Wasan —和算— (Traditional Japanese Mathematics)

digitization of unique collection at Tohoku University Library

Ueki, Toshiya (植木 俊哉) & **Sasaki, Tomoo** (佐佐木 智穗)

Tohoku University Library (东北大学附属图书馆)

Outline

1. Introduction of Tohoku University and the Library

2. Tohoku University *Wasan* Database : digitization of unique collection

3. Future strategy of digitizing collections and sharing data

Introduction of Tohoku University and the Library

Overview of Sendai (仙台) and Tohoku University (东北大学)

Tohoku University is located in Sendai, the largest city in the Tohoku region, well known as *"The Tree-clad City"* *"Academic City"*.

［City of Sendai］

Population As of August 2017	*1,086,012*

By bullet train from Tokyo	*350 km* *1.31 h*
By local train from Sendai Airport	*17 km* *20 min*

Sendai

Tokyo

Tohoku university has 10 Faculties / 16 Graduate Schools 3 Professional Graduate Schools / 6 Research Institutes

Faculties
Arts and Letters
Education
Law
Economics
Science
Medicine
Dentistry
Pharmaceutical Sciences
Engineering
Agriculture

Graduate Schools
Arts and Letters
Education
Law
Economics and Management
Science
Medicine
Dentistry
Pharmaceutical Sciences
Engineering
Agricultural Science
International Cultural Studies
Information Sciences
Life Sciences
Environmental Studies
Biomedical Engineering
Educational Informatics Research Division, Education Division

Professional Graduate Schools
Law School
School of Public Policy
Accounting School

Research Institutes
Institute for Materials Research (IMR)
Institute of Development, Aging and Cancer (IDAC)
Institute of Fluid Science (IFS)
Research Institute of Electrical Communication (RIEC)
Institute of Multidisciplinary Research for Advanced Materials (IMRAM)
International Research Institute of Disaster Science (IRIDeS)

■Total Number of Staff■　6,433

■Total Number of Students■　18,019

■Total Number of International Students■　2,028　(as of May. 1, 2017)

History and Tradition
The spirit of Tohoku University

110 Years of History and Tradition

（**established in 1907 as Tohoku Imperial University, 1947 name was changed into Tohoku University**）

- **Research First** (研究第一)
- **Open Door** (门户开放)
- **Practice Oriented Research and Education** (实学尊重)

Open Door : Early Bonds between Zhejiang (浙江) and Tohoku University

Lu, Xun
鲁迅

A leading figure of modern Chinese literature born in Shaoxing (绍兴). He was the first international student to enter Sendai Medical College (1904). In his essay "*Professor Fujino*"(藤野先生), he describes his time in Sendai and his relation to a professor of Anatomy.

The lecture hall he studied at is still preserved and many visitors come to Tohoku University to see this place of Chinese-Japanese friendship.

Chen, Jiangong
陈建功

Received Doctor of Science in 1929. He was the first international student to earn a doctor degree in science from a Japanese university.

Su, Buqing
苏步青

He was the second international student to receive Doctor of Science from a Japanese university (1931) The group of Chinese mathematics researchers trained by Su is known as the "Su School".

About Tohoku University Library

- Established in **1911**
- Number of collections
    : **4.1 million**
- **1 Main Library**

    + **4 Branch Libraries** + **Institute Libraries**

Tohoku University Libraries

Main Library
(Kawauchi campus)

Medical Library
(Seiryo Campus)

Kita-Aobayama Library
(Aobayama Campus)

Engineering Library
(Aobayama Campus)

Agricultural Library
(Aobayama Campus)

Institute Libraries
(Katahira Campus etc.)

Unique collections of Tohoku University Library

Kano collection

- **Books** from **Kano, Kokichi** (1865-1942)
- A large-scale collection consisting of **more than 100,000 Japanese and Chinese pre-modern materials**, known as "**The encyclopedia of classical literature** " "**The treasury for *Edo* period studies**"

Soseki collection

- **Books** and **handwritten materials** by **Natsume, Soseki** (1867-1916) , a representative writer of Japan

孝文皇帝　高祖中子也

Shiji (Historical Records), Volume 10, Annals of the Emperor Xiaowen
史记　孝文本纪　第十　※National Treasure of Japan (日本国国宝)

Story of *Bunsho*

ふんしゃう

(*Nara-ehon* 奈良絵本)

Yakusha Sugatami **(Pictures of the *kabuki* actors)**

戏子姿见
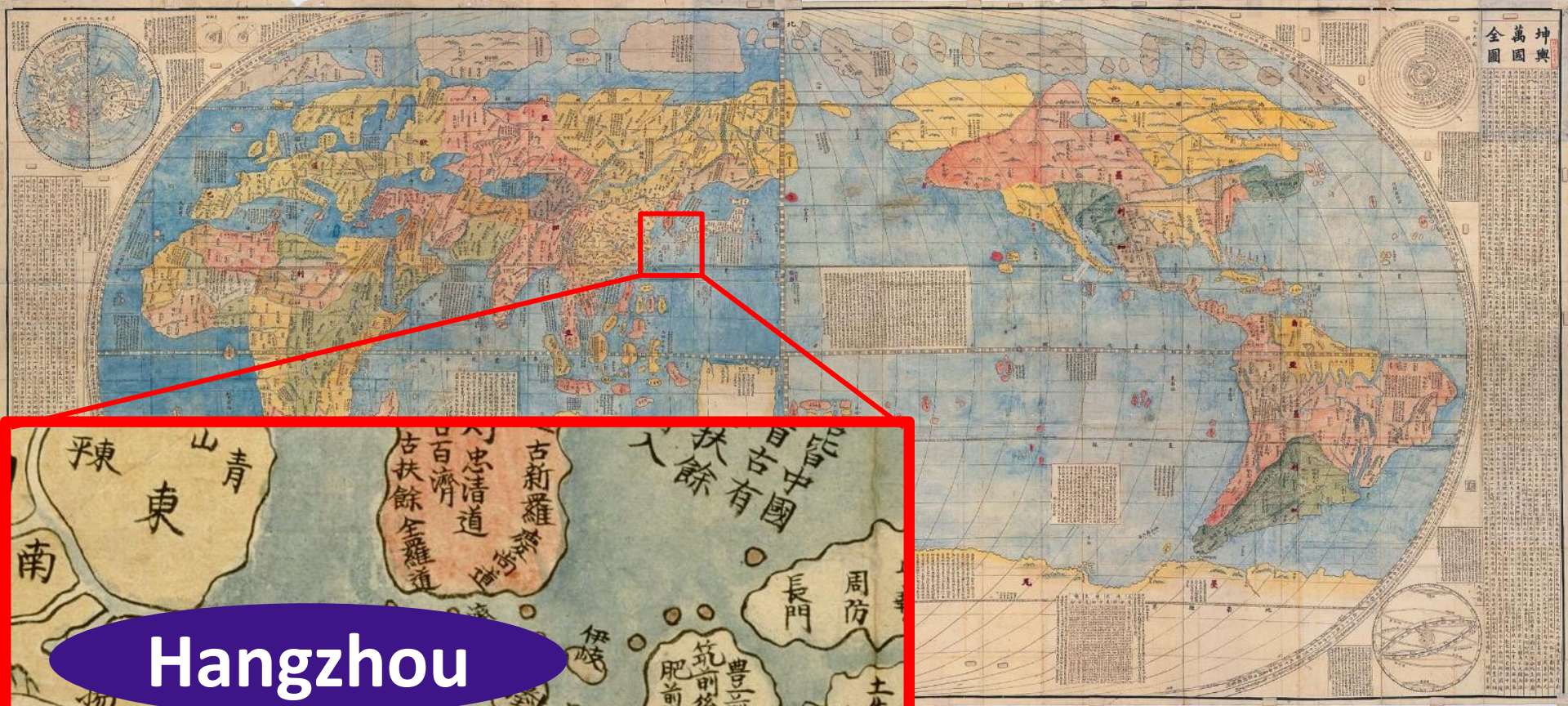
Hangzhou

Zhejiang

Kunyu Wanguo Quantu
(World Atlas)
坤輿万国全图

Unique collections of Tohoku University Library

Kano collection

- Books from **Kano, Kokichi** (1865-1942)
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Soseki collection

- Books and handwritten materials by **Natsume, Soseki** (1867-1916) , a representative writer of Japan

Wasan collection

Today's main topic

2

Tohoku University *Wasan* Database
: digitization of unique collection

"Tohoku University Digital Collection"

http://www.i-epository.net/il/meta_pub/engG0000398CROSS

Databases	number of items (all)	number of items (image data)	number of image data
Kano DB	44,080	18,338	36,133
Soseki DB	2,286	642	641
The *Akita* Archive DB	1,481	406	1,244
Precious Books DB	117	117	306
Wasan DB	18,178	9,220	693,698
Total	66,142	12,223	699,502

Digitized most systematically and Comprehensively

What is "*wasan*" ?

wa(和)=Japan   san(算)=mathematics

- **The mathematics which had developed its own way in the Edo period Japan** (1603-1868)
- Addressed **various mathematical problems from introductory to advanced levels**
- Regarded as **knowledge directly useful for lives of people**
- Became to **spread not only among the ruling class (***samurai***) but also the common people**

Many books related to "*Wasan*" were published during the Edo period !
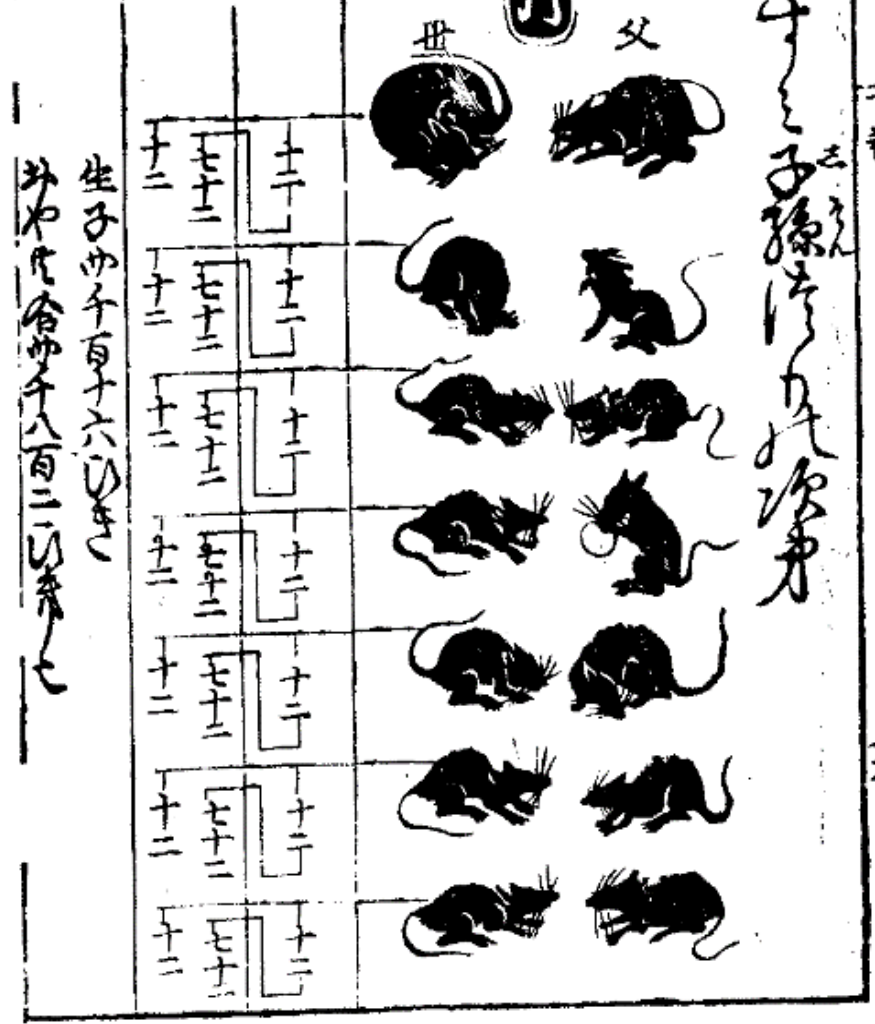
Number of mice

Jan.
father + mother + 12children
→ 14 mice

Feb.
parents mice 14
newly born mice 12 × 7
→ 98 mice

......

Dec.
→ 27,682,574,402 mice

Nezumizan (鼠算 ; geometric progression of mice)
from "*Jinkôki* (尘劫记)"

環矩圖

于後

數列

Calculate pi(π) from
regular 131072-gon inscribed in circle
π=3.1415926532…

依圜矩術得徑一之定周而以零約術得徑一百一十
三周三百五十五合問
求積者列圓徑冪以周率三百五十五相乘得數為
實列徑率一百一十三四之得四百五十二為法實
如法而一得圓滿之贅而已
求周率如左
圓率解
第一
徑一尺圓内如圖容四角次容八角次容一十六角次
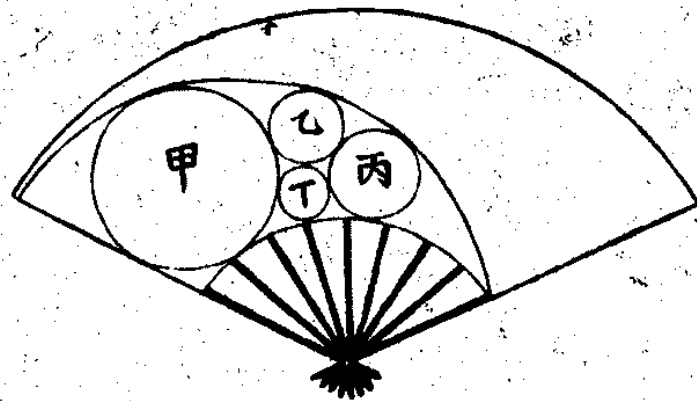容三十二角次如此至于二十三萬一千零七十二角
本以為股術求弦以角數相乘之各得截周各所得句
股弦及周

Calcurate pi(π) from polygon inscribed in circle

from "*Katsuyôsanpô* (括要算法)"

第五問

第四問

今有如圖團扇 按等側圓容寺 五角只云團扇 径若干問五角 面及側圓長短 径各幾何術
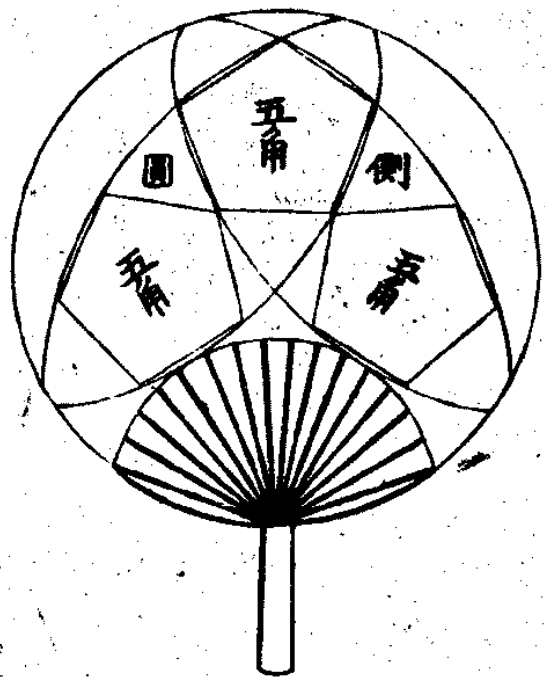
今有如圖扇面 容四圓覆弧背 只云乙丙丁圓 径各若干問求 甲圓径幾何術

Geometric puzzles where *Ougi* and *Uchiwa* (Japanese traditional Fan) appear from "Gomei*sanpô* (五明算法)"

Sangaku (算額 ; a votive horse tablet offering presented to a shrine or temple by a mathematical of the traditional wasan school by way of thanks)

Tohoku University Library
Wasan collection

More than 23,000 volumes of *wasan* materials !

- **Having almost all major books of *wasan***
  - ➤ Holding **90% of the *wasan* titles** which were published in the Edo Period
- **Including many manuscripts of *wasan-ka***

  (traditional Japanese mathematicians) from all over Japan
  - ➤ Collected by Prof. Hayashi, Prof. Fujiwara and other researchers of Japanese mathematical history
- **Containing many materials related to *wasan***
  - ➤ Old mathematical books in **China** and in **Korea**
  - ➤ **Astronomy**, **Study of the calendar**, and **Surveying**…

Number of materials, Tohoku University Library *Wasan* collection (Rounded)

The name of Collections	Number of titles	Number of volumes	Previous owners / Collectors
Hayashi Collection (owned)	**3,300**	**5,500**	Hayashi, Tsuruichi
Hayashi Collection (collected)	**1,800**	**3,500**	
Fujiwaha Collection (owned)	**1,100**	**2,600**	Fujiwara, Matsusaburô
Fujiwaha Collection (collected)	**700**	**2,800**	
Okamoto Collection	**1,700**	**2,700**	Okamoto, Noribumi
Kano Collection (collected)	**2,000**	**5,000**	Kanô, Kôkichi
Haga Collection	**124**	**257**	Haga, Yoshichirô
Hirayama Collection	**1,255**	**1,255**	Hirayama, Akira
Other collections	**248**	**997**	
Total	**12,227**	**23,612**	

The digitization project of the *wasan* materials

- **The project started from 2003**

  - ➢ Funded by Grants-in-Aid for Scientific Research <***KAKENHI***> (Japan Society for the Promotion of Science)

  - ➢ Continuted intermittently **until 2012**

- The first **full-text images publishing system** "**Tohoku University** *Wasan* **Portal**" was **released in June 2004**
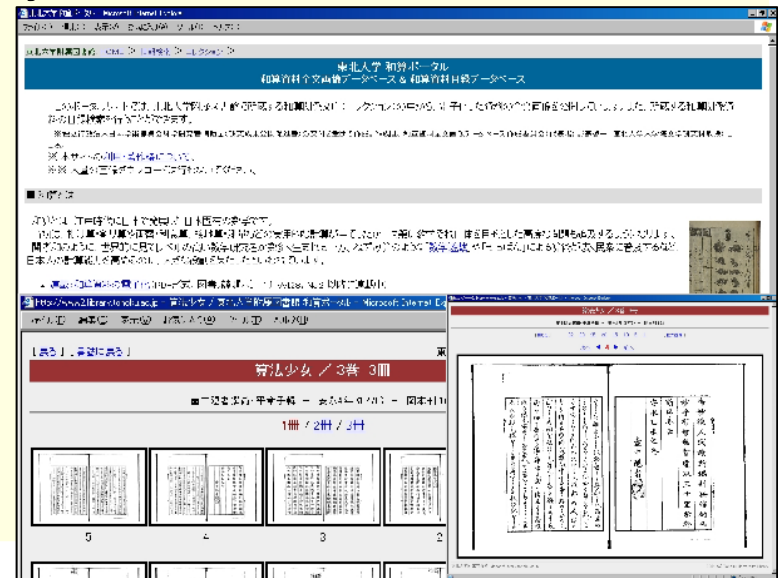
The digitization process of the materials

Wasan materials → *Photograph* → **Microfilm (negative, 16mm black and white)**

↓ *Develop*

Microfilm (for browsing) ← *Copy* ← **Microfilm (positive)**

Microfilm (for backup)

↓ *Scan*

TIFF image data

↓ *Convert*

Metadata — *Upload to database system* — **PNG image data**

↓

Publish on the web
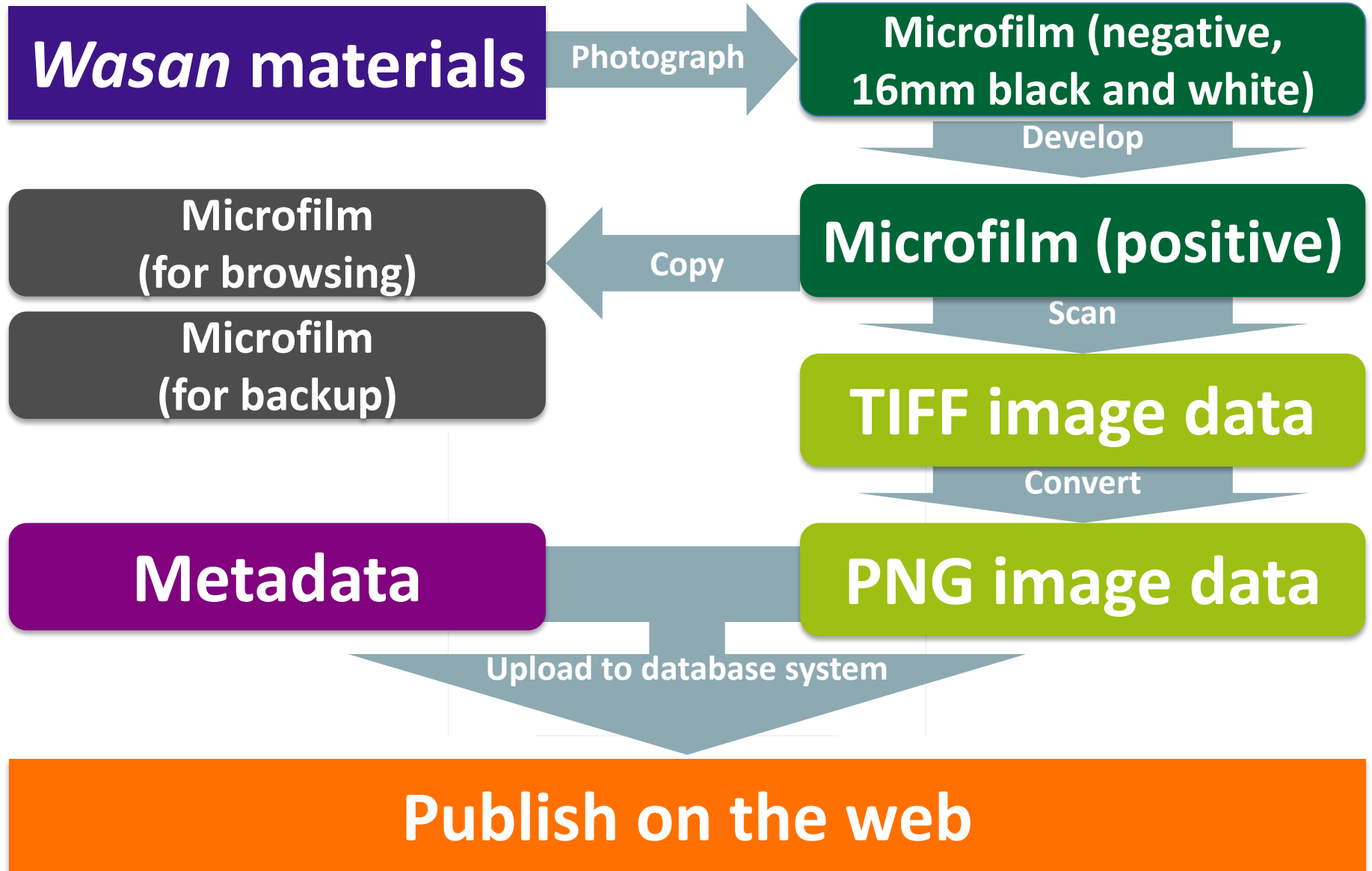
The items of the metadata

title	書名		**recno**	レコード番号	※repeatable	
titleread	書名ヨミ		**collect**	文庫・集書	※repeatable	
author	著・編者名		**callno**	請求記号		
authorread	著者名ヨミ		**collectcallno**	文庫＋請求記号		
pub	出版者		**imageset**	画像有無		
year	刊行年等		**mfno**	MF番号		
syear	西暦		**mfvol**	MF巻		
vol	巻		**mfframe**	MFコマ		
issue	冊		**oinum**	旧画像数		
ms	刊写別	※repeatable	**orecno**	旧レコード番号		
note	目録注記等		**ocatno**	旧catno		
comment	その他注		**oimagestart**	旧巻始コマ		
class	分類	※repeatable	**image**	画像	※repeatable	

Number of metadata & already taken materials

The name of Collections	Made metadata	Already taken materials
Hayashi (owned)	3,378	3,058
Hayashi (collected)	1,760	1,737
Fujiwara (owned)	868	645
Fujiwara (collected)	533	480
Okamoto (published)	532	515
Okamoto (manuscript)	1199	1142
Haga	127	107
Becchi	43	0
Total (ex. Kano and other)	**8,416**	**7,274**
Kano	6,207	257
Other	3,510	1,276
Total	**16,847**	**7,512**

Database System

- **1ˢᵗ** Generation (From **2004** to **2010**)
  - ➤ **Original System (PHP+MySQL)** developed by librarian

- **2ⁿᵈ** Generation (From **2010** to **2015**)
  - ➤ Digital Archive System "**InfoLib**" produced by *Infocom Corporation*

- **3ʳᵈ** Generation (From **2015** to **now**)
  - ➤ "**InfoLib**" on **cloud server**
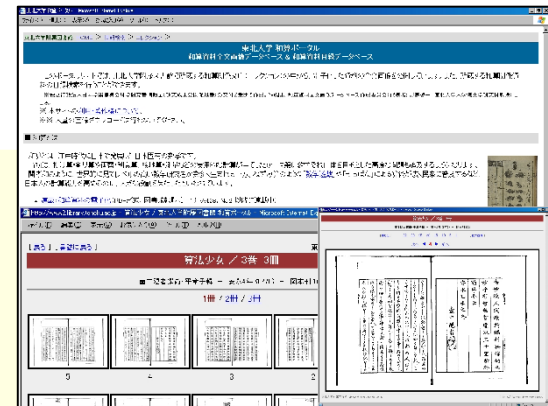
The 2010 Mathematical Society of Japan Publication Prize was awarded to *Wasan* DB!

"You are **providing opportunities to come in touch with *wasan* materials** and **making a big contribution to *wasan* research** by **digitizing one of Japan's foremost *wasan* materials** and **publishing full-text images on the web**."

2010
日本数学会出版賞

東北大学附属図書館 殿

関孝和の円周率の計算

東京女子大学　長田直樹 (Naoki Osada)
Tokyo Woman's Christian University

概要

関孝和が『括要算法』巻貞において円周率の計算をいかに行ったか、関および建部賢明・賢弘が「定周」をいかなる意味で用いたかを明らかにする。さらに、『括要算法』と『大成算経』の関係について試論を述べる。

1 はじめに

関孝和は、直径 1 の円に内接する正 $2^{15}, 2^{16}, 2^{17}$ 角形の周の長さ s_{15}, s_{16}, s_{17} から

$$t_{15} = s_{16} + \frac{(s_{16} - s_{15})(s_{17} - s_{16})}{(s_{16} - s_{15}) - (s_{17} - s_{16})} \tag{1}$$

を計算し定周を定めた。(1) は関の後継者達からは「増約術」と呼ばれ、今日では Aitken Δ^2 法と呼ばれている収束の加速法である。関は正 $2^2, \ldots, 2^{17}$ 角形の勾股弦周の値を小数点以下 19 桁表示し、t_{15} の値を 17 桁正しく計算し、定周を 12 桁求めた。

本報告では『括要算法』巻貞を忠実にたどることにより、関の計算を再現する。関の計算を再現する過程で、次の 3 点を明らかにする。

1. 関の方法 (1) では理論的に何桁の円周率を得ることができるか。
2. 関はどのような方式で何桁の計算を行ったか。
3. 関は何故 17 桁しか正しい値を得られなかったか。

また、関は 17 桁正しい値を得たにもかかわらず「定周」は何故 12 桁だったのか、を考察することにより、関及び建部賢明・賢弘兄弟が「定周」をいかなる意味で用いたかを明らかにする。さらに、関及び建部兄弟の円周率についての研究を比較することにより、『括要算法』と『大成算経』の関係について試論を述べる

Aitken Δ^2 法をいかに導びいたかについて、関は何も残しておらず未解決問題になっている。これについての仮説は付録に与える。

2 関の計算

2.1 計算の概要

『括要算法』巻貞の冒頭 (図 1, 図 2 の 1 丁裏) に「円周率術ヲ求ム　モシ円満径一尺有リ、則チ円周率若干ヲ問フ。答曰、径一百一十三ナレハ、周三百五十五ナリ。環矩ノ術ニ依リテ、径一ノ定周ヲ得、零約術ヲ以テ、径一百一十三、周三百五十五ヲ得、問ニ合フ。」と要約されているように、「求円周率術」において関は円周率の近似分数 355/113 を次の 3 つのステップにより導いた。

1. 直径 1(尺) の円に内接する正 $2^2, \ldots, 2^{17}$ 角形の勾股弦周を「環矩術」により得る。
2. 正 $2^{15}, 2^{16}, 2^{17}$ 角形の周長から (1) を計算し、「定周」3.14159265359 微弱を得る。
3. 2 の「定周」を用いて「零約術」により「周径率」355/113 を得る。

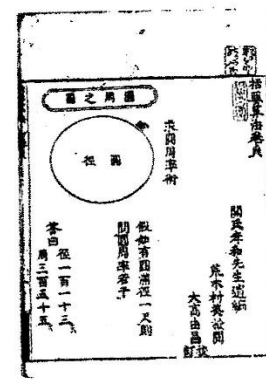1 は村松茂清ら関以前の和算家などと類似の方法を用いたと思われるが、2 と 3 は関の独創によるものである。特に 2 は現代の数値解析の視点から見ても画期的業績 [2, 3, 10] である。まず、2 の考察から始める。
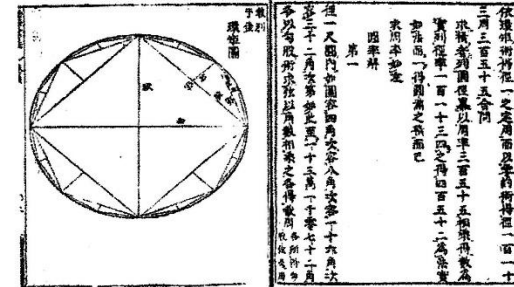

図 1　『括要算法』(東北大学・岡本刊 089) 巻貞 1 丁表

図 2　『括要算法』(東北大学・岡本刊 089) 巻貞 1 丁裏 (右)、2 丁表 (左)

2.2 Aitken Δ^2 法

数列 $\{s_\nu\}$ の差分を $\Delta s_\nu = s_{\nu+1} - s_\nu$ により、2 階差分を $\Delta^2 s_\nu = \Delta s_{\nu+1} - \Delta s_\nu$ により定義する。

数列 $\{s_\nu\}$ を

$$t_\nu = s_{\nu+1} + \frac{(s_{\nu+1} - s_\nu)(s_{\nu+2} - s_{\nu+1})}{(s_{\nu+1} - s_\nu) - (s_{\nu+2} - s_{\nu+1})} = s_\nu - \frac{(\Delta s_\nu)^2}{\Delta^2 s_\nu}$$

により定義される数列 $\{t_\nu\}$ へ変換する方法を Aitken Δ^2 法 (Δ^2 法と略す) あるいは Aitken 加速法という。名称は統計学者の A.C. Aitken[1] が、1926 年に代数方程式の最大根を求める過程で使ったことに由来する。
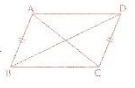
Δ^2 法による加速については次の定理が基本的である。

定理 1 (P. Wynn, J.W. Schmidt) 数列 $\{s_\nu\}$ が $\nu \to \infty$ のとき

$$s_\nu = s + c_1 \lambda_1^\nu + c_2 \lambda_2^\nu + o(\lambda_2^\nu) \tag{2}$$

と漸近表示されるものとする。ここで、s は未知の極限値、$c_1, c_2, \lambda_1, \lambda_2$ は未知の定数で $1 > |\lambda_1| > |\lambda_2| > 0$

問3　∠XOY の二等分線上の点 P から、2 辺...
　　　垂線 PH, PK をそれぞれひくとき、
　　　PH＝PK となることを証明しなさい。

練習問題

①　AB＝AC の二等辺三角形 ABC で、頂点...
　　底辺 BC に垂線をひき、その交点を H と...
　　(1)　上のことがらにあう図をノートにかき...
　　(2)　BH＝CH となることを証明しなさい...

塵劫記

　119 ページで利用した木の高さの求め方が...
塵劫記は、寛永 4 年 (1627) に、吉田光由 (...
書かれました。

　塵劫記には、そろばんを使った四則計算など、日常に必要なことのほかに、数学パズルのような問題ものっていて、教科書として、数学の楽しさを伝える本として、江戸時代のベストセラーとなりました。

　塵劫記は、発刊以降、内容の少し違うものもたくさん出版されています。

　特に、寛永 18 年に出されたものには、複雑な図形の面積を求める問題などの 12 題が、その解き方をのせずに追加されています。
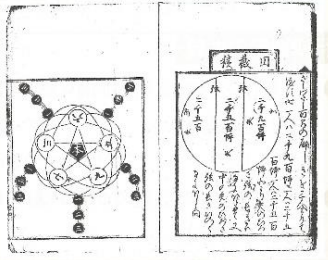
　このような難しい問題を解くことに挑戦することによって、当時の若い数学者が力をつけたことも、塵劫記の大きな功績です。

未来へひろがる
数学 ②
Find the beauty in Math.
啓林館

Q9. たて 133 間、よこ 7 間 5 尺 2 寸の長方形の田の面積を求めなさい。

　『塵劫記』には長方形だけでなく、平行四辺形、正六角形、三角形、円、扇形、それらの合成形など、いろいろな面積の問題があります。第三章にその一部を掲載しましたので、実際に計算してみてください。

　最後に、円の面積に挑戦してみましょう。

解　よこの 7 間 5 尺 2 寸のうち、5 尺 2 寸を 6 尺 5 寸（＝1 間）で割り、7 間 5 尺 2 寸＝7.8 間を求めます。これにたての 133 間をかけて、
7.8×133＝1037 坪 4 分
これを「田法三百」で割って小数第 1 位まで求めると、
1037.4÷300＝3.4 反あまり 17.4
〈答〉3 反 4 畝 17 歩 4 分

Q10. 直径 15 間の円形の田の面積を求めなさい。

　私たちは、円の面積を、「半径×半径×3.14」で求めますが、『塵劫記』では、「直径×直径×0.79」で求めています。円の面積を、円に外接する（円の直径を一辺とする）正方形の面積の 0.79 倍と考えているわけです。これを「円法七九」といいます。この場合、直径×直径×0.79＝半径×半径×4×0.79＝半径×半径×3.16 ですから、円周率は 3・16 となります。
　『塵劫記』では円周率＝3・16 でしたが、円周率の近似値として 3・14 が正しいことを日本...

解　『塵劫記』の解き方は
15×15×0.79＝177 坪 7 分 5 厘
177÷300＝0.5 あまり 27
〈答〉5 畝 27 歩 7 分 5 厘

Page view of
Tohoku University Digital Collection

University of British Columbia

Tsinghua University

Seoul National University

National Taiwan University
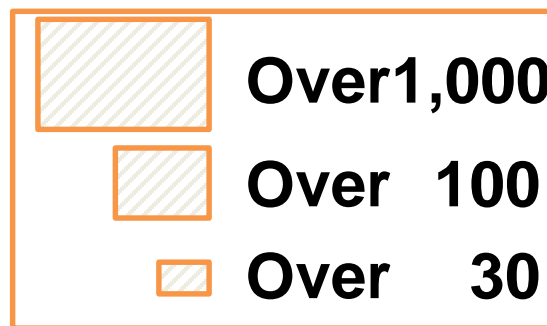
City University
of Hong Kong
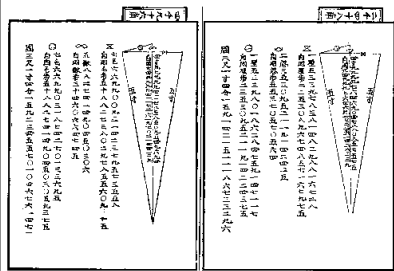
Over1,000

Over   100

Over   30

Figure 3.5: Calculation of π in Muramatsu Shigekiyo's *Sanso*, 1663 edition, Tōhoku University, Okamoto Collection.

in Japan and could not have failed to strike the minds of this time. Of the final computation of 21 digits, 7 are correct, but as we have already seen, Muramatsu was primarily concerned only with the first two of these.

A numerical calculation of this scope must surely have raised questions by its author about the correctness of the digits found. At the very least, Muramatsu would have been in a position to observe, in view of the results, that the values obtained converged slowly towards a limiting number, and to be sure of the correctness of certain digits. To see this, let us underline the digits of the obtained values which remain fixed from one step to the next:

$$p_3 = 3.061467$$
$$p_4 = 3.121445$$
$$p_5 = 3.136548$$
$$p_6 = 3.1403311$$
$$p_7 = 3.14127725$$
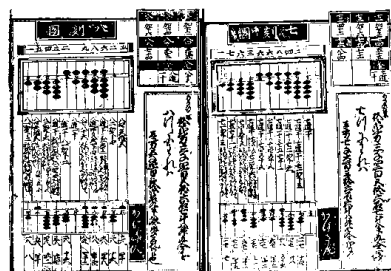$$p_8 = 3.14151380$$
$$p_9 = 3.1415729$$

Figure 1.1: Division by 7 and 8 in Yoshida Mitsuyoshi's *Jinkōki*, 1643 edition, Tōhoku University, Fujiwara Collection.

reciting at every stage the rhymes corresponding to the configuration obtained on the abacus and defined by the pair dividend–divisor.[12]

For the extraction of roots, their position in the book suggests that these operations were considered by the author as a new technique of distinctly higher difficulty. The scheme of the two operations is clearly borrowed from the *Suanfa tongzong*. Moreover, there are indications that Yoshida was far from mastering this procedure.[13] As the drawing of four abaci placed side by side in the chapter devoted to the extraction of cube root indicates, Yoshida was unaware of the possibility of performing the calculation with counting rods,[14] an instrument which was to play a decisive role in the second half of the century.

The *Jinkōki* takes the form of a collection of problems listed under headings whose titles most often recall the concrete situations where the operations are required: trade with wood for construction, calculation of strips of cypress bark, calculation of bundles of bamboo, estimation of the number of tiles required to cover roofs, estimation of strips of gold required for covering folding screens, trade of gold lamination, etc. The analysis which we give below will temporarily leave aside the context in which the techniques are implemented.

The majority of the problems require for their solution elementary operations like division, multiplication, the rule of three and proportions.[15] In a problem of estimat-
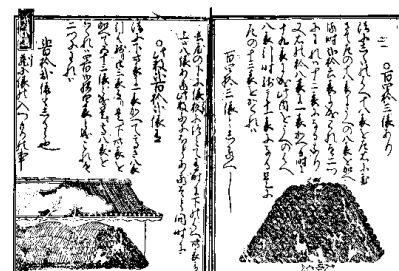
Figure 1.2: Example of a problem in Yoshida Mitsuyoshi's *Jinkōki*, 1643 edition, Tohoku University, Fujiwara Collection.

ing piled-up objects, Yoshida makes use of the formula giving the sum of the first thirteen integers, $13(13+1)/2$.[16]

Yoshida also has tools allowing him to numerically translate geometric properties: the relation between the three sides of a right triangle (or "Pythagoras' theorem"), the equality of the ratios of the sides for two similar right triangles,[17] and a set of procedures for evaluating simple surfaces and volumes.

Areas and volumes are taken up, respectively, in the framework of estimating areas (*kenchi*) and of estimating the content of various containers. In both cases, geometry is not the exclusive criterion which dictates the choice of examples. Yoshida's interest seems to lie rather in the rules for manipulating units of areas and volumes. Thus one finds four examples of calculation of the area of a rectangular field where each time the procedure is different. The shapes considered are not ordered: the trapezium precedes the triangle, and composed forms obtained by joining simple forms are mixed with simple forms. The procedures given are often approximations, in particular when curved edges are replaced by straight ones. The same remarks apply to volumes. The representations to which the latter are associated are such that one can barely even designate them as "forms" or "figures," since they are reproduced in all their materiality (wooden bowls, storage barrels for sake, etc.). This does not mean that the volumes measured were necessarily simple: one finds there cubical, cylindrical and tetrahedral forms as well as prisms with triangular or octagonal base.

Ce manuel, dont la première édition est publiée en 1627, sera un *best-seller* tout au long des deux siècles et demi de pouvoir Tokugawa. Le *Jinkôki* n'est pas très différent par son esprit des traités d'arithmétique commerciale que l'on rencontre en Europe à l'époque médiévale ; il s'inspire aussi beaucoup des traités mathématiques à usage populaire de la Chine des Ming (1368-1644). Il s'agit de répondre aux besoins les plus criants d'une société en pleine mutation. Le *Jinkôki* aborde une large palette de sujets : on y trouve les règles de calcul à l'aide du boulier, instrument de calcul qui se diffuse à cette époque, les règles de conversion des monnaies, des problèmes commerciaux classiques, des estimations de superficies ou de capacités, des estimations de matériaux nécessaires à des travaux de construction, etc. Le

(Photographie de Shibahara Hideo)

Sangaku de Hiwatari, préfecture de Fukushima.
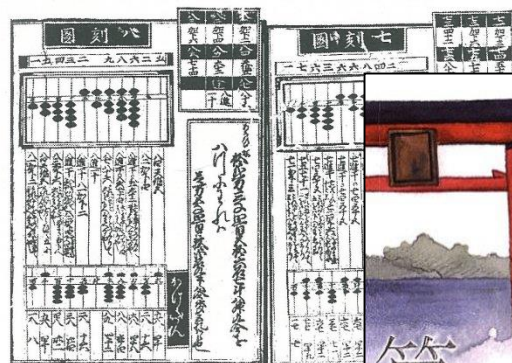
Pages présentant les tables de division pa[r] 8 dans le *Jinkôki* (édition de 1643), Unive[rsité] (Japon), collection Fujiwara.
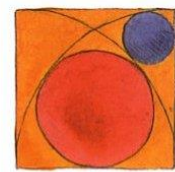
naturellement aux techniques qui permettent de les résoudre. Par-

Géry Huvent

Sangaku
Le mystère des énigmes géométriques japonaises

算額

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équation obtenue, il faut la résou[dre] déroule entièrement à l'aide de pe[...] quadrillée. Les expressions polynom[...] du processus trouvent une traductio[...]

Importance of the *Wasan* DB, and how it is used in the world

"Providing opportunities to come in touch with *wasan* materials"

From the perspective of school education / lifelong learning
➢ **Improving mathematical skills**
➢ **Understanding regional culture and history**

"Making a big contribution to wasan research"

From the perspective of wasan research infrastructure
➢ **Enabling comparative studies of an enormous amount of materials**
➢ **Promoting the cross-border spread of *wasan* research**

3

Future strategy of digitizing collections and sharing data

Strategy of digitizing unique collections

Tohoku University Library is a member of the

Project to Build an International Collaborative Research Network for Pre-modern Japanese Texts (NIJL-NW Project)

- The project is conducted by the
  National Institute of Japanese Literature
  (**NIJL** : 国文学研究资料馆)
- **300 thousand "Pre-modern Japanese Books"**
  will be converted to digital images

Partnerships

NIJL

Japan

20 core universities

Hokkaido University, Tohoku University, University of Tsukuba, University of Tokyo, Ochanomizu University, Nagoya University, Kyoto University, Osaka University, Kobe University, Nara Womens's University, Hiroshima University, Kyushu University, Keio University, Kokugakuin University, Rikkyo University, Waseda University, Otani University, Doshisha University, Ritsumeikan University, Kansai University

Others

Public and private universities, others

Overseas

Institutions under Academic Exchange Agreement with National Institute of Japanese Literature

College de France, Institute des Hartes Etudes Japonaises, Columbia University, Korea University, University of Florence, Beijing Foreign Studies University, Leiden University, University of Venice, University of Naples, Sapienza University of Rome, Vatican Library, University of British Columbia, University of Cambridge, East Asian Library (University of California, Berkley), Berlin State Library, University of Hawaii at Manoa, Heidelberg University

Others

Universities, research institutes, others

National Institutes for the Humanities
National Museum of Japanese History
National Institute for Japanese Language and Linguistics
International Research Center for Japanese Studies

Research Organization of Information and Systems
National Institute of Informatics
National Institute of Polar Research

+

# Partnerships

* Red underline indicates the member of PRRLA

Contribution of Tohoku University to the NIJL-NW project

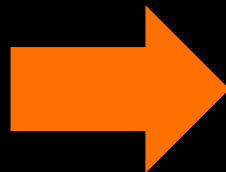| Year	Collection / Subject	Number of items	Number of image data
2014	(The project started)		
2015	**Wasan**	**9,220**	**693,698**
2016	**Medical science**	**137**	**14,497**
2017	**Science, Industrials, a martial art**	***197**	***30,000**
2018	**Science, Religion, etc.**	***1,100**	(undecided)
…			
2023	(The Project will end)		

* The number of plans

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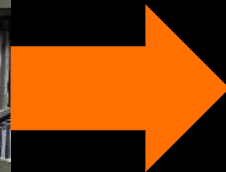
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Strategy of data sharing

- Tohoku University Digital Collection's system (InfoLib) implements the function of **OAI-PMH Repository**

**We are considering
how we will provide PRRLA with metadata**

- The problem that the database **can be searched only in Japanese**

**We'd like to consider
the creation of English metadata**

Thank You!!
谢谢！！

Contact

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