From Digital Archives to Digital Humanities
The NTU Approach

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Outline

• NTU’s Digital Archives of Taiwan
• From digital archives to digital humanities
  - building a digital research environment
• A case study with THDL (Taiwan History Digital Library)
  • Further analysis of query results (post-processing)
  • Discovering relationships from old land deeds
• Exploring Digital Humanities
Purposes of Digital Archives

- Preserve the past (which ends at present)
- **Prepare for use** (which starts at present)

Users: present and future students, faculty, and researchers
Digital Archives built at NTU
http://www.digital.ntu.edu.tw
Time Spans of Archives

- Taiwan History Digital Library: 1607-1940
- DARC: 1776-1940
- Taiwan Colonial Court Archives: 1895-1945
- Database of Taiwanese Old Photos: 1895-1945
- Kuomintang Party Records Archives: 1900-1950
- Social Movements Archives from Tsulin Foundation: 1951
- NTU Institutional Repository: 1963
- NTU Web Archiving System: 1996
- Taiwan Colonial Empirical Statistics: 1895-1945
- Taiwan Provincial Assembly Archives: 1946-1981
<table>
<thead>
<tr>
<th>Databases</th>
<th>Features</th>
<th>Records</th>
</tr>
</thead>
<tbody>
<tr>
<td>THDL</td>
<td>- Full text digital library of pre-1900 primary historical documents. &lt;br&gt;- Records span from 1621 to 1911 &lt;br&gt;- Economic activities, ethnic relations and land transactions in Taiwan during Ming and Qing Dynasty</td>
<td>100 million words</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Metadata: 70,288</td>
</tr>
<tr>
<td>DARC</td>
<td>- Manuscripts of Kanori Ino, the Tan-Hsin archives, the Yasusada Tashiro collections, De Beausset archive &lt;br&gt;- The Qing Dynasty, the Japanese colonial period, the period of American aid, to present</td>
<td>Metadata: Over 125,000</td>
</tr>
<tr>
<td>Taiwan Provincial Assembly Archives</td>
<td>- Taiwan provincial Assembly Archives &lt;br&gt;- 62,720 documents dating from 1 May 1946 to December 1998 &lt;br&gt;- Will be 3 times the size when done</td>
<td>Metadata: 98,745</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Images: 1,336,030</td>
</tr>
</tbody>
</table>
| Taiwan Colonial Court Archives (TCCRA) | • 50 year of Taiwanese judicial court records, from 1895 to 1945, under the Japanese colonial rule  
• Superior Court and the Taipei, Hsinchu, Taichung and Chia-Yi Courts | Metadata: 309,811  
Images: 2,471,579 |
| --- | --- | --- |
| Taiwan Colonial Empirical Statistics | Comprehensive statistical records during the Japanese colonial period, just about everything | Metadata: 103,787  
Images: 194,624 |
| Archives from Tsu-lin Foundation | • 7,000 volumes of 430 magazines dating from 1957-2004, about 300 were banned at some point  
• Newspaper clippings from 1951-2006 | Metadata: 147,834  
Images: 400,000 |
| DL of Taiwanese Old Photos | The most comprehensive photographic record of pre-1945 Taiwan | Metadata:37,449  
Images: 38,653 |
| NTU Web Archiving System | Including websites of institutes, organizations and significant events. | Archived over 4,550 websites. |
### Political affairs, NTU’s own collections

<table>
<thead>
<tr>
<th>Nationalist Party (KMT) Records Archives</th>
<th>Classified archives, Wuhan archives, Political Figures Correspondence, Five Divisions archives and National Defense Committee archives</th>
<th>Metadata: 69,412 Image: 800,000</th>
</tr>
</thead>
</table>
| NTU Institutional Repository            | • NTU research journals, conference papers, research reports, projection slides and teaching materials  
• Category and keyword search           | Metadata: 138,918, 44,585 items in full-text |
| DARC                                    | • Taiwanese cultural documents, specimens of flora and fauna, geological studies, archeological surveys, historical documents of zoology and medicine. | Metadata: 125,000 Images: over 1,000,000 Many in full-text |
What we have produced

• Digitization started in 1996
• Digital collections
  – produced more than 1,400,000 metadata records, 5,200,000 images and 216,000,000 full texts of cultural contents
• Systems and research tools
  – Built over 10 large scale digital libraries, many with referential and mining tools such as term analysis, relation graphs, query-result post-processing and analysis
  – Built systems for the digital collections of other institutions such as the Taiwan Provincial Assembly, Academia Historica, the University Library, Museum Group, Departments of Law, Musicology, and Anthropology of NTU
From digital archives to digital humanities
Next challenge…

• How to make these high quality digital materials available to the research community?

• What kind of new research paradigm, methodology, insights, can massive digital archives bring to humanities research, especially on Taiwanese history?
Building a Digital Research Environment

- Understand the need of researchers
- Understand the nature of different archives
- IT people and humanists build the System together

Create a dialogue and find a balance between IT and user needs

Continual improvement of contents and functions through dialogue
• From providing information to discovering research issues

• An environment in which researchers can search/retrieve, observe, analyze, and explore

• An environment to find new context/relations within a sub-collection of documents
A case study with THDL (Taiwan History Digital Library)
The Goals of THDL

• To build a comprehensive full-text digital library of pre-1895 Taiwan historical documents for research in Taiwanese history

• To build a research platform for historians to study documents, observe relations, discover new research subjects, and conduct research
Taiwan History 101

• Since 5000 BC: Inhabited by Austroesians (2% of current population).
• 1000 AD: Han Chinese started to migrate
• 1624: First non-indigenous government in Taiwan established by the Dutch (in the south)
• 1626: Spanish occupied northern tip and built 3 forts (driven out by Dutch 15 years later)
• 1661: Koxinga (鄭成功) drove out the Dutch
• 1683: Zheng’s grandson surrendered to the Qing emperor Kangxi (康熙)
History, continues

- 1887: Qing established the Taiwan Province
- 1895: Taiwan ceded to Japan after the Sino-Japanese war
- 1945: Taiwan return to Republic of China (after WWII)
- 1949: Republic Of China (Nationalist) government moved to Taiwan
- 1987: Martial law lifted, full democracy established
Current Content of THDL

• More than 37,000 **Ming and Qing Imperial Court documents** (1607 to 1895) from over 280 sources
  – Most are reports to emperors & imperial decrees
• More than 32,000 **pre-1900 land deeds** from 95 sources – growing by the month
• All keyed-in as machine readable full-text and supplemented with metadata records.
• More than 150,000,000 words, over 70,000 metadata records
THDL as a Research Platform

• We want to build a digital library for researchers.
• It should not be a storehouse that simply contains digital contents.
• It should provide tools to help researchers explore documents.
• The user interface should integrate both the contents and the tools.
A Glimpse of THDL Interface
Tools that We Want to Offer

1. Retrieval Tools
   – Help users **find what they want**

2. Mining Tools
   – Help users **observe and analyze what they have found**
   – Help users **explore and discover what they might not know**

3. Referential tools
The Local Officials Chart of Taiwan during the Qing Dynasty

Chinese and Western Dates Mapping system (Later than Ming Dynasty)
Retrieval Tools

• Full-text and Metadata Search
  1) Full-text Search: helps one find documents by specifying terms occurred in desirable documents
  2) Metadata Search: helps one find documents with specific metadata attributes

• Management of Search Results
  3) Personal query history: automatically records the most-recent user queries for later use
  4) User-defined sub-collections: allows one to save interested documents for later use
Every Sub-collection can have its own Significance

• In principle, every sub-collection of documents has its own collective meaning
  – Often much more significant than the sum of its parts

• If a database contains $n$ documents, there are $2^n$ possible sub-collections

• It is often difficult for human to find the meaning of a large sub-collection (by reading documents individually)
Mining Tools

• We regard **a query result as a sub-collection**

• We provide the following tools to help one explore collection-level properties of a sub-collection

  1) Post-query classifications
  2) Presentation of the sub-collection by a line chart of chronicled distribution
  3) Term frequency and term co-occurrence analysis
Post-Query Classifications (1/2)

- In addition to returning a ranked list of documents, THDL classifies a query result by 4 facets (year, source, author, and document type)
  - For example, the “year” facet contains 1666, 1667, 1668, …, etc.
- Post-query classifications emphasize the idea that the distribution of classes within a facet can be a useful collective property about a sub-collection.
Post-Query Classifications (2/2)

- By observing **distributions of the query result**, one can easily find the class that contains most documents. One may check the distribution patterns to see if there is anything more than what one expects.
- By clicking a class item, one can retrieve the documents belonging to that class (faceted search)
Presentation of a Chronicled Distribution

• We use a line chart to help one visualize the temporal relation in a query result

• It is often interesting to ask “why the resulting distribution looks like this?”
Term Frequency Analysis

- We developed an algorithm to extract terms (named entities of people and locations) from full-text.

- Term frequency analysis computes the terms that occur mostly in a query result (a sub-collection).

- When the query consists of terms, the analysis will generate terms that co-occur.
A Closer Look at the Tables of Terms

- A term that appears in more documents suggests that this term is likely to be more relevant to the query
- We list the terms in descending order by their document frequency (DF)
- These terms can help one spot persons and locations that are likely to be important in the query result
Summary of the Integrated Interface

Collections
Search Area
Query History
Reordering Facility
User-defined Sub-collections
Term Frequency Analysis
Post-query Classifications
Summaries of Returned Documents
Old Land Deeds of Taiwan

• Before 1895, land deeds were the only proof of transaction and ownership of land in Taiwan
  – At 1895, Taiwan was ceded to Japan by the Qing dynasty
• A land deed can be a contract for
  – transaction of ownership,
  – rental or transition of farming right,
  – pawning of a piece of land,
  – division of family properties,
  – a permit from government to cultivate a specific piece of land which was not owned by any person
The Land Deeds in THDL

• We have accumulated more than 32,000 pre-1900 land deeds of Taiwan.
  – Unprecedented in terms of scale, time span (over 250 years), area (the entire western plains of Taiwan), and sources (over 95)
  – They are extremely valuable for studying the land development, social and economic evolution, and race relationship of pre-1900 Taiwan
An Example of Old Land Deeds
Another Example
(source: the Dept. of Anthropology, NTU)
The Modernization of the Land Management System (around 1915)

• During the Japanese colonial rule (from 1895 to 1945), the government replaced the old land-deed system by a new one that employed modern measurement and management technology

• Many old land deeds were destroyed or discarded afterward
Significance of Land Deeds

• Although each land deed may only be significant to its owner, the collection as a whole provides fascinating content for studying the pre-1900 Taiwanese society.

• They can be used to study the following subjects of pre-1900 Taiwan
  – the development of a region,
  – the overall land management,
  – the evolution of society and people (such as the transition of land rights from the indigenous people of Taiwan to the Han people migrated from China),
  – economy,
  – law.
The Corpus of Old Land Deeds in THDL

• As of 2010/03/08, we have incorporated the full-text of 32,435 land deeds into THDL

• They came from 95 sources

• The numbers increase every month (was 28,576 six months ago)
Challenges in Research on Old Land Deeds

• Most research in Taiwan on this subject used only a few land deeds (often less than 100)
• With such a large quantity (> 30,000) of land deeds -- all in searchable full-text,
  – What kind of observations can be made?
  – What kind of research issues can emerge?
Discovering Relationships among Land Deeds

- Retrieval technologies often assume that documents (i.e., land deeds) are independent.
- However, land deeds can be related, and their relationship can be complicated.
  - A piece of land might be sold from A to B, then from B to C, or the son of B to C.
  - Or the land might be divided among the sons of the owner, then each inheritor may conduct further transactions on the inherited land.
Discovering Relationship by Reconstruction: Main Components of an Old Land Deed

• **type** of the deed: selling, renting, pawning, etc.
• **seller** (or owner) of the piece of land,
• **buyer** (or lender) of the piece of land,
• **location** of the land and its **boundaries** (4 reaches),
• **cost** (usually in silver or material),
• **names of witnesses** as well as the **scrivener**,
• **date**.
Deed type
Names of the sellers
Location and boundaries of the land
The price
Names of the witnesses and the scrivener
Signatures of the sellers
The date
Representing the Deed Features

• We extracted the component values to get features of a land deed and recorded them with XML.
A Sample Rule to Reconstruct Relationship

• A sold a piece of land to B (deed \( \alpha \)), and later B sold it to C (deed \( \beta \)) if all the followings hold:
  1) The time of deed \( \alpha \) is prior to that of \( \beta \)
  2) The location of deed \( \alpha \) is the same as that of \( \beta \)
  3) One of the buyers in \( \alpha \) appears to be one of the sellers in \( \beta \)

• Since most citizens were illiterate, there can be variations on person and location names in deeds
  – Cannot use exact match algorithms to check conditions
  – Instead, we need to apply fuzzy techniques to match person and location names

• However, relaxing to allow fuzzy conditions can produce too many false-positive candidates
  – We use the matching of other features to increase precision
立杜賣盡根契人李丁貴、李丁茂、李丁山。有承父祖遺下山埔一所，坐落土名大平頂。東至崙頭石釘，西至蔡家崙頂分水，南至蔡、李二姓公地，北至荖梅溪；四至界址分明。今因乏銀費用，情願將此山林埔地壹盡出賣，先問叔兄弟侄，不欲承受。外托中送就與王雨官出首承買，三面議定，時值價銀參拾大員正，銀即日仝中交收足訖。其契卷俱各花押明白，交付買主收存執掌，其山林埔地隨即仝中踏明界址，付買主前來耕作、收租納課，永為己業。自此壹賣千休，寸土無留，不敢異言。保此埔業，係丁貴等父遺下給墾物業，與至親不敢言贖不敢言貼，亦無重張典掛他人為礙。如有不明，丁貴等出首，一力抵當，不干買主之事。此係二比甘愿，各無反悔，恐口無憑，立杜賣盡根契字壹紙，併上手墾單合夥字，合共參紙，付執為炤。……(中略)

在場知見人  陳高厚 為中人  楊口
道光捌年玖月 日仝立杜賣盡根契人李丁貴、丁茂、丁山

立杜賣盡根契人王文雨有明買得李丁貴山埔壹所，坐落土名大坪頂，東至崙頭石釘，西至蔡家崙頂分水，南至蔡、李兩家公地，北至荖梅溪，四至界址分明，每年配番口糧租粟貳斗正。今因乏銀別用，情願將此山林埔地照界一盡出賣，先向叔姪人等不欲承受，外托中送斷賣與吳仙童觀出首承買，當日仝中三面言議，時值價銀玖拾大員正。……(中略)保此業係雨自己明買物業與叔兄弟姪人等無涉，亦無來歷不明及重張典掛為礙等情，如有，雨自出首一力抵擋，不干買主之事。此係二比甘愿，各無迫勒異言，今欲有憑，立杜賣永盡根斷契一紙，併上手墾單合夥字，合約字一紙，上手契連司單一紙，共四紙，付執為炤。……(中略)

代書人林士格 為中人汪添喜 知見人胞嫂林氏堂叔王者貼 胞姪王初魁
道光拾伍年正月日立杜賣永盡根斷契人王文雨
上下手契 (出典後杜賣, the owner first pawned the piece of land and then sold it)

立轉典園契人，麻荳社下街陳義，有自己明典過黃家鹽埔園壹坵，受種貳分，年帶管事所費錢貳佰文，坐落土名大山腳西北畔，東至車路，西至塚，南至車路，北至張家園，四至明白為界。今因乏銀別置，願將此鹽埔園出典，先儘問房親叔兄弟侄不能承受，外托中引就轉典與本保大山腳莊陳營觀出頭承典，三面言議，著下時價佛銀貳拾大員正，其銀即日全中交訖，其鹽埔園隨即踏明界址，付與銀主前去掌管招佃耕作收成抵利，不敢阻當，亦不敢異言生端茲（滋）事，保此鹽埔園係是義自己明典物業，與別房親人等無干，亦無重張典掛他人，以及上手交加不明為礙。如有不明，義自出頭抵當，不干銀主之事，此係二比甘愿，各無反悔，口恐無憑，今欲有憑，立轉典園契壹紙，併上手契壹紙，合共貳紙，付執存炤。即日全中見收過契內銀貳拾大員，完足再炤。為中人陳三 知見人李品 同治乙丑年拾月 日立轉典鹽埔園契人陳義 代書李溶波 再者此園自同治乙丑年拾貳月起，限至同治癸酉年拾貳月，所典主備足契內銀取贖，不得刁難，如至限無銀取贖，仍付銀主掌管，批明再炤。

立賣杜絕盡根契字人，麻荳社陳同義，有自己建置鹽埔園壹段，受種貳分，年帶貼管事所費錢貳佰文，坐落土名在大山腳西北畔，東至車路，西至塚，南至車路，北至張家園，四至明白為界。今因乏銀費用，願將此鹽埔園出賣，先盡問房親人等不能承受，外托中引就賣與本保埤長庄陳榮三出頭承買，三面言議，著下時價佛銀肆拾大員正，其銀即日全中見交訖，其園隨即踏明界址交付銀主，前去起耕掌管收稅抵利，不敢阻擋，自此一賣千休，日後子孫不敢言找言贖，保此園係是義自己建置之額，與房親人等無干，亦無重張典掛他人來歷交加不明等情。如有不明等情，義自出頭抵當，不干銀主之事，此係二比甘愿，各無反悔，口恐無憑，今欲有憑，立賣杜絕盡根契壹紙，併上手契壹紙、典契壹紙，共叁紙付執為炤。即日全中見交過契面銀肆拾大元，完足再炤。為中人陳協 同治捌年四月 日立賣杜絕盡根契字人陳同義 知見人、代書陳同寧
<table>
<thead>
<tr>
<th>Relations between deeds</th>
<th>Relations found</th>
<th>Cross collections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Successive transaction pairs</td>
<td>2409</td>
<td>119</td>
</tr>
<tr>
<td>Red deeds (Transaction deed and the sale tax receipt)</td>
<td>92</td>
<td>2</td>
</tr>
<tr>
<td>Allotment agreements</td>
<td>878</td>
<td>56</td>
</tr>
<tr>
<td>Duplications of deeds</td>
<td>531</td>
<td>232</td>
</tr>
</tbody>
</table>
Diverse distribution of old land deeds:

• Cross Collection (For Example: )
  - 《台灣平埔族文獻資料選集：竹塹社》
    Hsinchu → Tainan
    《台南市政府文化局民族文物館暨永漢民藝館古契書》
  - 《台灣平埔族文獻資料選集：竹塹社》
    Hsinchu → Taipei
    《臺灣總督府檔案抄錄契約文書・永久保存公文類纂》
  - 《臺灣總督府檔案抄錄契約文書・15年保存公文類纂》→
    《臺灣總督府檔案抄錄契約文書・永久保存公文類纂》
Land transitivity graphs

8件契書,地點:加冬腳庄馬留洞:水運腳上街

Sale

Division

Division

Pawning, sale

03/10/2010
Found 2376 LTG (1/2)

• 103 deeds

Graph_ID = 130 (含有 103 件契書)

| 年代 | 代(DF): 清 光緒二年(1);清光緒二十年(15);清光緒二十五年(52);清光緒二十九年(1);清光緒三十一年(1);清光緒三十三年(3);日明治二十九年(5);日明治三十年(4);日明治三十二年(2);日明治三十三年(3);日明治三十四年(11);日明治三十五年(5) |
| 常見地點(TF): 六分寮(173);善化里西堡(97);埔園(73);下圍(60);虎頭山(45);台南(40);四分(39);一甲(35);十七份(33);福建(30) |
| 常見人物(TF): 林人文(229);陳恭記(29);文支(15);鄭文(15);鄭元記(15);翁永貞(14);楊老探(12);林新奇(12);張喊(11);嚴吉(9) |
| 其它詞彙(TF): 溪洲(174);海埔(148);甲(87);合豐?(46);兵備道(30);按察使(30);巡撫(15);軍工(15);總督(15);按司(14) |

• 65 deeds

Graph_ID = 33 (含有 65 件契書)

| 年代 | 代(DF): 清 同治六年(26);清同治八年(3);清同治十年(1);清同治十一年(8);清同治十三年(2);清光緒七年(1);清光緒九年(1);清光緒十五年(1);清光緒十九年(1);日明治十年(1);日明治二十二年(4);日明治三十五年(1);日明治三十八年(1);日明治四十年(1);日明治四十一一年(1);日明治四十一年(6) |
| 常見地點(TF): 坑仔口(184);小坑(103);粗坑(102);文山堡(90);坑仔口庄(78);櫻梅嶺(66);雙坑(63);橫路(51);九芎坑(49);虎尾寮(48) |
| 常見人物(TF): 李明德(57);李復吉(57);文支(15);黃勝(54);鄭顯(52);周金煌(46);黃萱(37);黃坤(37);陳英(32);蕭蕃(32) |
| 其它詞彙(TF): 水流(297);金福安(124);李祥記(124);李六吉(90);陳成記(75);陳合發(74);陳興記(52);杜賣(32);豐年(31) |
Found 2376 LTG (2/2)

- 36 deeds

Graph_ID = 108 (含有 36 件契書)

年代 (DF): 清道光三十年(1); 日明治三十四年(15); 日明治三十五年(2); 日明治三十六年(1); 日明治三十七年(2); 日明治三十八年(8); 日明治三十九年(4); 日明治四十三年(3)

常見地點 (TF): 竹南一堡(87); 永和山庄(72); 龍岡(53); 大坑(46); 沙坑(38); 永和山(31); 大湖(30); 雙坑(29); 橫崗(29); 中心(24)

常見人物 (TF): 廖維二(24); 廖清河(23); 廖俊日(19); 廖阿賢(17); 廖維岳(15); 廖阿北(14); 廖佳福(12); 鄧火興(12); 謝舜臣(11)

其它詞彙 (TF): 番田(193); 杜賣(57); 三角(36); 水流(28); 水橋(27); 錢糧(11); 貴字號(7); 華字號(7); 屯營(6); 富字號(6)

- 36 deeds

Graph_ID = 512 (含有 36 件契書)

年代 (DF): 清光緒十三年(6); 清光緒十五年(4); 清光緒十七年(2); 清光緒十八年(1); 清光緒十九年(1); 日明治二十九年(1); 日明治三十年(1); 日明治三十一(1); 日明治三十四年(11); 日明治三十八年(2); 日明治四十一年(6)

常見地點 (TF): 青山(106); 彩和山(78); 十寮庄(52); 範箕窩(50); 公館(44); 竹北二堡(40); 後面(36); 七寮(34); 寮庄(25); 坑底(25)

常見人物 (TF): 張秀欽(59); 蔡華亮(40); 周元寶(37); 曾阿統(34); 陳傳生(26); 徐阿連(25); 徐明枝(25); 范琳生(24); 梁阿傳(24); 陸細番(22)

其它詞彙 (TF): 水流(91); 金廣成(59); 銃櫃(24); 元字號(14); 甲(13); 杜賣(7); 巡撫(6); 番子(6); 大股首(6); 小股首(5)
A family story unfolded by the land transition:

The Liao family in the mountain area in Miaoli
A Finding that Contains 103 Land Deeds

- It is unlikely for a researcher to get this result by hand.
- These land deeds were related to a 14-year (1894-1907) cultivation history of a 0.5km² area in Tainan.
More about the Finding

- The owner secured a cultivation permit and lent the piece of land to many farmers in the first two years. Then some people coveted the land and contested the ownership.
- 0.5km² is larger than the area of Academia Sinica
- Since Tainan was already highly cultivated by the year 1720, it is reasonable to wonder “why could the owner get the permit for such a big area?”
- Answer: The land was part of the river bed of Tsengwen River that was flooded every year

A map around Academia Sinica

we are here

0.5 km² is larger than the area of Academia Sinica
Integrating the Relationships to THDL

Links to show the relation graph and the Involved documents
Jigsaw puzzle through *four reaches*

North: PPP

East: A
A
A

West: A
A
A

South: BBB

East: XX

West: D
D
D

South: MMM

East: XX

West: XXX

North: EEE

South: EEE

East: X

West: XXX

North: EEE

South: EEE
The result of jigsaw puzzle:
A map of land ownership

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Concluding Remarks: Exploring Digital Humanities

• From digital archives to digital humanities
• We have built large-scale digital libraries and have built tools to help researchers search, observe, analyze, and explore retrieval results
• Integrating digital content and tools into digital research environments
• What kind of changes could information technology bring to research in the humanities?
• Information technology (IT) can help discover unexpected context/relations that are difficult for human to find. However, interpreting the findings still lies in the hand of scholars.
• We hope our work (THDL for instance) can **enhance interaction** between historians and IT researchers, **open new doors** to the research of Taiwanese history, and become a model for digital humanities in Taiwan
• New methodology? New research paradigm?
Thank you for listening and you are welcome to use our system.

http://www.digital.ntu.edu.tw/