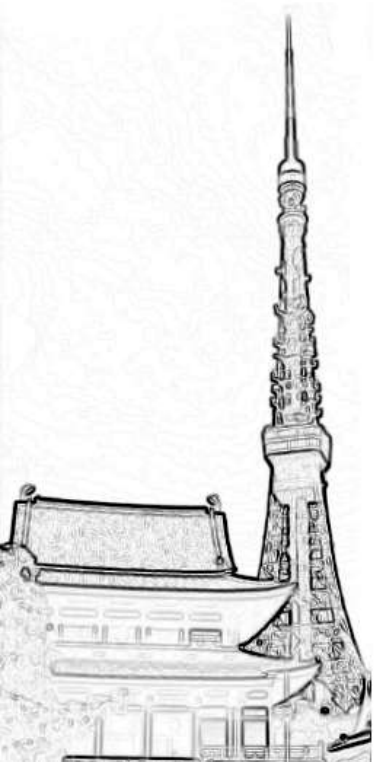
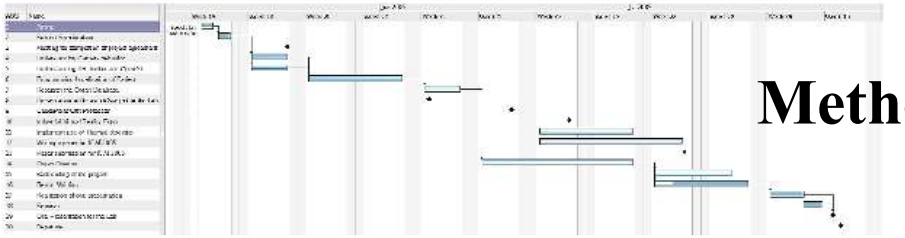


Polytech'Grenoble
University Joseph Fourier, France

At University of Tsukuba, Japan
Computer Vision and Image Media Laboratory

Internship context

Subject Presentation



Methodologies

System Overview

Results

Context of internship

Japan 日本

→

→

Context of internship

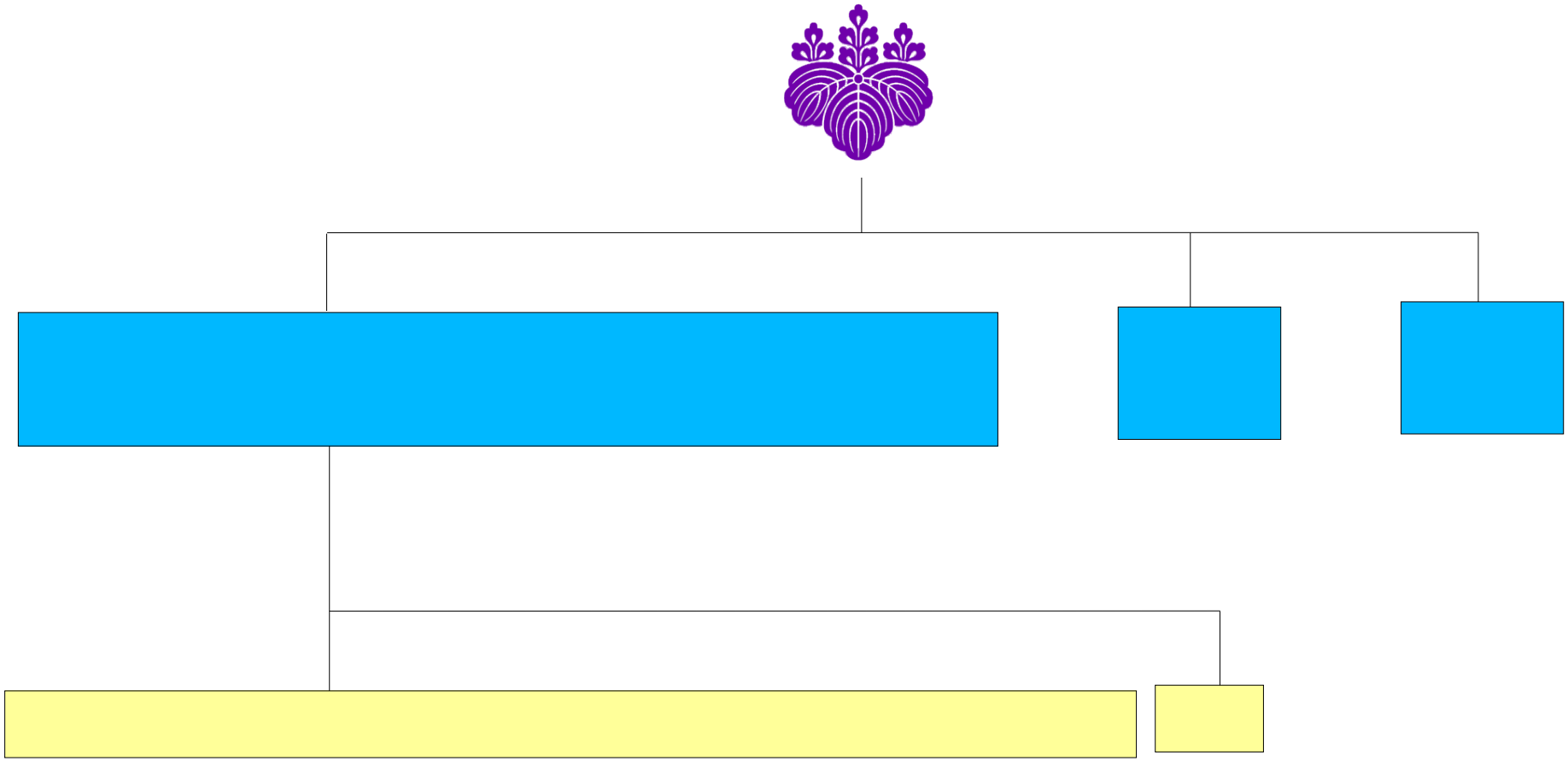
Japan 日本

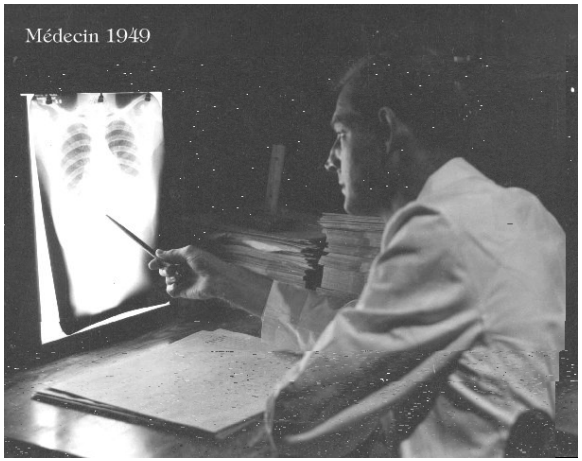
つくば市

筑波大学

University of Tsukuba

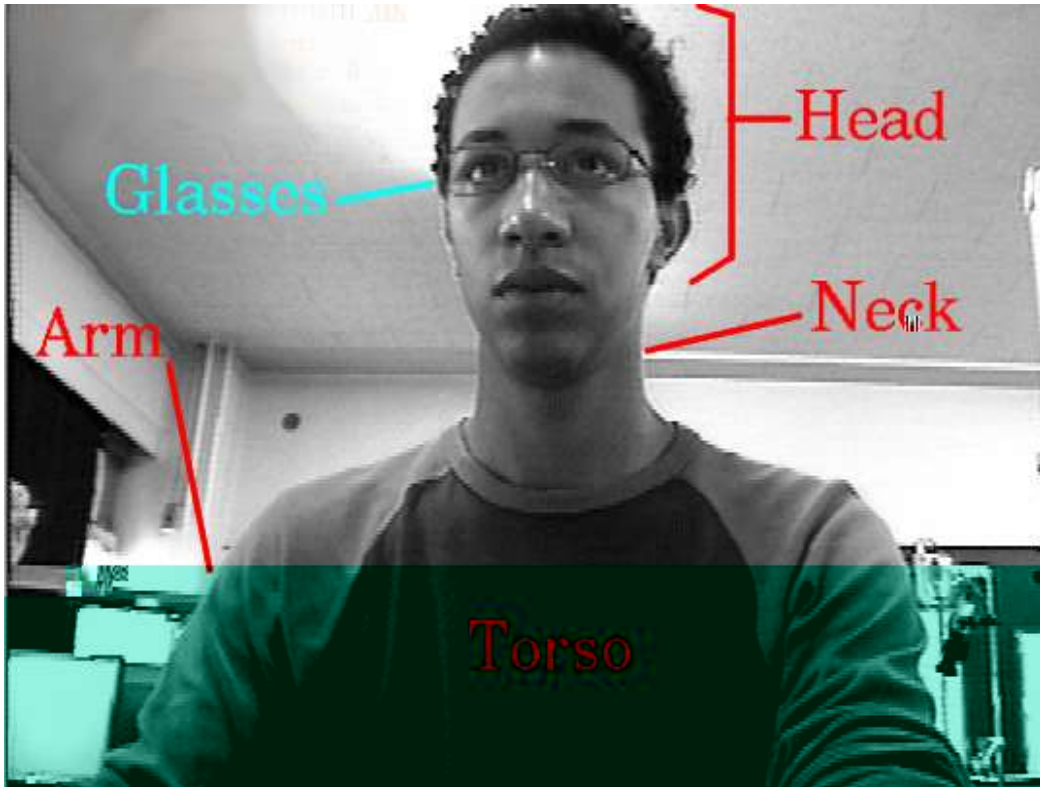
Context of internship



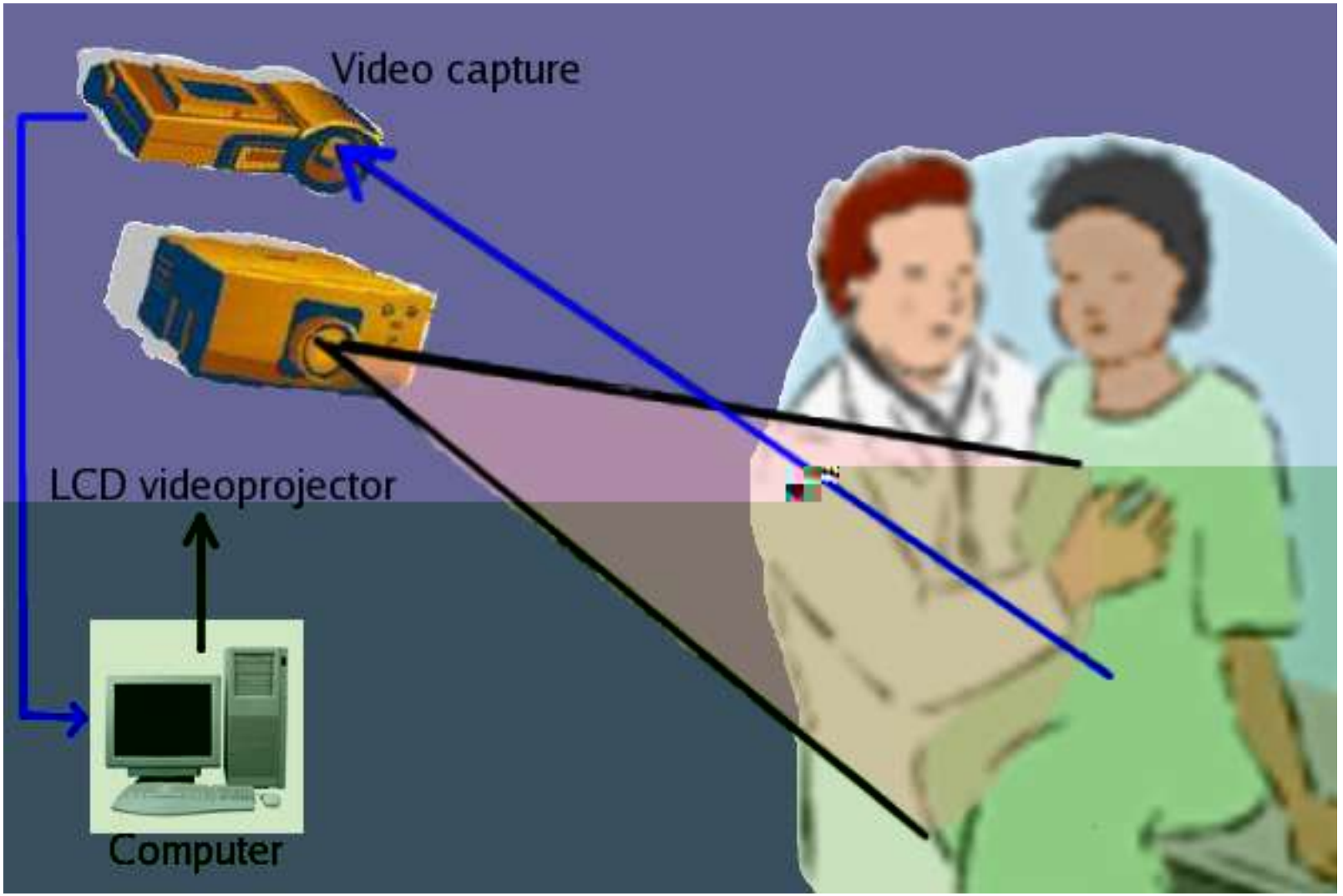

Médecin 1949


Médecin 1949

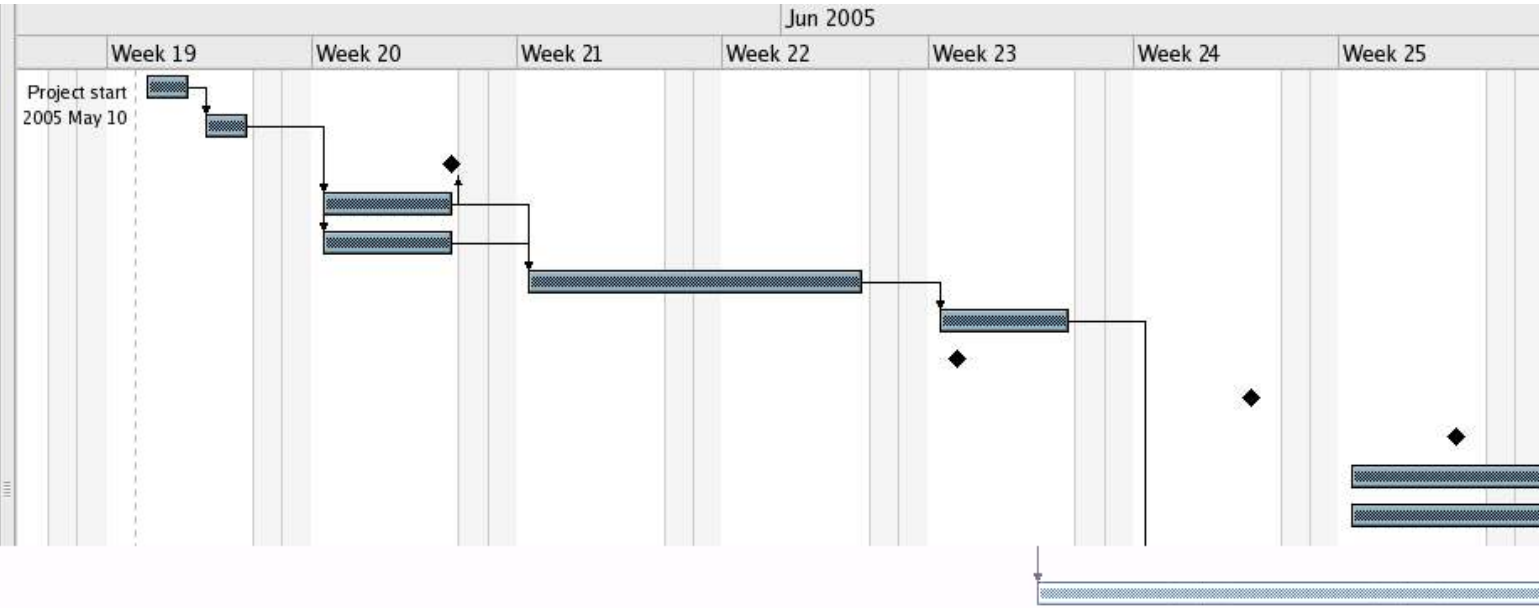

Médecin 1949


Head
Glasses
Neck
Arm
Torso

-
-
-


Video capture
LCD videoprojector
Computer

WBS	Name
1	Arrival
2	Subject Specification
3	Meeting for completion of project agreement
4	Understanding Camera behavior
5	Understanding AR Toolkit and OpenGL
6	Programming Localization of Patient
7	Research the Organ Database
8	Presentation of Research Subject to the Lab
9	CheckPoint with Professor
10	Industrial Virtual Reality Expo
11	Implement use of Thermal detection
12	Writing a paper for ICAT2005
13	Paper submission for ICAT2005
	Organ Overlay
	Back ending of the project
	Report Writting
	Realization of oral presentation
	Seminar
	Oral Presentation for the Lab
	Departure



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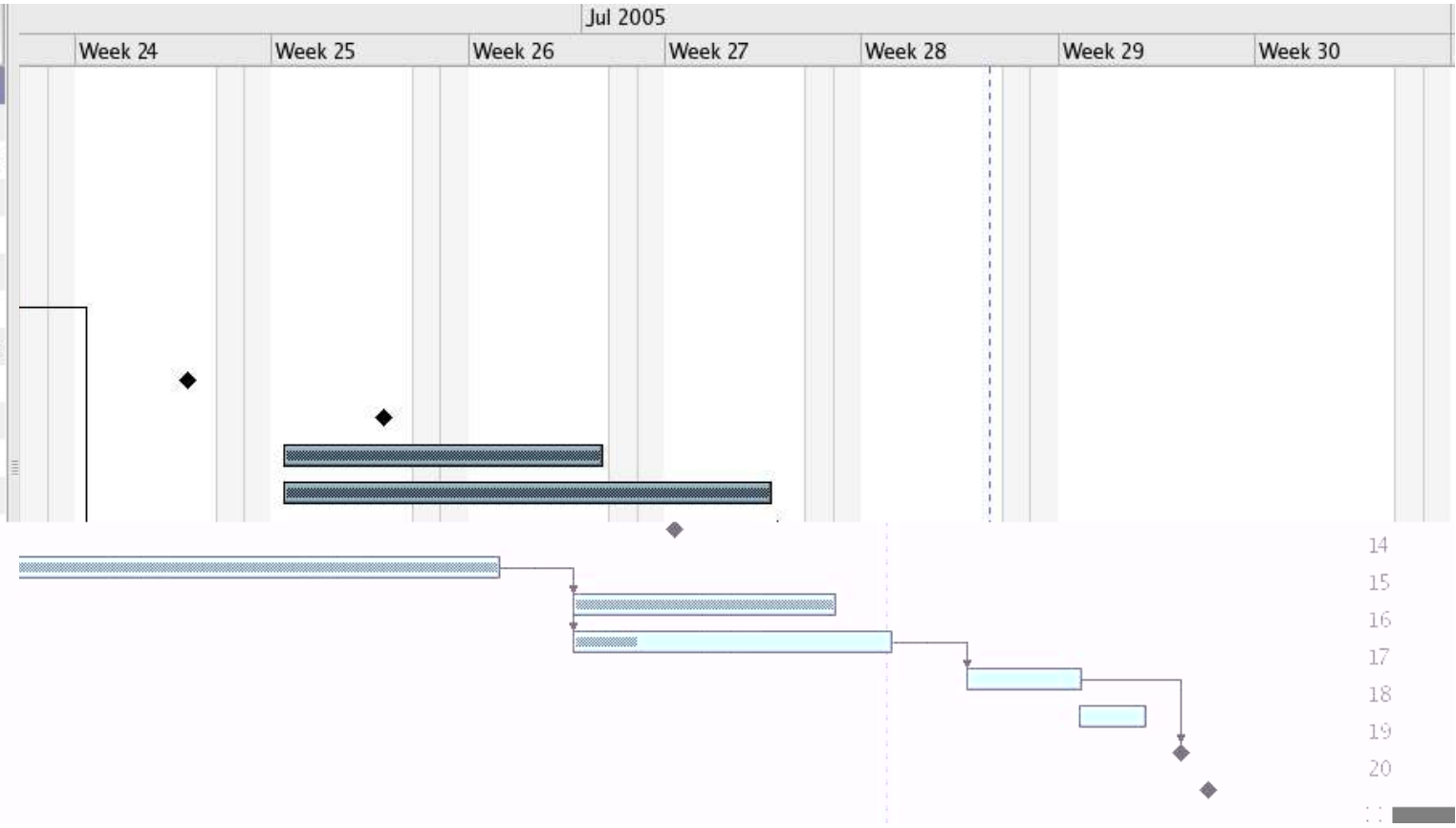
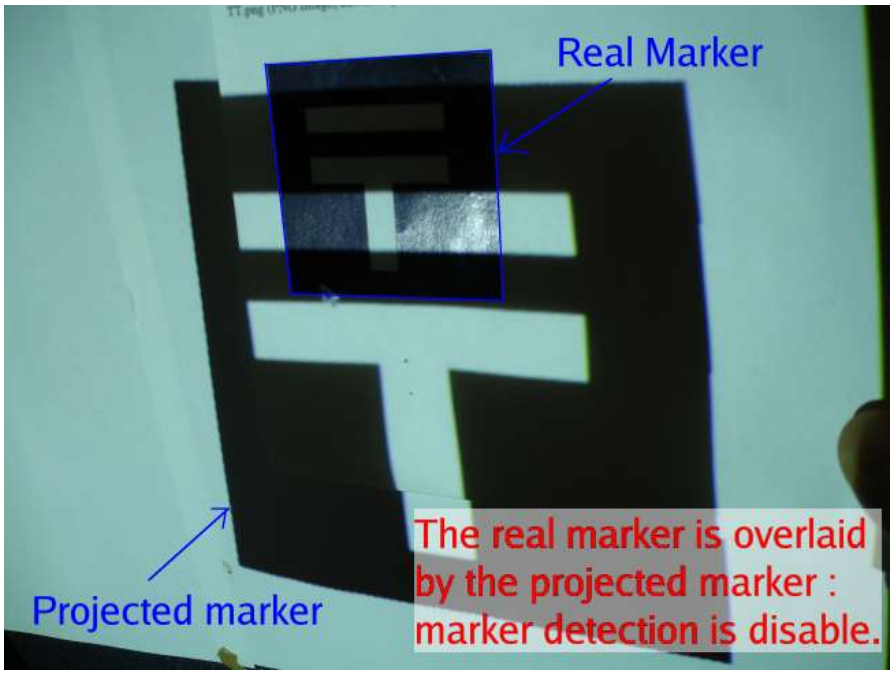
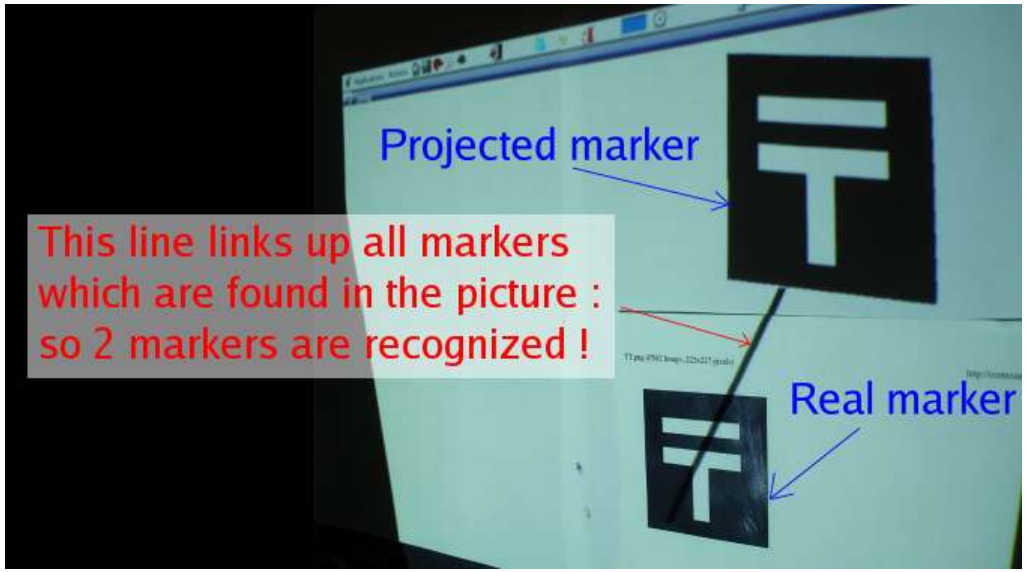


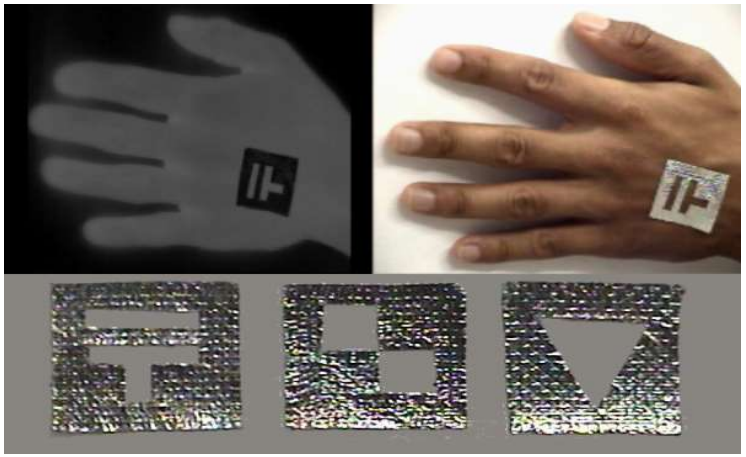

AR Toolkit

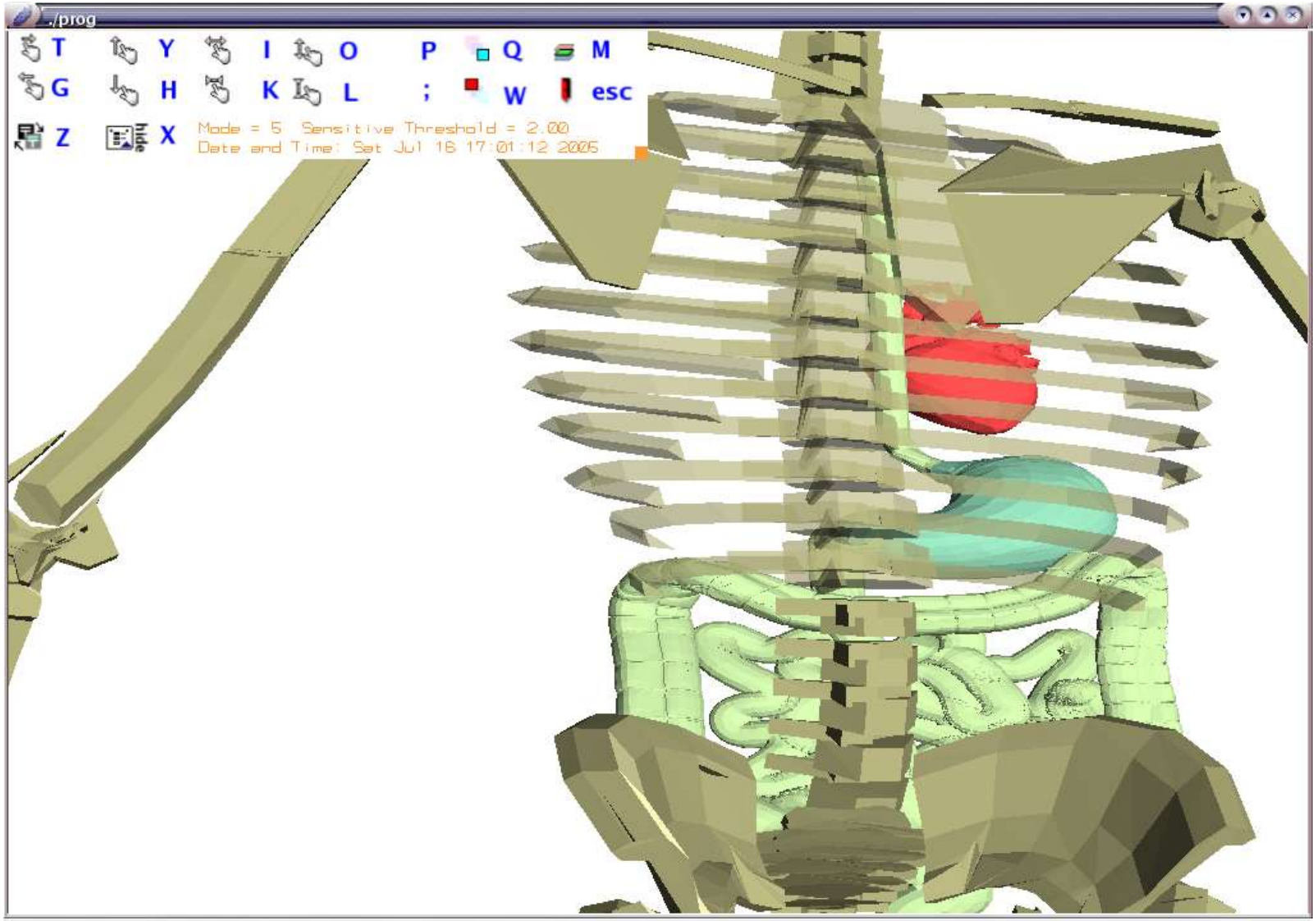
Drawbacks


Real Marker
Projected marker
The real marker is overlaid by the projected marker : marker detection is disable.


Projected marker
This line links up all markers which are found in the picture : so 2 markers are recognized !
Real marker


25mm

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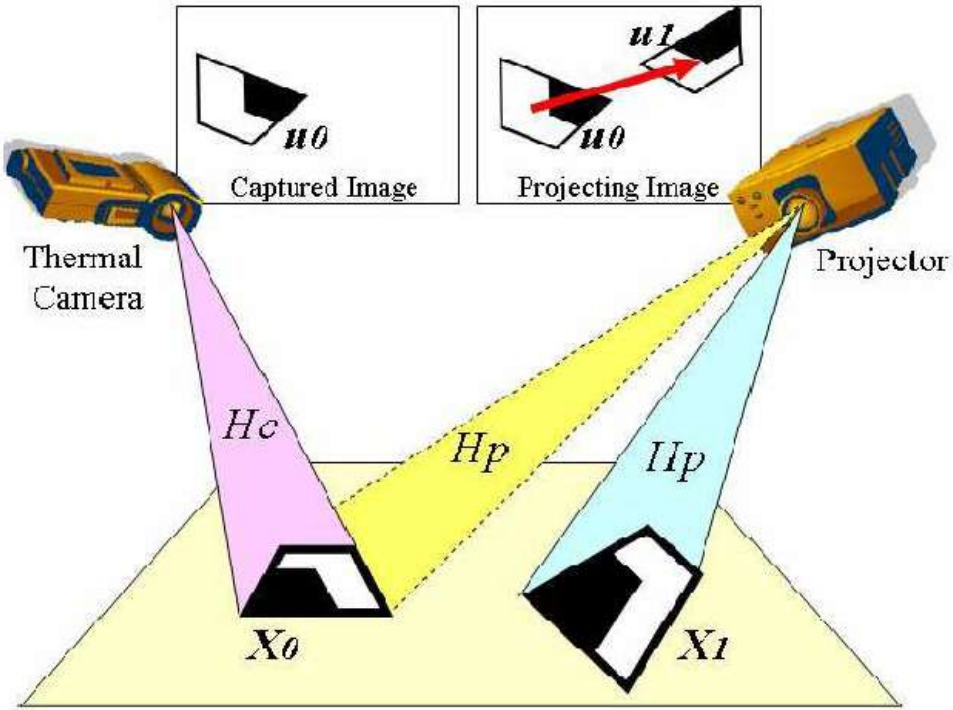
T Y I O P Q M
G H K L ; W esc
Z X
Mode = 5 Sensitive Threshold = 2.00
Date and Time: Sat Jul 16 17:01:12 2005


u1
u0
u0
Captured Image
Projecting Image
Thermal
Camera
Projector
Hc
Hp
IIp
X0
X1


./prog
T Y I O P Q M
G H K L ; W esc
Z X
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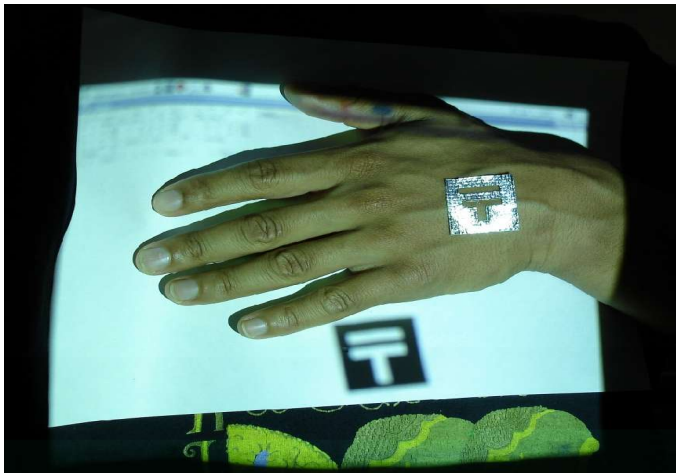

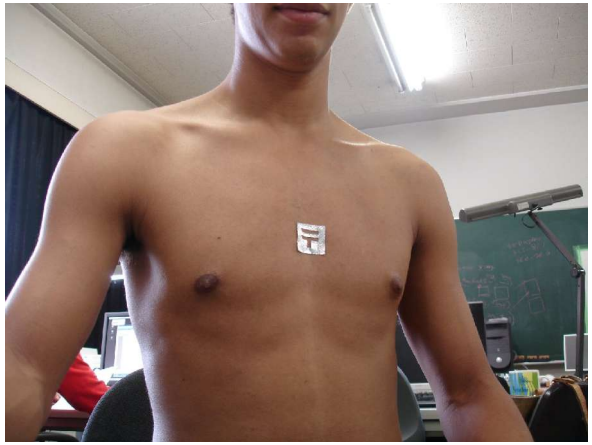

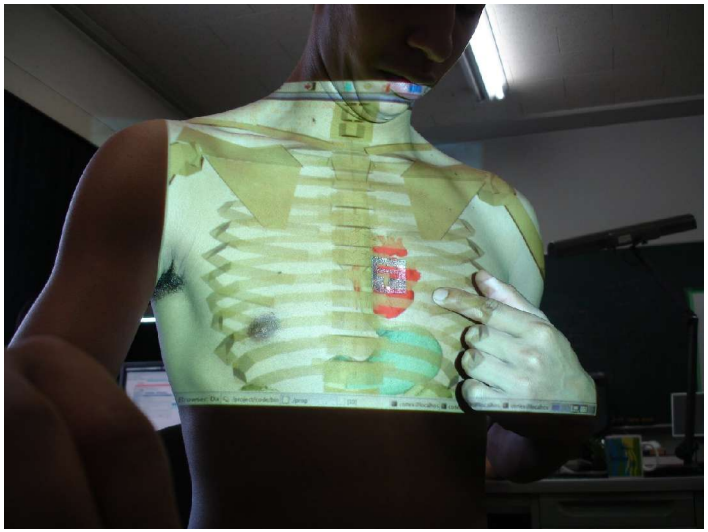

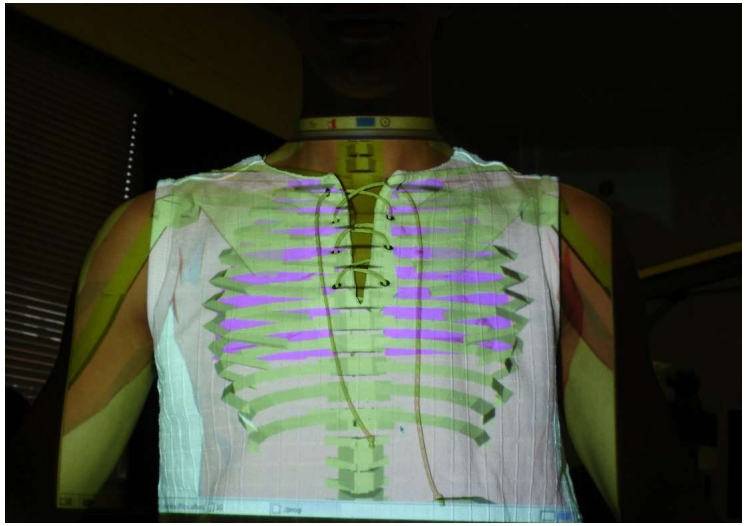

ICAT 2005

See-Through Medical Examination: Visual Support for Medical Consultation by using Projector-Based Augmented Reality and Thermal markers

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Haruo Noma*, Kiyoshi Kogure* and Yuichi Ohta†
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‡ Universite Joseph Fourier, Domaine Universitaire BP 53, Grenoble, 38041, France
* ATR, 2-2-2 Hikaridai, Keihanna Science City, Kyoto, 619-0288, Japan
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Abstract

This paper presents a system that allows patients and physicians to experience better communication during medical consultations using Augmented Reality (AR) technology. This AR system can superimpose augmentations (i.e., human body components) onto the real patient's body. This annotated information would form the cornerstone for collaborative work between the two actors. We focus on the advantages of projector-based technology and the ARToolKit. Our technique, based on thermal markers (i.e., using human body temperature as a source of information) is used for tracking the location of pain in the patient through the projected augmentations. The second aim of using thermal markers is to protect the patient's privacy. The required calibration method between thermal-camera and projector is also presented. The feasibility of the system is demonstrated through development of a complete application.

Key words: Augmented Reality, Medical Consultation, Collaborative Work, Thermal Marker, Health Science

1. Introduction

In medical consultations, communication is one of the most important factors between a doctor and a patient. In the direction from the patient to the doctor, information about the patient's status must be collected as accurately as possible to construct a precise interpretation of it. In the other direction, the patient must be able to receive comprehensible information to give his informed content without any misunderstanding. In both directions, clear communication is essential. A collaborative work exists based on the patient's body (if we disregard psychological consultations).

Two problems need to be solved. The first is: how can the physician bring medical knowledge and his interpretation in a simple way, even if the patient has no anatomical knowledge? The second problem is: how can the patient explain to the doctor the feelings that are difficult to localize and specify? These two main problems are summarized in Fig. 1.

Fig. 1: Difficulty of the communication between patient and doctor

Augmented Reality (AR) has potential to be a convenient tool for human communication that allows the user to see the real world with virtual objects superimposed upon it. AR is based on mixing a live video stream from a camera with computer-generated graphical scene elements [Azu97]. This kind of AR technique is helpful for general medical visualization tasks, mainly in surgical applications [Baj92] [Sta96] [Fuc98] [Gos03], or for training applications [Sie04] [Gos03], however, there does not yet appear to have been approaches proposed that apply collaboration between live video and computer-generated elements. In the fully Virtual Reality world, some experiments have been carried out involving patient and doctor interaction [Joh05], but it is still important to conduct medical examinations on real patients' bodies, because diseased parts will always be with us. On the other hand, if we realized a system that utilizes a patient's body information (e.g., appearance and shape), privacy issues must be carefully considered. People usually do not want to be in hospital, thus they might be quite reluctant to have their personal information taken down without any clear merit.

This paper introduces our trial to provide a prototype system for a see-through medical examination, which is based on AR technology, and that respects patient privacy.

Future of this project ...

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has been accepted

Future of this project ...

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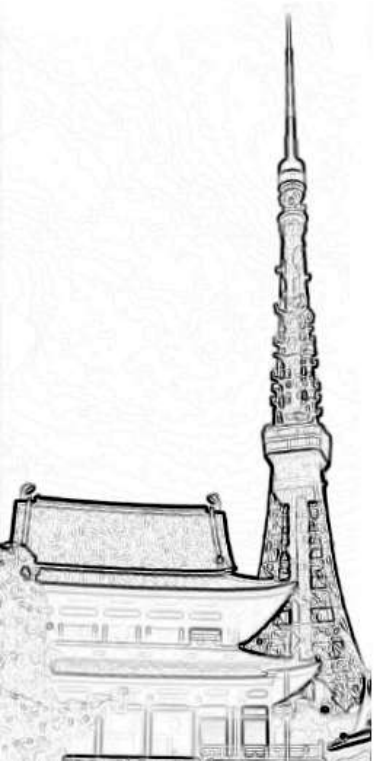

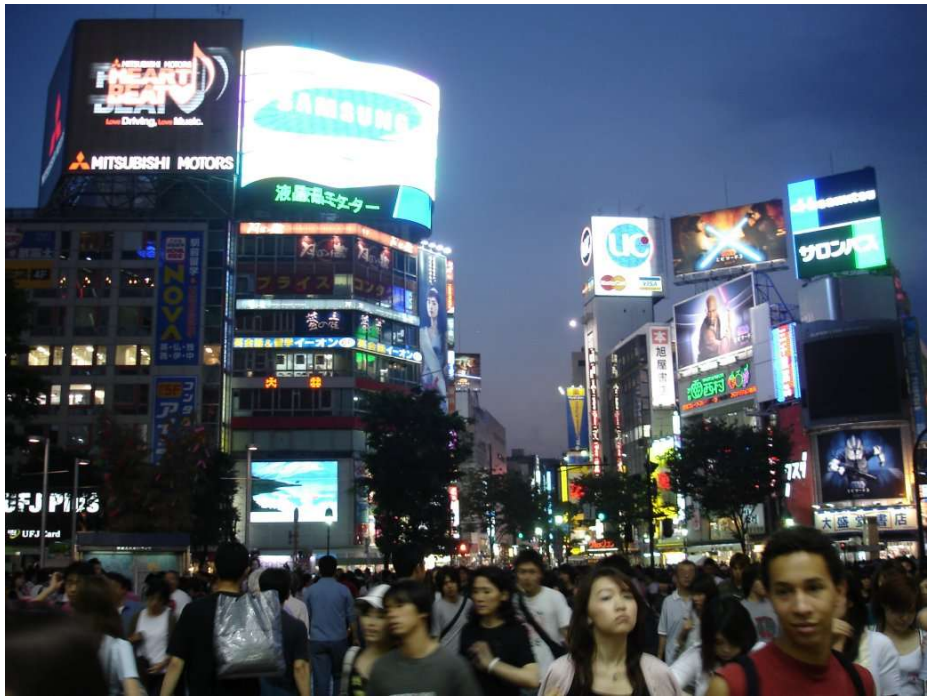
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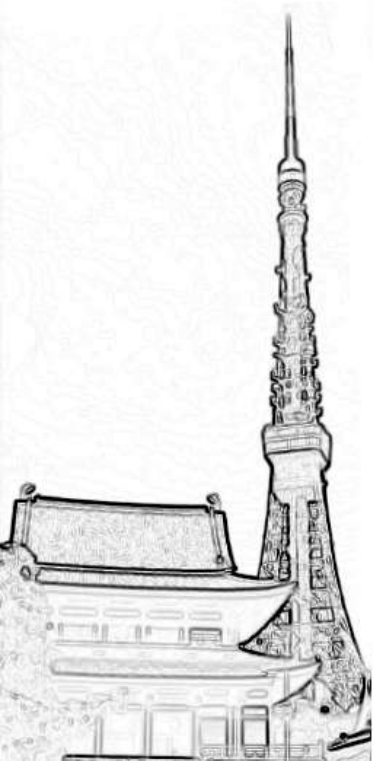

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