# 基于移动医疗的连续断层影像 2D/3D 可视化交互技术研究

## 基础性原型平台演示视频的时间轴说明

**一、高分辨率 2D 医学图像（X 线）的交互演示**

1. Web2D 的笔记本演示（1280 x 800）.mp4

   *Introduction:*

   上传一幅 14.1 MB 的 DICOM 平片至 Web2D 服务器并让其他人无损访问的完整流程

   (1) Upload an original image (preprocessing as URPS) 00:00:01

   (2) Jump to web browser accessing 00:01:03

   i. Adjust the display number of tiles in view area 00:01:10

   ii. Zoom in and out 00:01:25

   iii. Quick positioning via navigation picuture(thumbnail) 00:01:42

   iv. Sliding via mouse event or finger touch 00:01:56

   v. Making annotation 00:02:15

   vi. Browsing annotation 00:02:49

   vii. Online chat 00:03:25

   viii. Window-level rescale 00:03:50

2. Web2D 的 iPad 演示（1024 x 768）.mp4

   i. Adjust the display number of tiles in view area 00:00:01

   ii. Zoom in and out 00:00:20

   iii. Quik positioning via navigation picuture(thumbnail) 00:00:29

   iv. Sliding via mouse event or finger touch 00:00:38

   v. Making annotation 00:00:55

   vi. Browsing annotation 00:01:35

   vii. Window-level rescale 00:01:49

3. Web2D 的电子白板演示（PC 电脑、笔记本、iPad 同步）.mp4

   i. PC: adjust the display number of tiles in view area 00:00:01

   ii. PC: zoom in and out 00:00:15

   iii. PC: quik positioning via navigation picuture(thumbnail) 00:00:24

   iv. PC: sliding via mouse event or finger touch 00:00:36

   v. PC: making annotation 00:00:46

   vi. PC & laptop: online chat 00:01:12

   vii. laptop: quik positioning, making annotation and browsing annotation 00:01:42

   viii. IPad: quik positioning and sliding, etc. 00:02:06

   ix. IPad: making annotation . 00:02:27

   x. IPad: browsing annotation, etc. 00:02:40

   xi. PC: removing annotation 00:02:52

**二、连续断层医学图像 3D 可视化的"主从"交互演示**

4. Web3D 的笔记本演示（完整操作流程）.mp4

*Introduction:*

*by Chrome 43 web browser with mouse-based interaction*

*Slave model: skeleton*

(1) First loading

| | | |
|---|---|---|
| i. | choose a group of SMIs | 00:00:01 |
| ii. | wait server loading SMIs in memory | 00:00:04 |
| iii. | enter 3D visualization task | 00:00:19 |

(2) Interactive behavior

| | | |
|---|---|---|
| i. | rotate, flip, zoom | 00:00:24 |
| ii. | clipping, etc | 00:00:53 |
| iii. | customized color and opacity | 00:01:05 |
| iv. | panning, etc | 00:01:29 |

5. Web3D 的笔记本演示（通过 email 邀请）.mp4

*Introduction:*

*by Firefox 46 web browser with mouse-based interaction*

*Slave model: skin*

| | | |
|---|---|---|
| i. | Receive an email of invitation of case discussion | 00:00:01 |
| ii. | Link to 3D visualization task | 00:00:06 |
| iii. | Rotate and flip | 00:00:14 |
| iv. | Zoom in and out | 00:00:38 |
| v. | Clipping, etc | 00:00:45 |
| vi. | Customized color and opacity | 00:01:10 |
| vii. | Zoom in and panning | 00:01:20 |
| viii. | Customized color and opacity (second time) | 00:01:41 |
| ix. | Repeat interactive behaviors: rotate, flip, zoom, clipping, etc | 00:02:10 |

6. Web3D 的 iPad 演示（完整操作流程）.mp4

*Introduction:*

*by Safari web browser with gesture-based interaction*

*Slave model: skeleton*

(1) First loading

| | | |
|---|---|---|
| i. | choose a group of SMIs | 00:00:01 |
| ii. | wait server loading SMIs in memory | 00:00:09 |
| iii. | enter 3D visualization task | 00:00:24 |

(2) Interactive behavior

| | | |
|---|---|---|
| i. | rotate, flip, zoom | 00:00:31 |
| ii. | clipping, etc | 00:00:47 |
| iii. | customized color and opacity | 00:01:02 |
| iv. | zoom in and panning, etc | 00:01:11 |
| v. | zoom out, panning, and cancel clipping, etc | 00:01:41 |
| vi. | Repeat interactive behaviors: rotate, flip, zoom, etc | 00:02:09 |

**三、连续断层医学图像 3D 可视化的"主从"及“一令一动”交互、注释、同步交流综合应用演示**

7. Web3D 的 PC 电脑演示（含同步交流、注释、“主从”以及“一令一动”交互）.mp4

*Introduction:*

*by Chrome 43 web browser with mouse-based interaction*

*“从”模型: 骨架*

（模拟用户 A 通过一封求助邮件的链接开始与 B 的同步交流的场景）

| | | |
|---|---|---|
| i. | 通过邮件链接受邀讨论 | 00:00:00 |
| ii. | 自由视角变换（一令一动） | 00:00:04 |
| iii. | 缩放、自由交互 | 00:00:12 |
| iv. | 信息注释 | 00:00:25 |
| v. | 在线交流 | 00:00:32 |
| vi. | 来自客户端 B 的同步浏览 | 00:00:45 |
| vii. | 利用“从”模型快速导航交互与交流 | 00:00:55 |
| viii. | 在线交流 | 00:01:17 |

**四、连续断层医学图像 VR、MPR、MIP 重建交互效果演示**

8. H5 网页演示：通过 HTML5 网页在 80KBps 带宽下的无损交互.mp4

*Introduction:*

*by Edge web browser with mouse-based interaction*

*“从”模型: 骨架*

| | | |
|---|---|---|
| i. | 通过从模型交互 | 00:00:00 |
| ii. | 交互效果呈现 | 00:00:02 |
| iii. | 解剖操作 | 00:00:05 |
| iv. | 设置 VR 重建的映射函数（调窗） | 00:00:11 |
| v. | MPR 重建 | 00:00:20 |
| vi. | MIP 重建 | 00:00:30 |
| vii. | 利用“从”模型变换 MIP 重建位置 | 00:00:38 |

9. C/S 版演示：基于窗体版在 80KBps 带宽下的无损交互.mp4

*Introduction:*

*by Client side with mouse-based interaction*

*“从”模型: 轻量化断层影像*

| | | |
|---|---|---|
| i. | 输入共享影像的序号 | 00:00:13 |
| ii. | 通过“从”模型交互（MPR 为例） | 00:00:21 |
| iii. | 基于“从”模型交互后的结果呈现（MPR 为例） | 00:00:28 |
| iv. | 调窗 | 00:00:41 |
| v. | 通过“从”模型交互（MIP 重建设置） | 00:00:56 |
| vi. | 基于“从”模型交互后的结果呈现（MIP 为例） | 00:01:07 |
| vii. | 调窗及尺寸测量 | 00:01:28 |