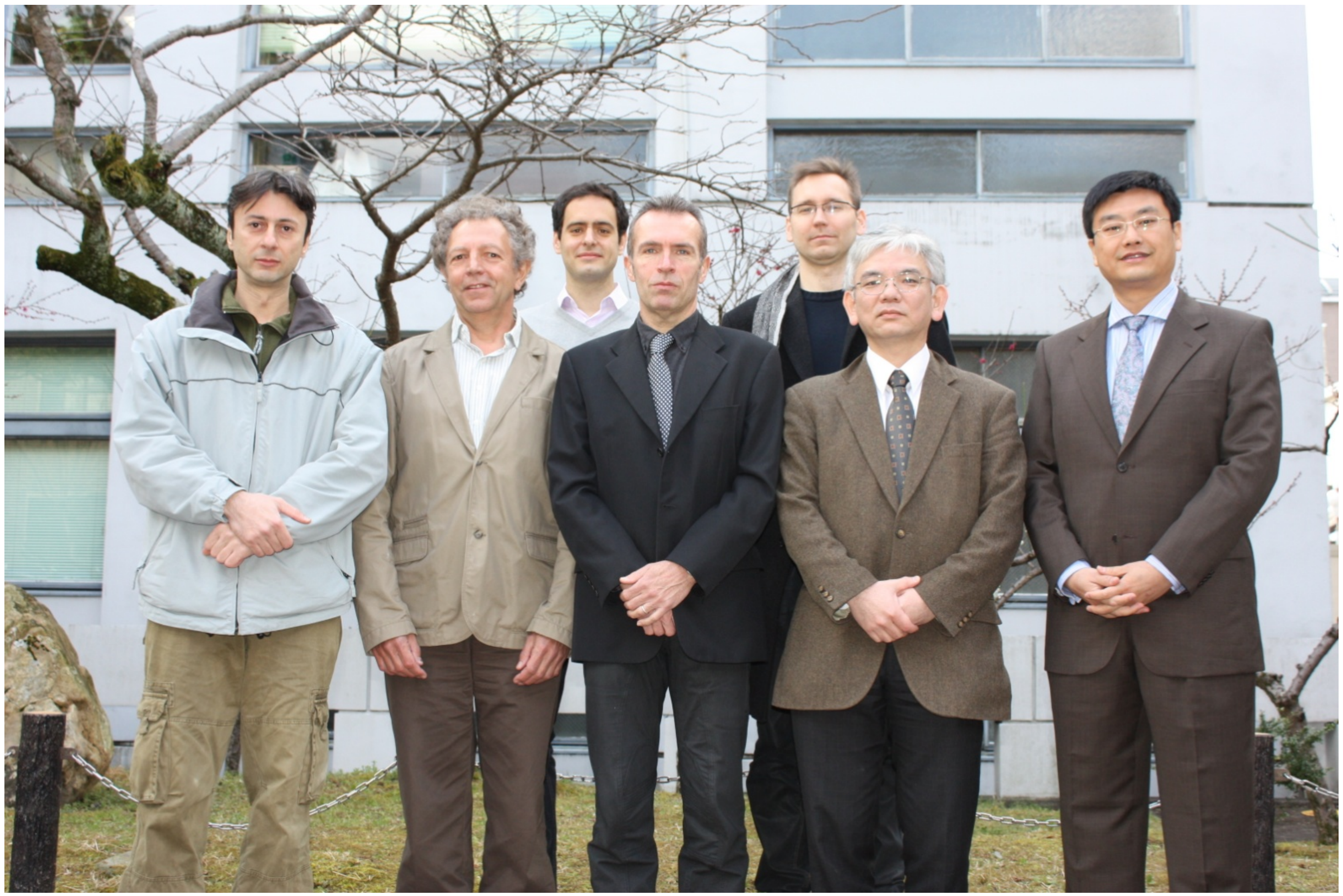
Stayed @ ISM in '04 & '06

Hedge-fund '07-'09

Hedge-fund '07-'09

Lecturer Princeton ’09-’10

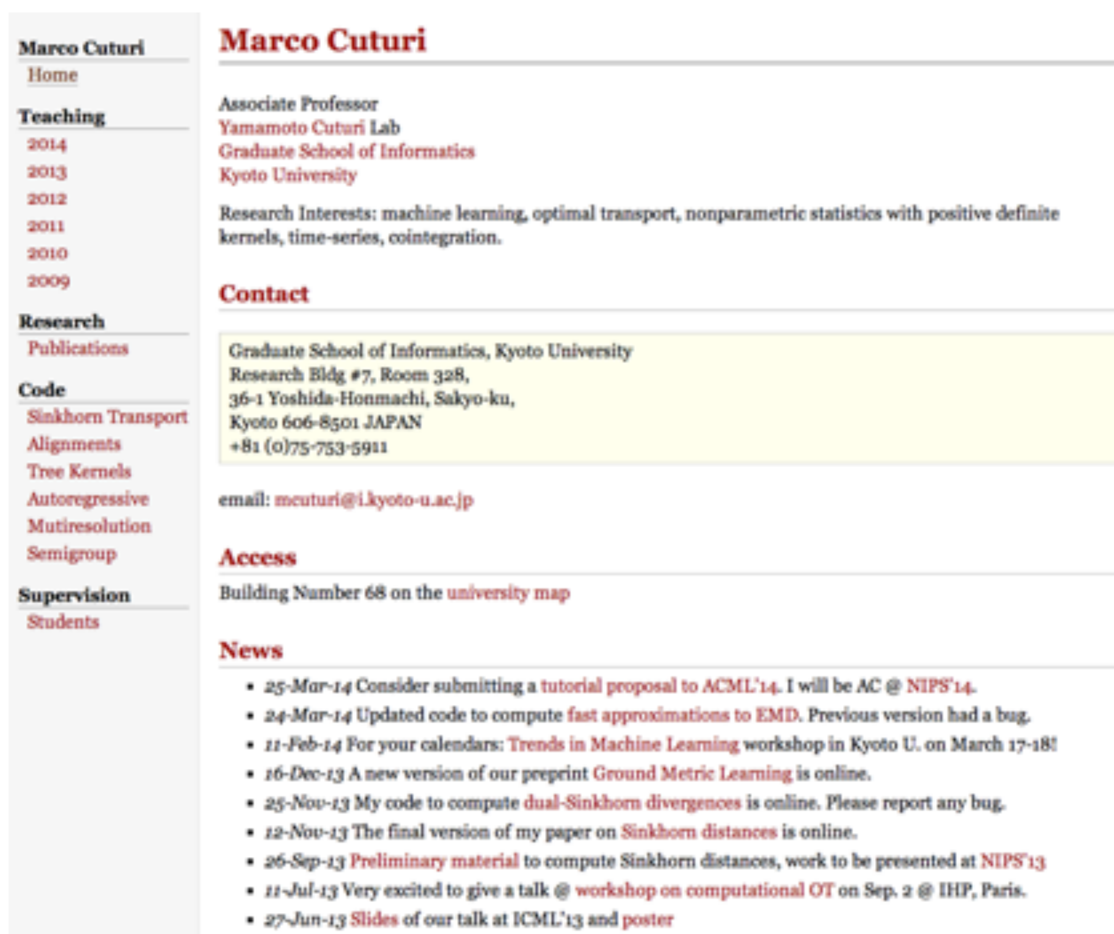
G30 特定准教授 ’10



准教授 '13

山本 Cuturi　研究室

- Statistical Machine Learning (統計的機械学習)

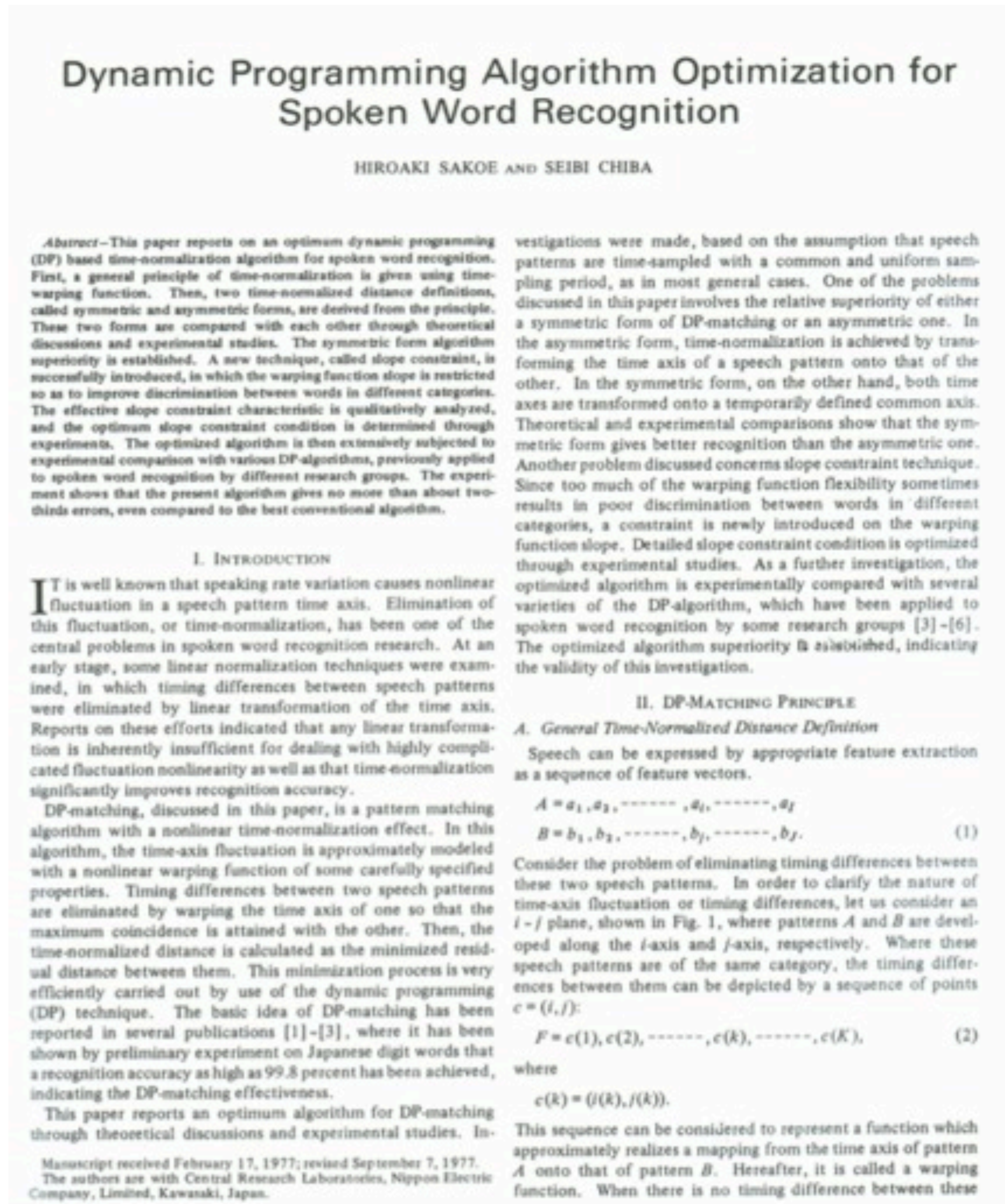


Writing in Scientific English

When will you need to write in scientific english?

- a thesis
- a scientific paper
- a letter to editor / collaborator / reviewer
- a grant proposal
- a cover letter/research statement
- a patent submission
- a blog post

Writing a Scientific Paper



Dynamic Programming Algorithm Optimization for Spoken Word Recognition

HIROAKI SAKOE AND SEIBI CHIBA

Abstract—This paper reports on an optimum dynamic programming (DP) based time-normalization algorithm for spoken word recognition. First, a general principle of time-normalization is given using time-warping function. Then, two time-normalized distance definitions, called symmetric and asymmetric forms, are derived from the principle. These two forms are compared with each other through theoretical discussions and experimental studies. The symmetric form algorithm superiority is established. A new technique, called slope constraint, is successfully introduced, in which the warping function slope is restricted so as to improve discrimination between words in different categories. The effective slope constraint characteristic is qualitatively analyzed, and the optimum slope constraint condition is determined through experiments. The optimized algorithm is then extensively subjected to experimental comparison with various DP-algorithms, previously applied to spoken word recognition by different research groups. The experiment shows that the present algorithm gives no more than about two-thirds errors, even compared to the best conventional algorithm.

I. Introduction

It is well known that speaking rate variation causes nonlinear fluctuation in a speech pattern time axis. Elimination of this fluctuation, or time-normalization, has been one of the central problems in spoken word recognition research. At an early stage, some linear normalization techniques were examined, in which timing differences between speech patterns were eliminated by linear transformation of the time axis. Reports on these efforts indicated that any linear transformation is inherently insufficient for dealing with highly complicated fluctuation nonlinearity as well as that time-normalization significantly improves recognition accuracy.

DP-matching, discussed in this paper, is a pattern matching algorithm with a nonlinear time-normalization effect. In this algorithm, the time-axis fluctuation is approximately modeled with a nonlinear warping function of some carefully specified properties. Timing differences between two speech patterns are eliminated by warping the time axis of one so that the maximum coincidence is attained with the other. Then, the time-normalized distance is calculated as the minimized residual distance between them. This minimization process is very efficiently carried out by use of the dynamic programming (DP) technique. The basic idea of DP-matching has been reported in several publications [1]-[3], where it has been shown by preliminary experiment on Japanese digit words that a recognition accuracy as high as 99.8 percent has been achieved, indicating the DP-matching effectiveness.

This paper reports an optimum algorithm for DP-matching through theoretical discussions and experimental studies. Investigations were made, based on the assumption that speech patterns are time-sampled with a common and uniform sampling period, as in most general cases. One of the problems discussed in this paper involves the relative superiority of either a symmetric form of DP-matching or an asymmetric one. In the asymmetric form, time-normalization is achieved by transforming the time axis of a speech pattern onto that of the other. In the symmetric form, on the other hand, both time axes are transformed onto a temporarily defined common axis. Theoretical and experimental comparisons show that the symmetric form gives better recognition than the asymmetric one. Another problem discussed concerns slope constraint technique. Since too much of the warping function flexibility sometimes results in poor discrimination between words in different categories, a constraint is newly introduced on the warping function slope. Detailed slope constraint condition is optimized through experimental studies. As a further investigation, the optimized algorithm is experimentally compared with several varieties of the DP-algorithm, which have been applied to spoken word recognition by some research groups [3]-[6]. The optimized algorithm superiority is established, indicating the validity of this investigation.

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II. DP-Matching Principle

A. General Time-Normalized Distance Definition

Speech can be expressed by appropriate feature extraction as a sequence of feature vectors.

$$A = a_1, a_2, \cdots\cdots, a_i, \cdots\cdots, a_I$$
$$B = b_1, b_2, \cdots\cdots, b_j, \cdots\cdots, b_J. \quad (1)$$

Consider the problem of eliminating timing differences between these two speech patterns. In order to clarify the nature of time-axis fluctuation or timing differences, let us consider an $i-j$ plane, shown in Fig. 1, where patterns A and B are developed along the i-axis and j-axis, respectively. Where these speech patterns are of the same category, the timing differences between them can be depicted by a sequence of points $c = (i, j)$:

$$F = c(1), c(2), \cdots\cdots, c(k), \cdots\cdots, c(K), \quad (2)$$

where

$$c(k) = (i(k), j(k)).$$

This sequence can be considered to represent a function which approximately realizes a mapping from the time axis of pattern A onto that of pattern B. Hereafter, it is called a warping function. When there is no timing difference between these

Writing a Scientific Paper

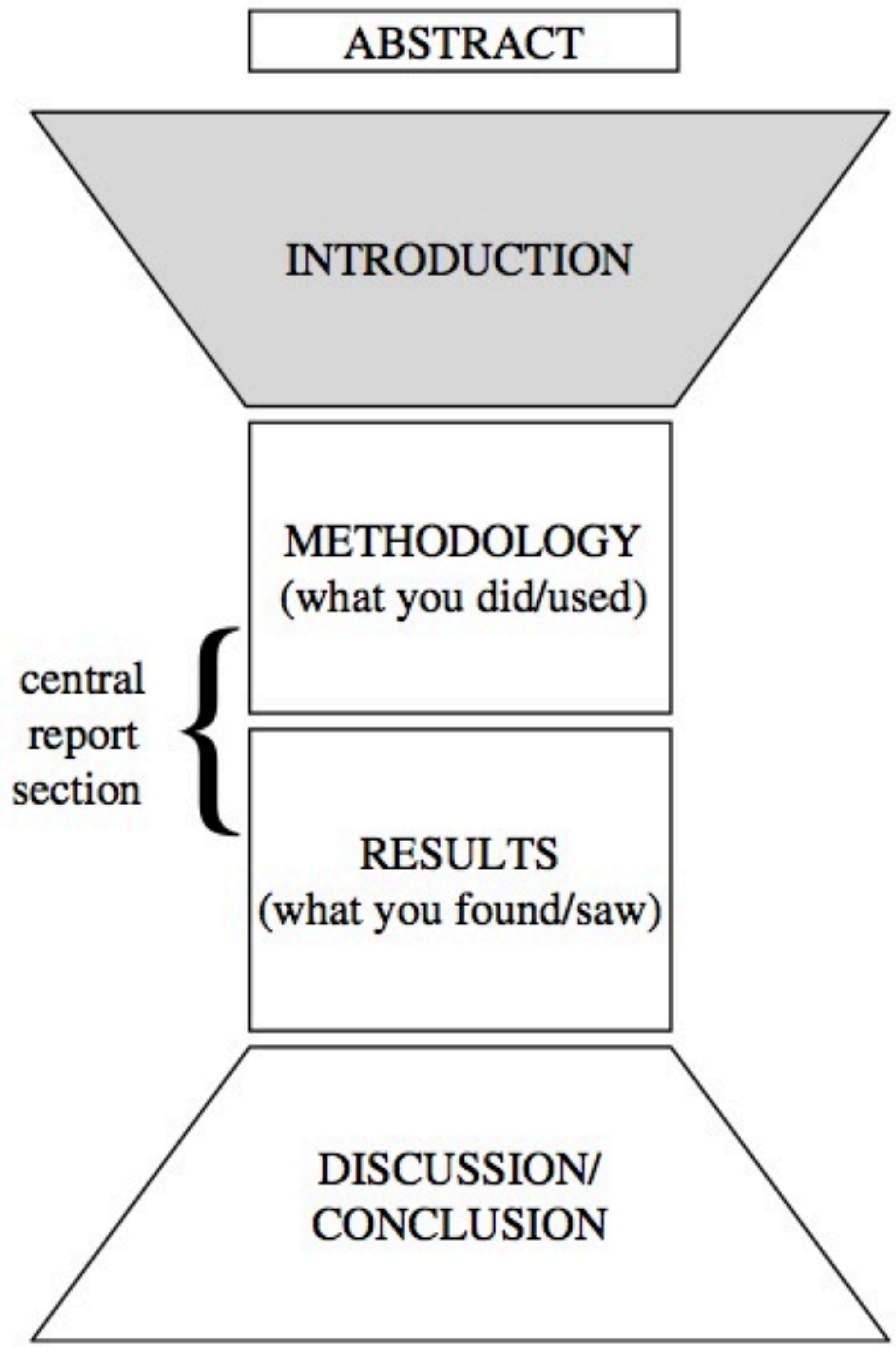

Fig. 1. The shape of a research article or thesis.

Writing a Scientific Paper

- Writing a Scientific Paper is an Exercise in communication
- The goal is to communicate a complex idea, and convince the reader that this new idea is worth the reader's time.
- To **write** a paper in english english, the **only thing you need** is become an expert in writing each of these sections:
- **abstract** / **introduction** / **methodology** / **experiments** / **discussion** / **conclusion.**
- **Unlike "standard english" the goal of writing in scientific english is well defined.**

The Abstract

Elevator Talk

- **What is an elevator talk, and what does it have to do with writing a paper? A lot.**
- Imagine you are the president of the nonprofit *Light Is The Solution Foundation*.
- The board of directors is meeting at the New York Hilton, and you are waiting to ride the elevator from the 31st floor to the

The Abstract and the Elevator Talk: A Tale of Two Summaries Thomas M. Annesley

Elevator Talk

- The doors open, and you find yourself standing with **Bill Gates**, head of the **philanthropic** (博愛) Gates Foundation
- The **Gates Foundation** meeting at the same hotel.
- Gates notices the logo on your shirt of a small child reading a book by the light of a lantern and asks you, *"What is that? What do you do?"*

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Elevator Talk

- Indeed, **what do you do now?** You have 30 floors, or ~1 minute, to give him your message and explain what you do.
- This might be a **unique chance** to get his attention

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Elevator Talk

- So you explain that normal living activities cease in many countries in the world after the sun goes down. Children have no light to read textbooks, mothers no light to cook, fathers no light to earn income.
- With this background, you then explain that the *Light Is The Solution Foundation* has addressed this problem by developing rechargeable lanterns that are low-cost, have a battery life of 30 hours, and put out light equivalent to three 60-W bulbs.
- You have given away 4500 lanterns in one country and have results showing that more children now share books, study together, and graduate at a higher rate. In fact, average incomes have risen by 20% for families who have received a lantern.
- You have concluded that this unique program could be expanded to any country that has even the crudest electrical grid or generators for recharging the lanterns.

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Elevator Talk

- This is the **elevator talk**.
- Your **1-minute** opportunity to summarize what you do, how you do it, the results you produce, and the impact you make.
- A **well-developed elevator talk** entices the listener to want to learn more. In many professions, entire careers are made and lost as a result of elevator talks.
- **ABSTRACT = ELEVATOR TALK**

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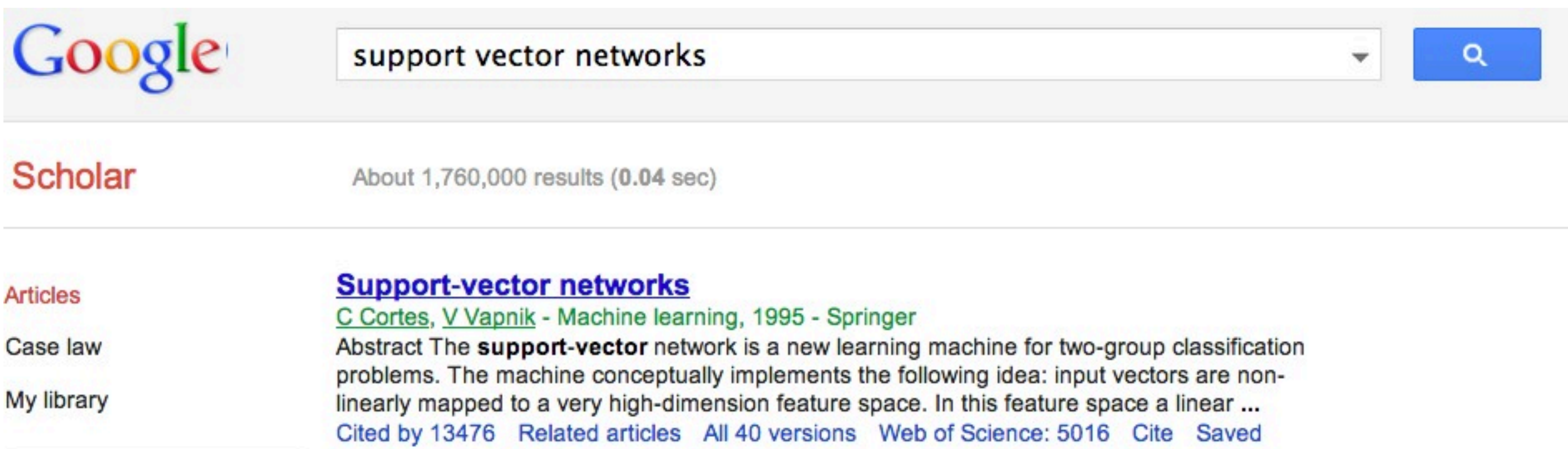
Abstract

Table 1. Characteristics of a well-written abstract.
Stands on its own without need to read the paper
States the hypothesis, question, or objective of the study
Completes the story by answering the hypothesis, question, or objective
Contains the same key words and terms as the title and the introduction
Follows the correct style and format
Follows the order of the main text (e.g., IMRAD)
Stays within the allowed word count
Does not contain information absent in the paper
Does not make conclusions unsupported by the data
Limits the use of abbreviations
Does not include references
Does not cite tables or figures

IMRAD format (Introduction, Methods, Results, and Discussion)

The Abstract and the Elevator Talk: A Tale of Two Summaries Thomas M. Annesley

Abstract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Case law
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Support-vector networks
C Cortes, V Vapnik - Machine learning, 1995 - Springer
Abstract The support-vector network is a new learning machine for two-group classification problems. The machine conceptually implements the following idea: input vectors are non-linearly mapped to a very high-dimension feature space. In this feature space a linear ...
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Abstract

SUPPORT-VECTOR NETWORKS

Corinna Cortes [1] and Vladimir Vapnik [2]
AT&T Labs-Research, USA

Abstract. The *support-vector network* is a new learning machine for two-group classification problems. The machine conceptually implements the following idea: input vectors are non-linearly mapped to a very high-dimension feature space. In this feature space a linear decision surface is constructed. Special properties of the decision surface ensures high generalization ability of the learning machine. The idea behind the support-vector network was previously implemented for the restricted case where the training data can be separated without errors. We here extend this result to non-separable training data.

High generalization ability of support-vector networks utilizing polynomial input transformations is demonstrated. We also compare the performance of the support-vector network to various classical learning algorithms that all took part in a benchmark study of Optical Character Recognition.

Abstract

- Choose the abstract of **any** paper in computational science and check whether they satisfy the assumptions of table 1.
- Choose **any computer scientist** of your liking and describe, as if writing an abstract, his/her biggest contribution to the field.