Visualization and analysis of time series data with the time information system HuTime

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Today's talk

How to use the time information system HuTime

- Overview

- Visualization
  What kind of data can be visualized?

- Operation
  Record search and Analysis

- Examples
  Researches using HuTime

- Let's try
  Data construction and related information

Example of the chronological table
including various information
(Ayutthaya Historical Study Centre)

Time Information System - HuTime

There are two versions of HuTime.
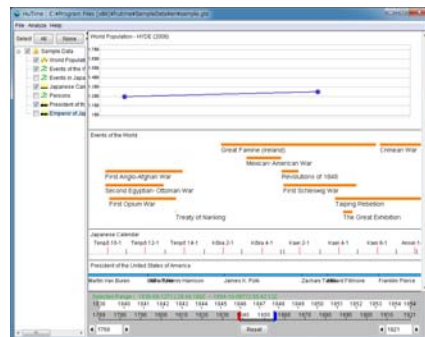
HuTime Stand Alone Version
for visualization and analysis

HuTime Web Version
(embedded in a webpage)
only for visualization

Time Information System - HuTime

HuTime is a software specialized for visualization and analysis of temporal information.

Features

- GIS like operation to visualize and analyze temporal information.
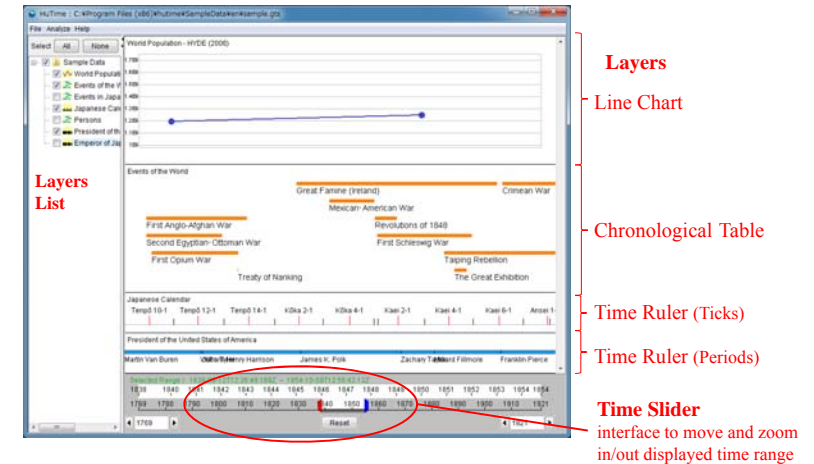- Specialized for temporal information.

Major Functions

- Chronological tables and charts (line, bar and plot) are displayed on the same temporal axis
- Search and extract of events
- Logical operation between layers
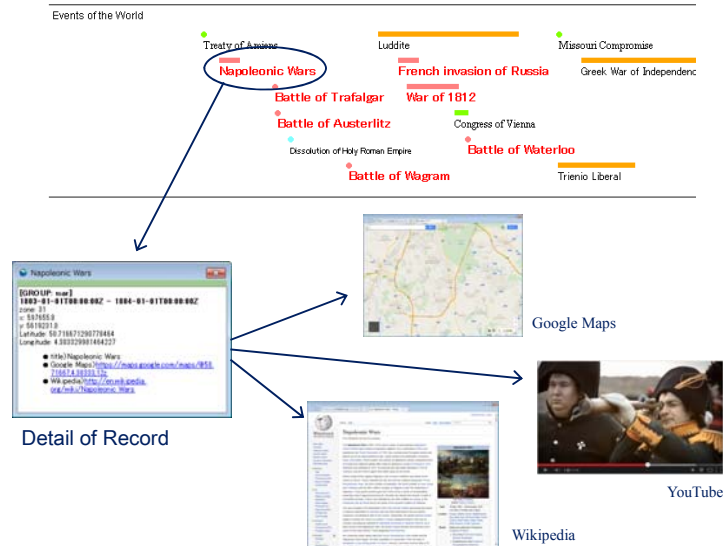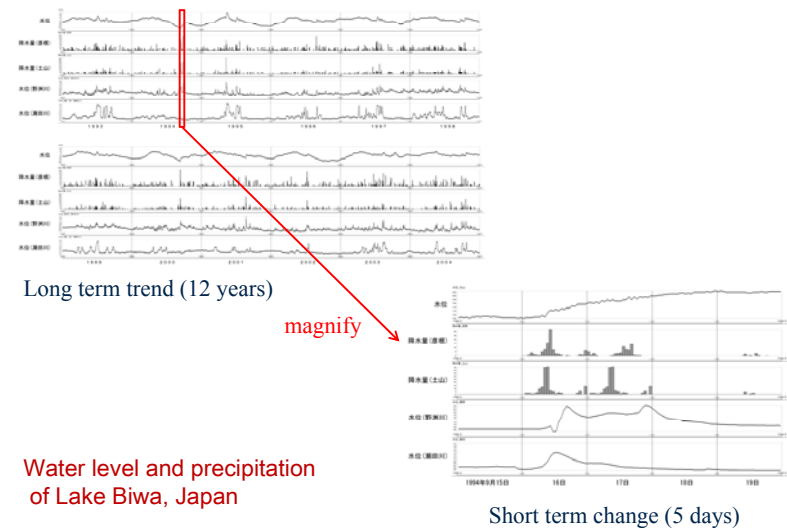- Time ruler according to different types of calendar system

HuTime Search

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Visualization

What kind of data can be visualized?

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Time Information System - HuTime

Layers
Line Chart

Layers List

Chronological Table

Time Ruler (Ticks)

Time Ruler (Periods)

Time Slider
interface to move and zoom in/out displayed time range

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Chronological Tables

Google Maps

Detail of Record

Wikipedia

YouTube

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Time Series Charts

Long term trend (12 years)

magnify

Water level and precipitation of Lake Biwa, Japan

Short term change (5 days)

Time Series Charts

Population dynamics in Japan

Legend:
- Hokkaido/Tohoku
- Kanto
- Chubu
- Kinki
- Chugoku/Shikoku
- Kyushu/Okinawa

Population

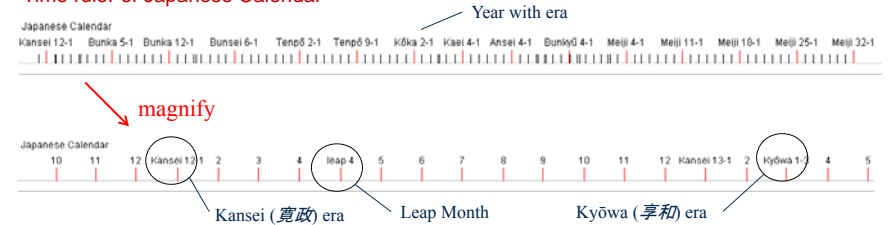Sex ratio

www.hutime.org   9
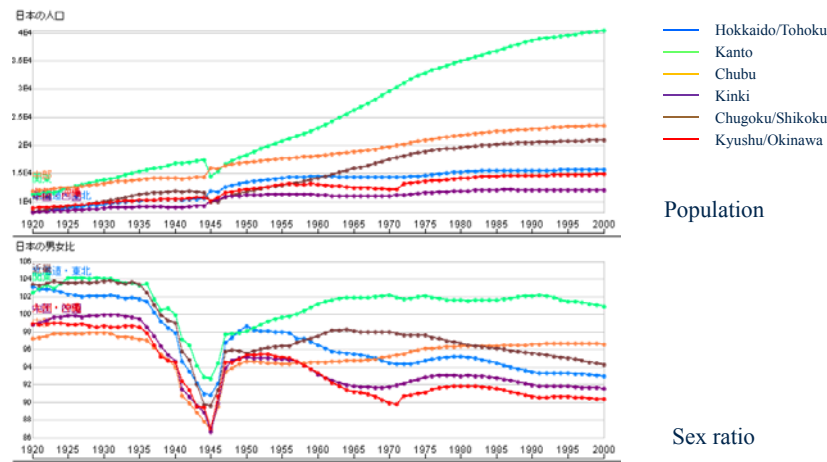
Time ruler

The time rulers are available to show ...
- Regional calendars
- Background to understand focused temporal changes or evens

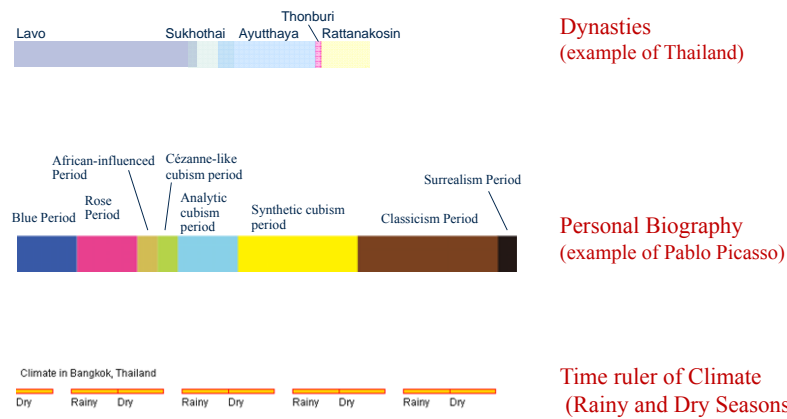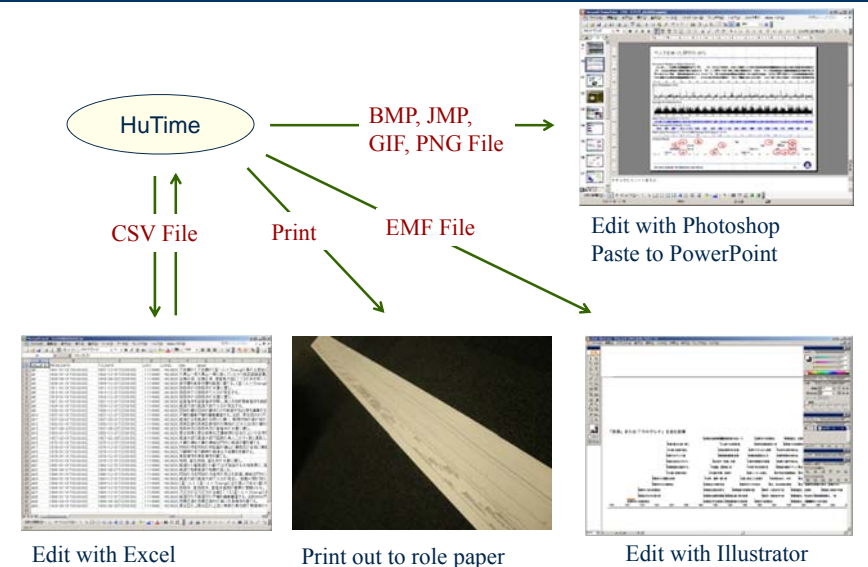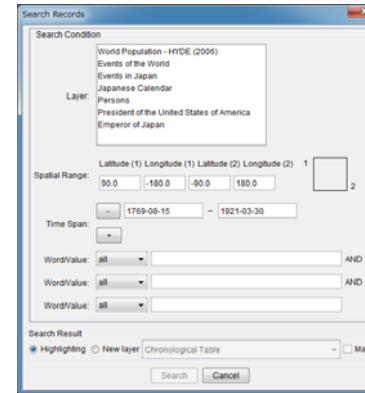**Time ruler of Japanese Calendar**

Year with era

magnify

Kansei (寛政) era   Leap Month   Kyōwa (享和) era

Time ruler of US Presidents

President of the United States of America

George Washington — John Adams — Thomas Jefferson — James Madison — James Monroe — John Quincy A...

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Time ruler

Thonburi
Lavo   Sukhothai   Ayutthaya   Rattanakosin

Dynasties
(example of Thailand)

African-influenced Period   Cézanne-like cubism period
Rose Period   Analytic cubism period   Synthetic cubism period   Surrealism Period
Blue Period   Classicism Period

Personal Biography
(example of Pablo Picasso)

Climate in Bangkok, Thailand
Dry   Rainy   Dry   Rainy   Dry   Rainy   Dry   Rainy   Dry

Time ruler of Climate
(Rainy and Dry Seasons)

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Output formats from HuTime

HuTime

BMP, JMP, GIF, PNG File

CSV File   Print   EMF File

Edit with Photoshop
Paste to PowerPoint

Edit with Excel   Print out to role paper   Edit with Illustrator

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Operation

Record search and Analysis

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Record Search

Characters data

Records contain given words

Numeric data

Records satisfying given condition
(Equal, Larger and Smaller)
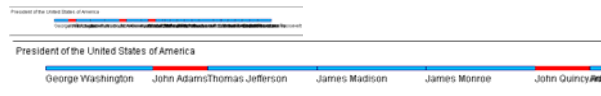
How to display the search result

- Highlighting found records
- New layer which consists of found record
- New layer to display period of found records

Other search conditions

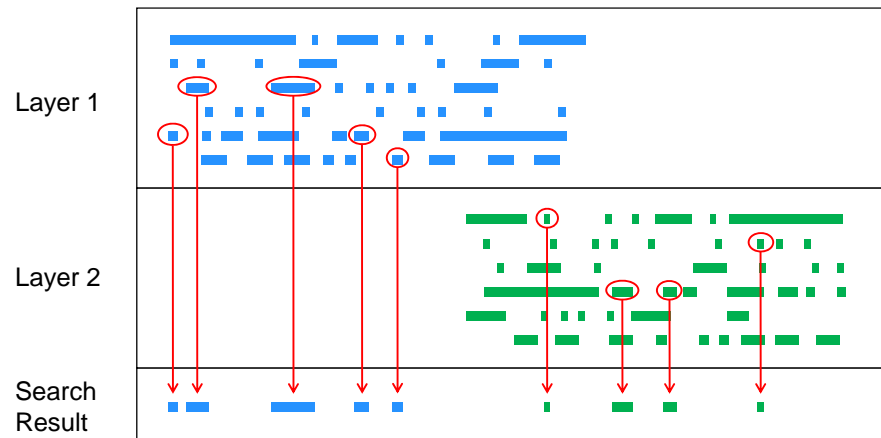- Layer specification
- Temporal and spatial range specification

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Record Search

Highlight US Presidents "John ???"

Extract records including keyword "War"

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Marge of temporal data with HuTime

Layer 1

Layer 2

Search Result

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Example for merge of chronological tables

Chronological Table
about Shiga Prefecture
（Shiga Prefecture）

Chronological Table
about Lake Biwa
（Lake Biwa Research Institute）

Chronological Table
about Documents relating with
Lake Biwa Development
（Library of Shiga Prefecture）

Chronological Table
about Water Resource Development
and Environment in Lake Biwa
（Executive Committee of
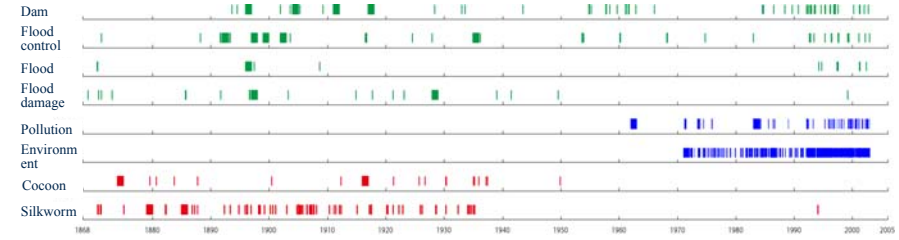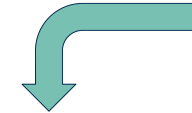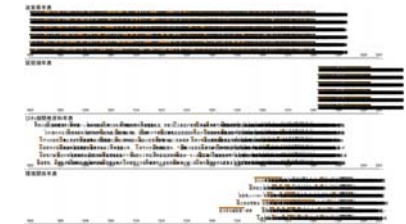Symposium for Issues about
Development of Lake Biwa）
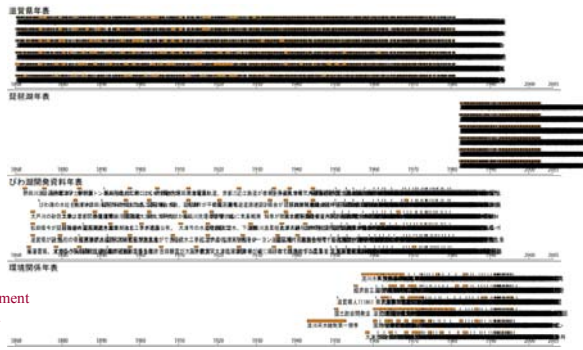
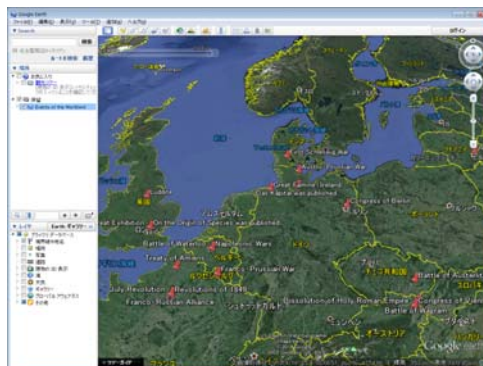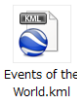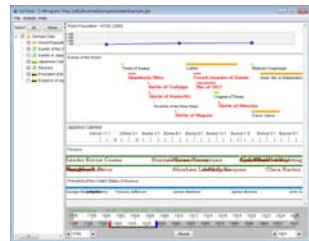Events including word of "red tide"
are extracted from the four tables

" Red Tide Chronological Table
in Lake Biwa"

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Record Search

Periods containing specific words

Dam
Flood control
Flood
Flood damage
Pollution
Environment
Cocoon
Silkworm

1868 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2005

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Data Export to Google Earth (kml file)

Events of the
World.kml

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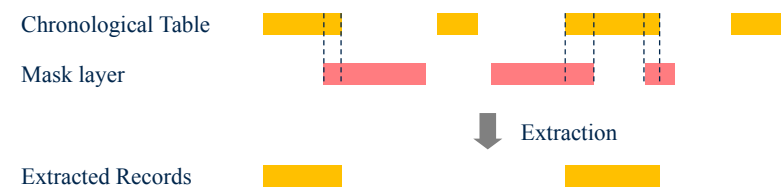
Operations using the mask layer

Logical operation between periods

AND   OR   NOT
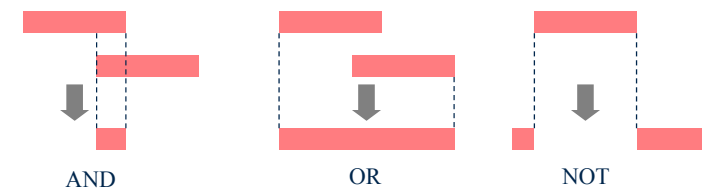
Record extraction   (correspond to Clipping in GIS)

Chronological Table

Mask layer

Extraction

Extracted Records

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Temporal Information Analysis using mask layers

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Demonstration – Temporal analysis using HuTime
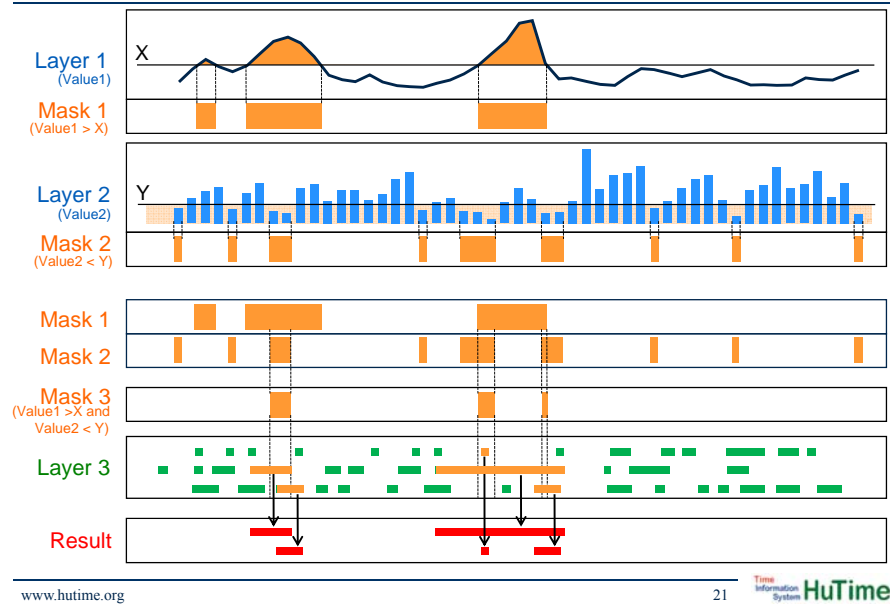
What kind of disasters were occurred during heavy rain fall and strong wind?
(Shiga Prefecture, Japan)

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Examples

Researches using HuTime

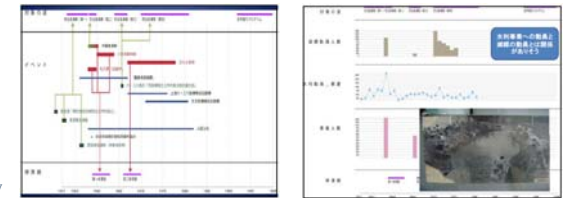
Slide 24
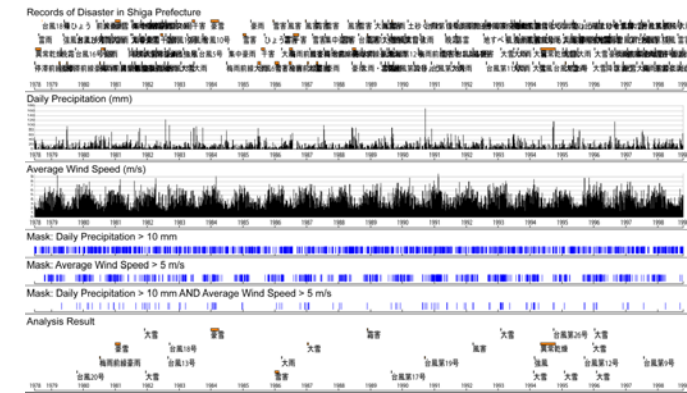
Utilization Example for HuTime

- **Environmental Study:** Relationships between environmental fluctuation and government action

- **Environmental Study:** Chronological table about environmental history

- **Area Study:** Research into the prefectural histories of Yunnan Province, China

- **Area Study:** Trade between Japan and Southeast Asia during the early modern era

- **Health Study:** collection of research documents about schistosomiasis (a parasitic disease) in China

- **Historiography:** Visualization of Shoku Nihongi (続日本紀, Chronicles of Japan, Continued)

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Trade between Japan and Southeast Asia during the early modern era

Mamoru Shibayama (Koto University)

Relationships among historical documents was considered on HuTime

Usage of Time basic data
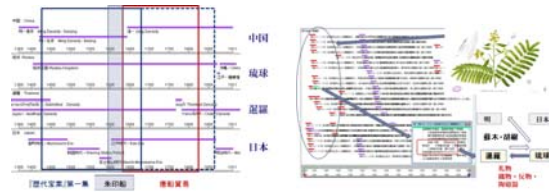
Visualization of Shoku Nihongi (続日本紀, Chronicles of Japan, Continued)

Makoto Goto (Hanazono University)

Difference in trends caused by difference in created periods of the document was found

Data are also displayed on a map.

Geocodingの結果

Time Information System **HuTime**

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Collection of research documents about schistosomiasis (a parasitic disease) in China
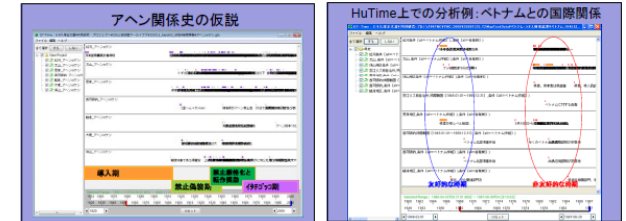
**Yuki Fukushi et al.
(Research Institute for Humanity and Nature)**

HuTime is used to preview the periods covered with collected documents

Important periods can be found from the preview

Research into the prefectural histories of Yunnan Province, China

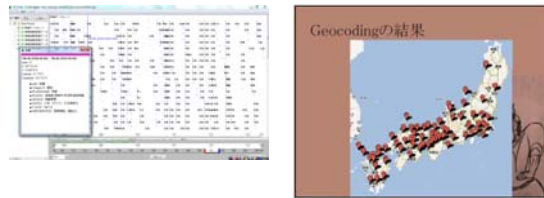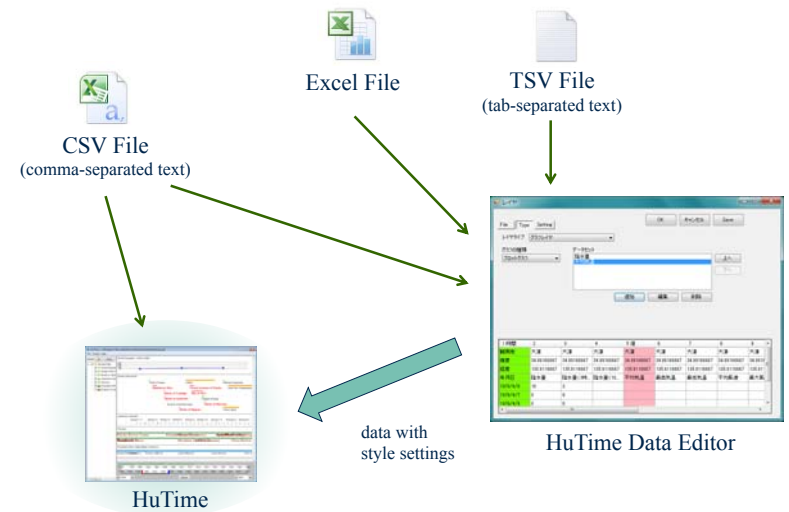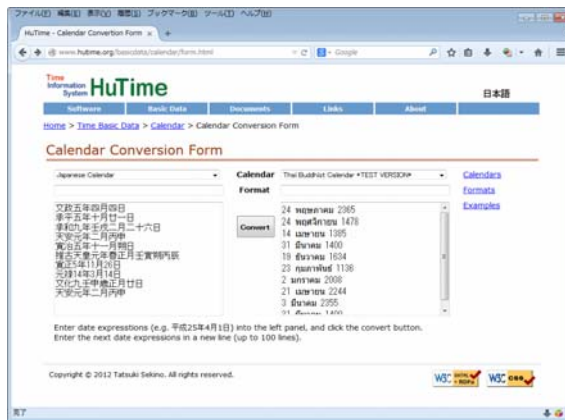**Masatoshi Kubo
(National Museum of Ethonology)**

アヘン関係史の仮説

HuTime上での分析例：ベトナムとの国際関係

Time Information System **HuTime**

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Let's try

Data construction and related information

Time Information System **HuTime**

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How to make data for HuTime?

Excel File

TSV File
(tab-separated text)

CSV File
(comma-separated text)

HuTime Data Editor

data with style settings

HuTime

Time Information System **HuTime**

Calendar Conversion – Web form

HuTime Website

http://www.hutime.org/basicdata/calendar/form.html

Features

・ Character strings expressing date are interpreted directly

・ Chinese characters and expression in a specific calendar are allowed

・ Multiple record are converted at once.

・ Interpretation and output of the character strings according to user specified format

http://www.hutime.org/
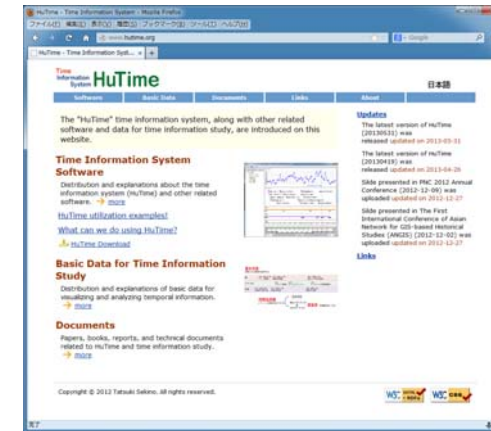
HuTime and related documents are available