Course overview

Digital Visual Effects

Yung-Yu Chuang

Logistics

DigiVFX

- **Meeting time:** 2:20pm-5:20pm, Thursday
- **Classroom:** CSIE Room 104
- **Instructor:** Yung-Yu Chuang (cyy@csie.ntu.edu.tw)
- **Teaching assistants**: 張明旭
- **Textbook:** Readings from books, journals and proceedings. Richard Szeliski's Computer Vision: Algorithms and Applications.
- .**Webpage**: (user name/password) http://www.csie.ntu.edu.tw/~cyy/vfx
- **Mailing list**: vfx@cmlab.csie.ntu.edu.tw subscribe via https://cmlmail.csie.ntu.edu.tw/mailman/listinfo/vfx/

This course is NOT about …

It isn’t about photography

It isn’t about 3D animations

DigiVFX

It isn’t about watching movies

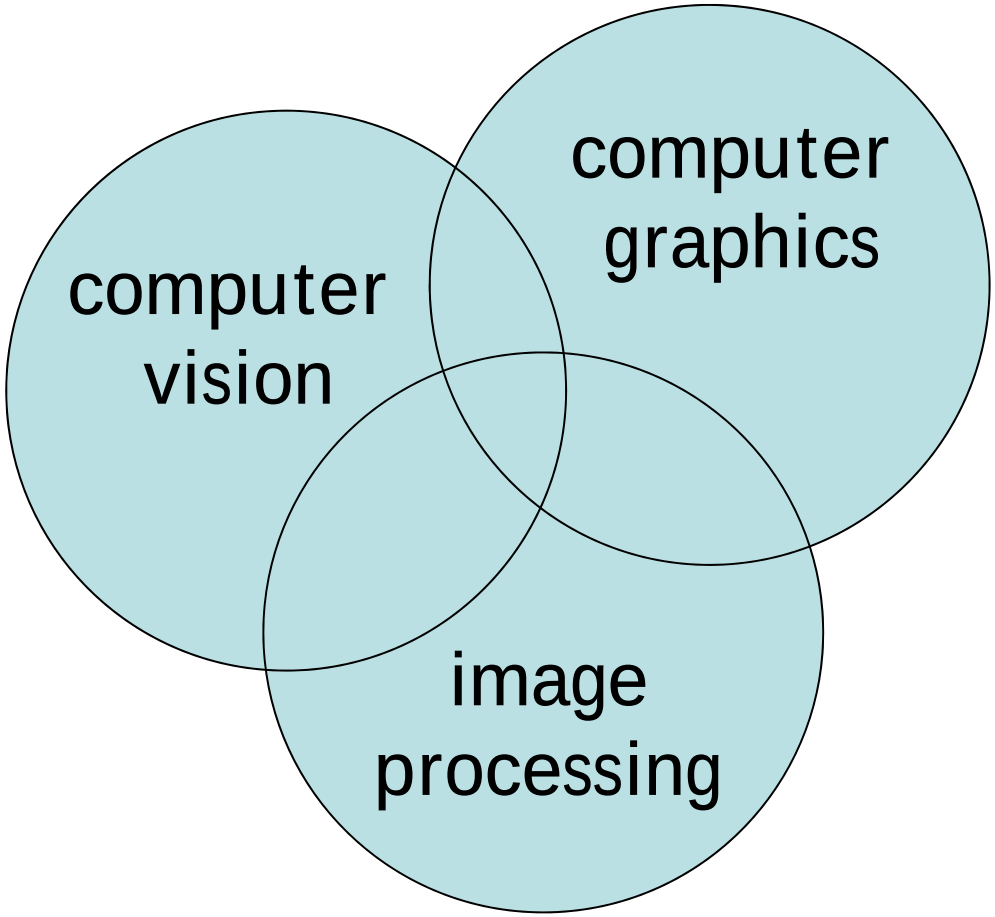
DigiVFX

It isn’t about physical effects

It's not about industrial tricks

DigiVFX

You will learn more about Taylor and Poisson than Lucas and Spielberg in this course. If you hear Lucas in the class, it is more likely to refer to Bruce Lucas, not George Lucas.



Prerequisites

DigiVFX

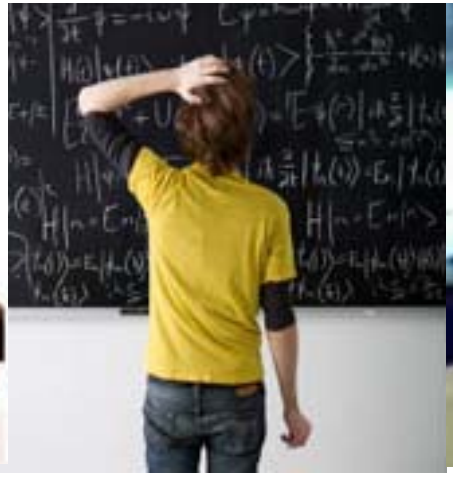
- It is a *must* that you have programming experiences.
- It is a *must* that you have basic knowledge on linear algebra and probability.
- It is a *plus* if you have background knowledge on computer vision, image processing and computer graphics.
- It is a *plus* if you have access to digital cameras and camcorders.

The vfx course

what other professors think you do

what other students think you do

what you thought you will do



what you actually do

Warning from previous students

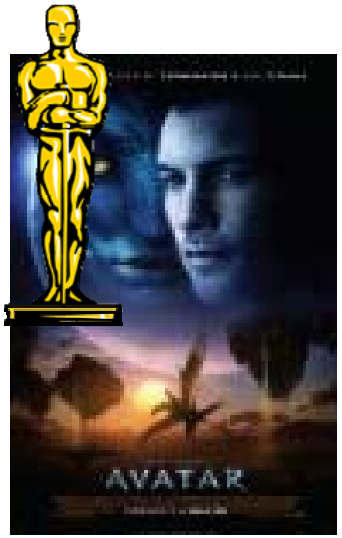
DigiVFX

- 請學期初老師要多提醒這門課的困難度請興趣或實力不足的同學勿修，否則就會像我一樣停修 XD

This course is about …

Digital Visual Effects

DigiVFX



2011

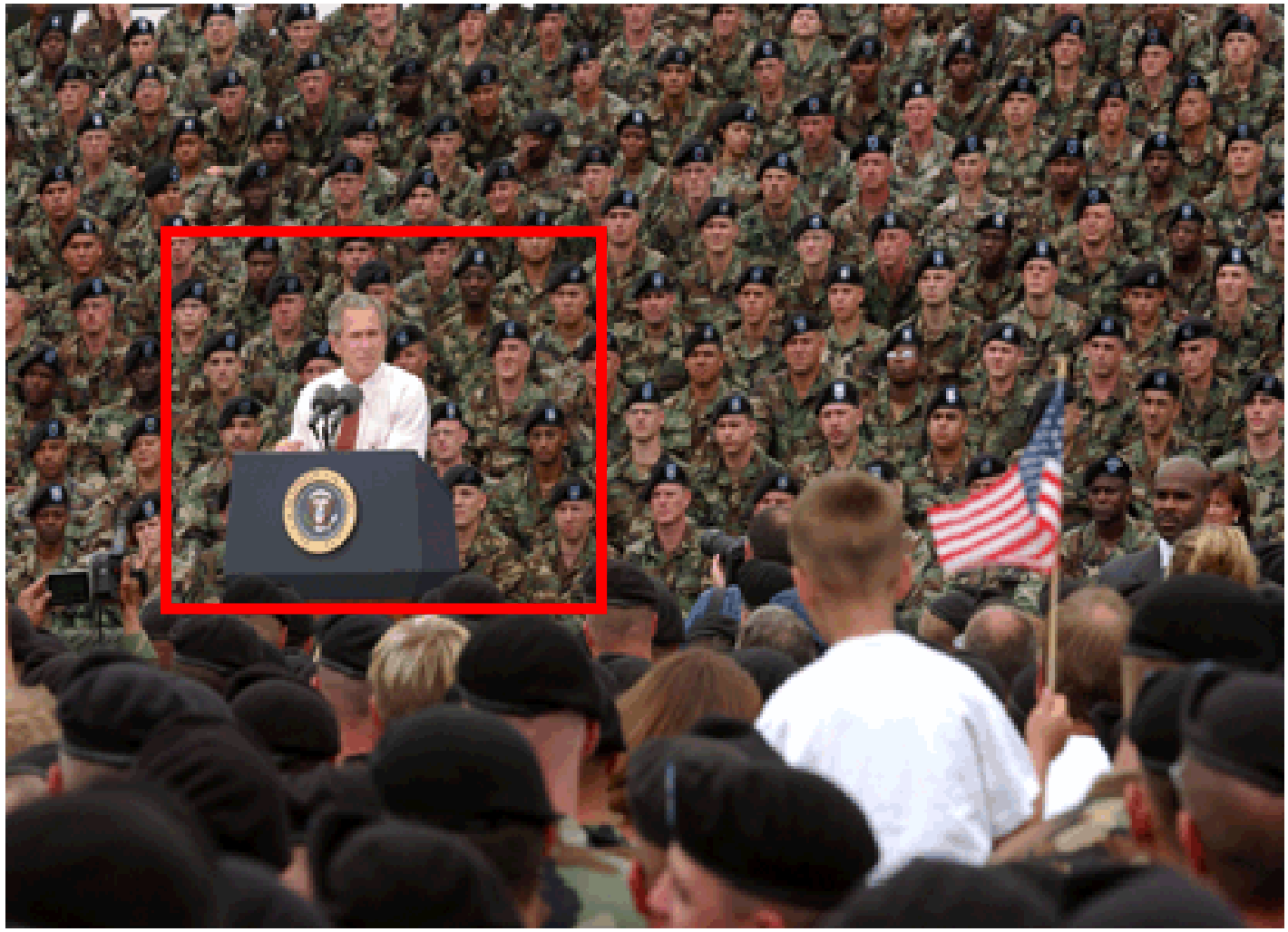
2011

Reality?

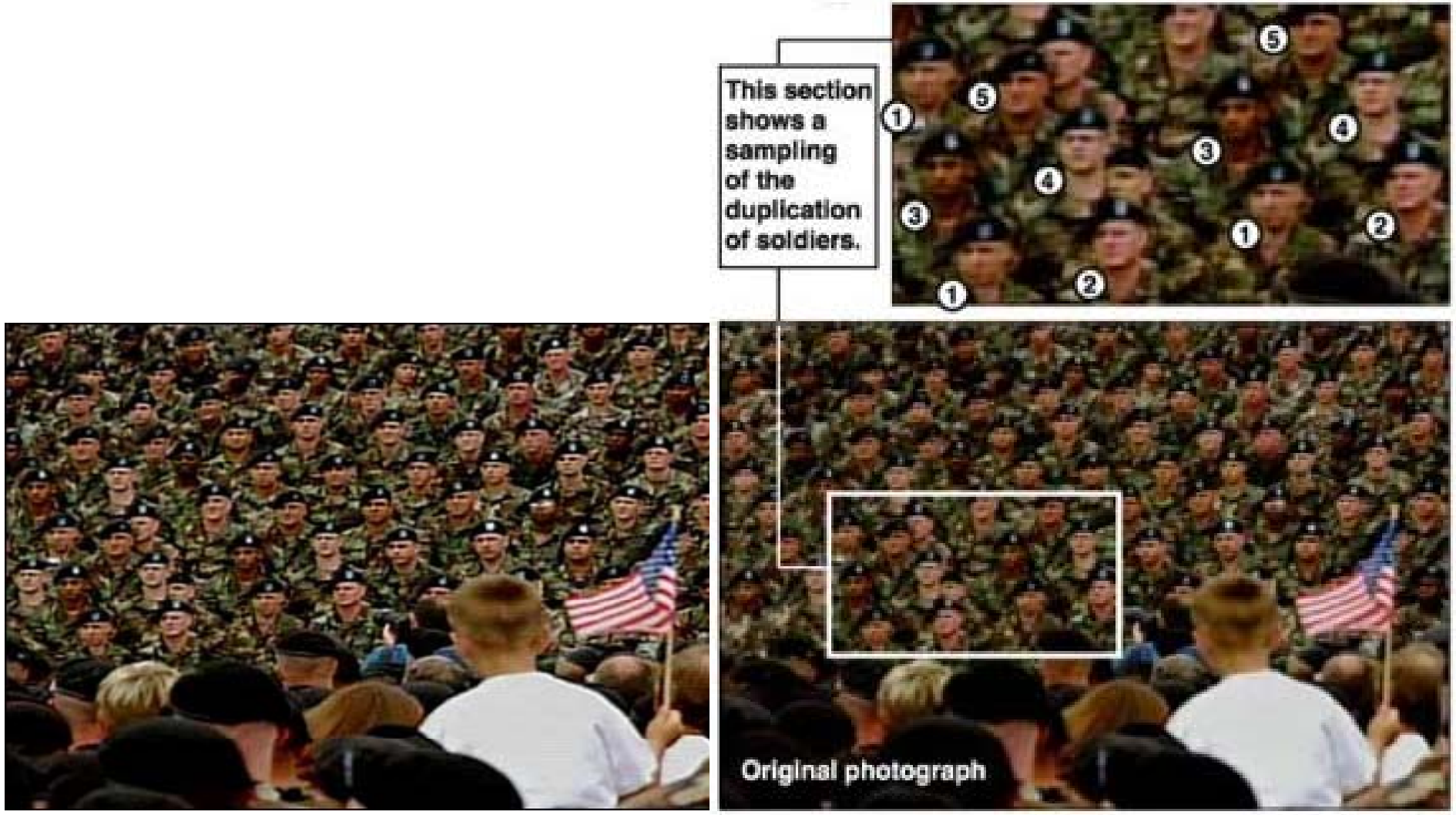
Retouching

Iraq War, LA Times, April 2003

Bush campaign's TV AD, 2004



Texture synthesis and inpainting



Domestic example

The Liberty Times
2007.12.17

Special effects

Stop action

The execution of Mary, 1895

Glass shot

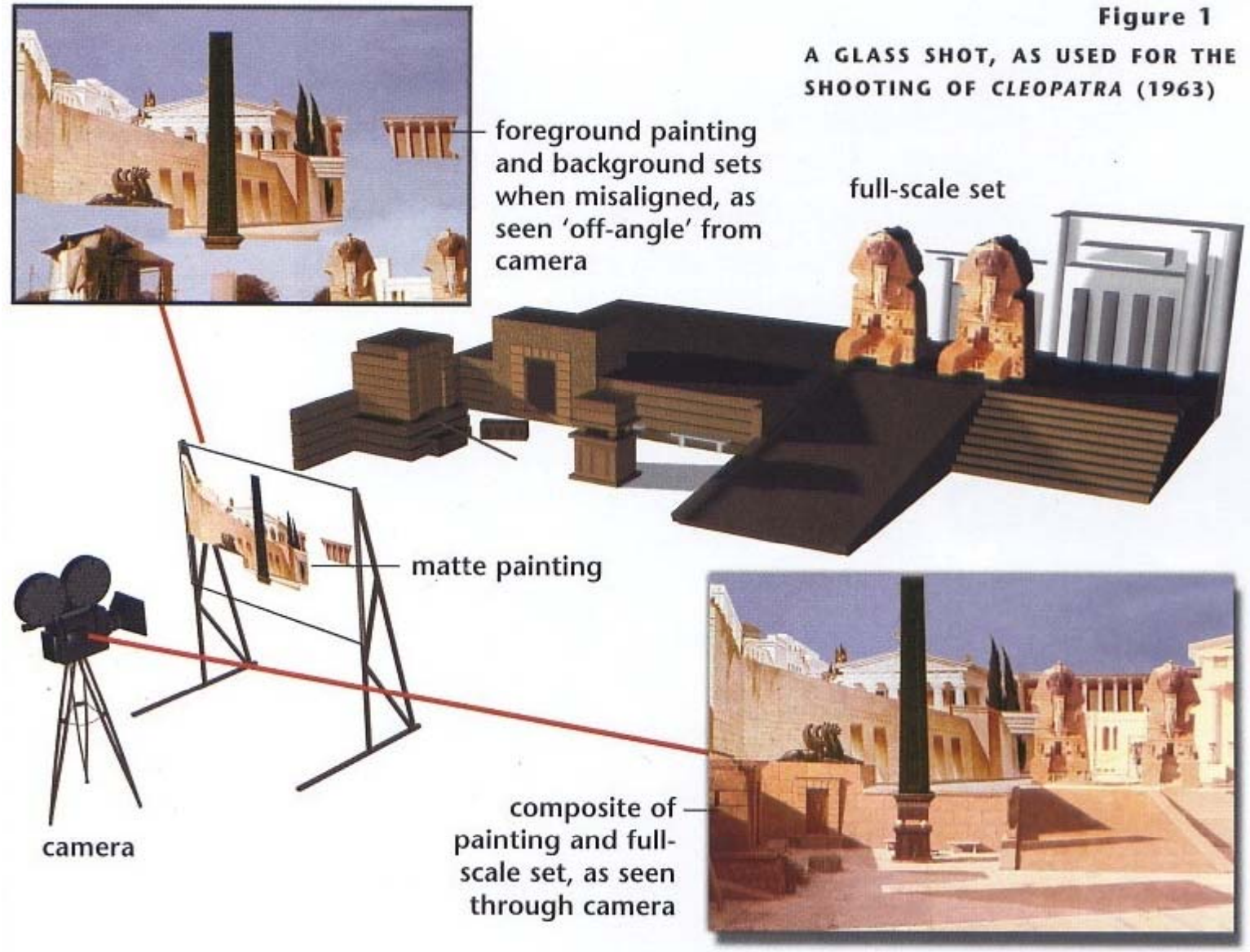
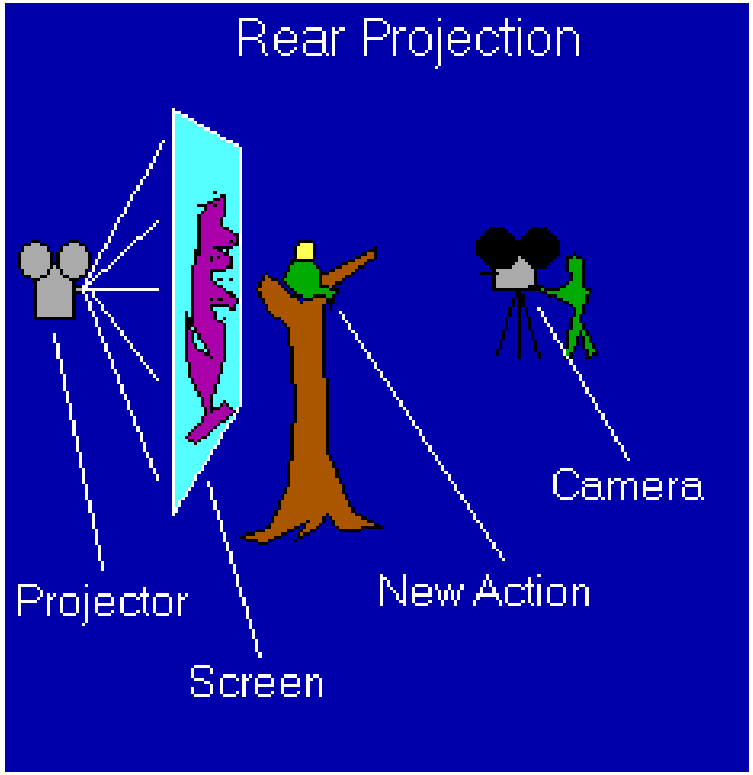


Figure 1
A GLASS SHOT, AS USED FOR THE SHOOTING OF CLEOPATRA (1963)
foreground painting and background sets when misaligned, as seen 'off-angle' from camera
full-scale set
matte painting
camera
composite of painting and full-scale set, as seen through camera

Rear projection



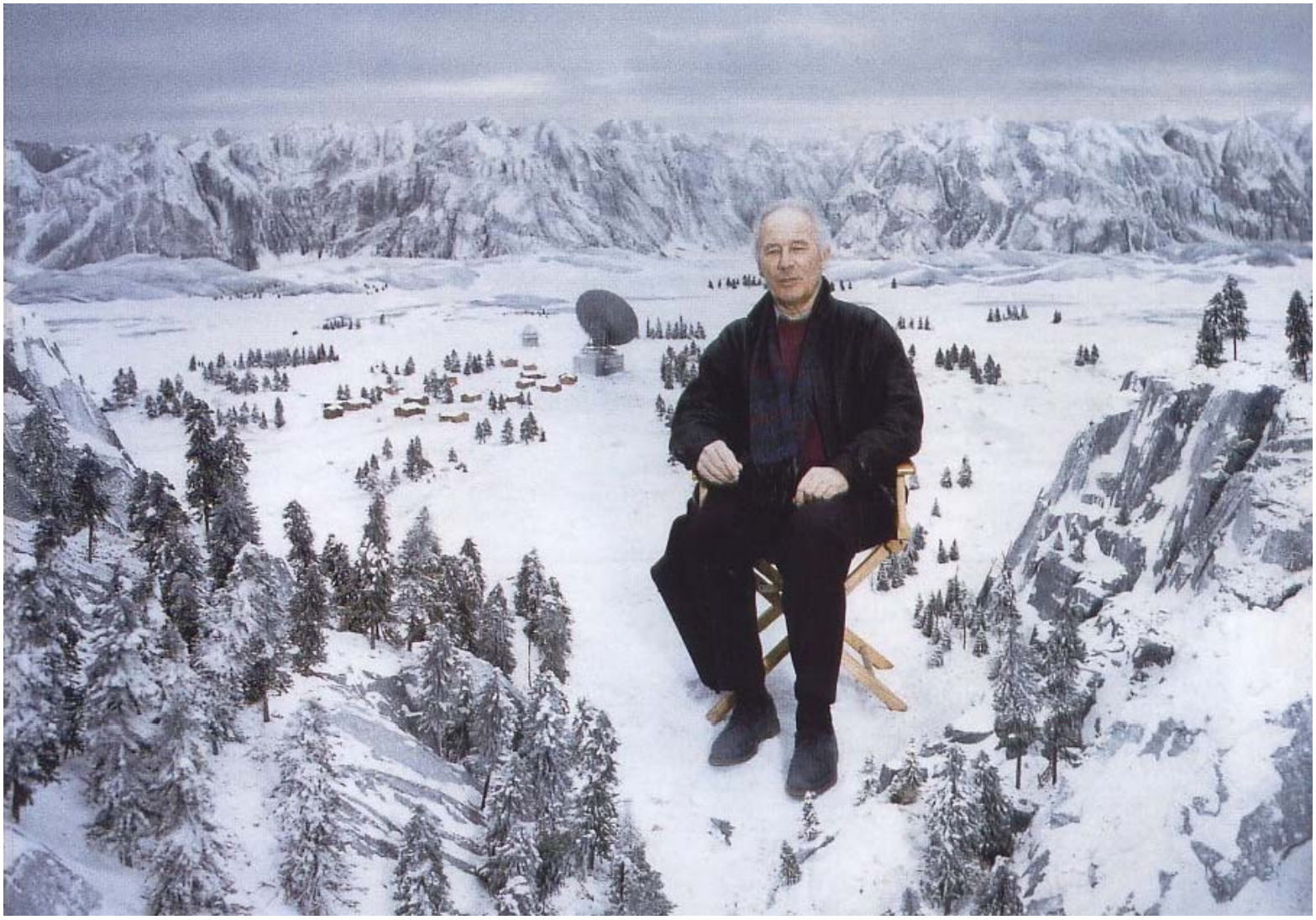
King Kong, 1933

Special effects (make-up)

DigiVFX

Special effects (physical effects)

Special effects (miniature)



Special effects (matte painting)

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Lord of the Rings

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Illusion - forced perspective

Computer-generated model

Visual effects 100 Years

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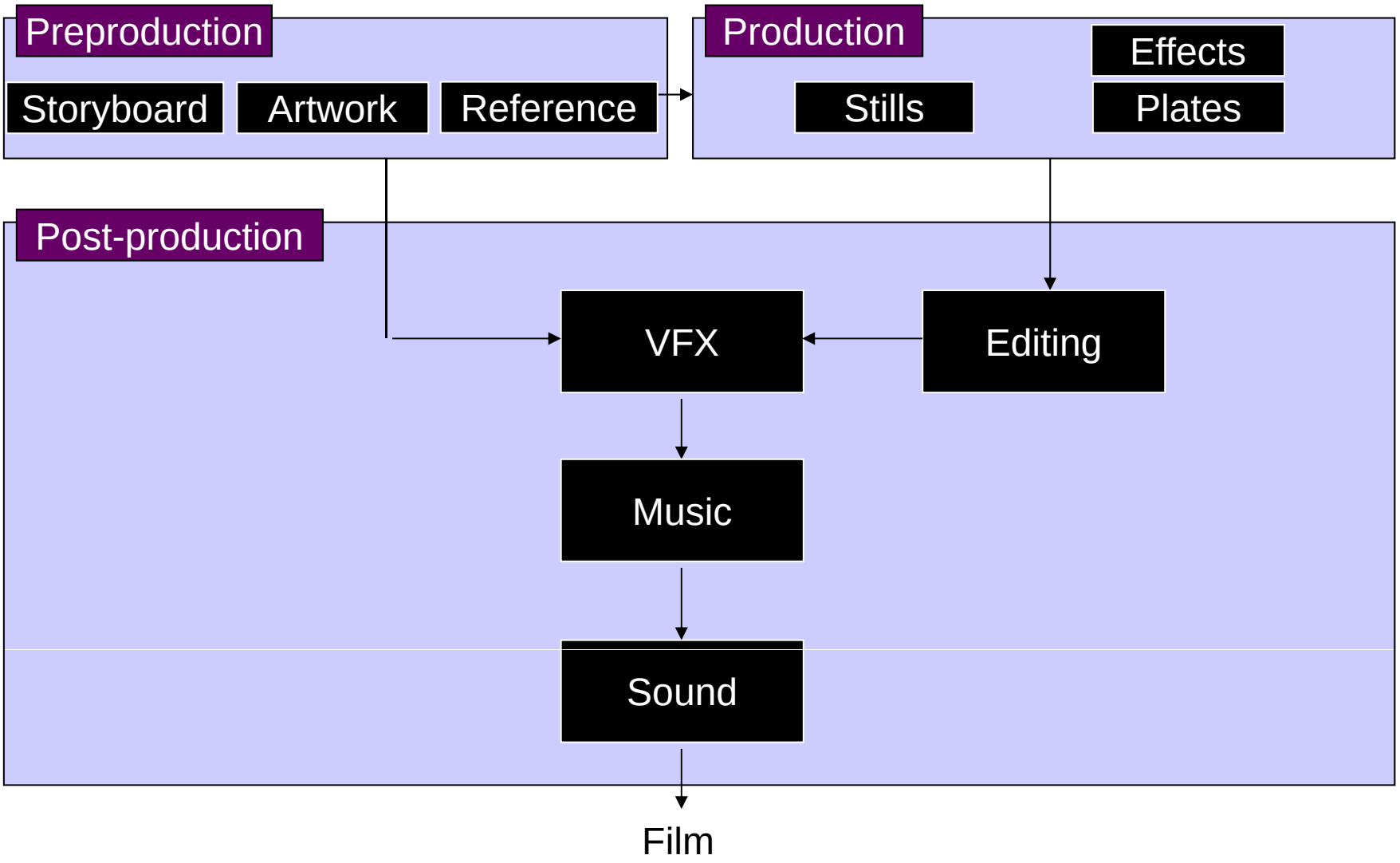
Production pipeline

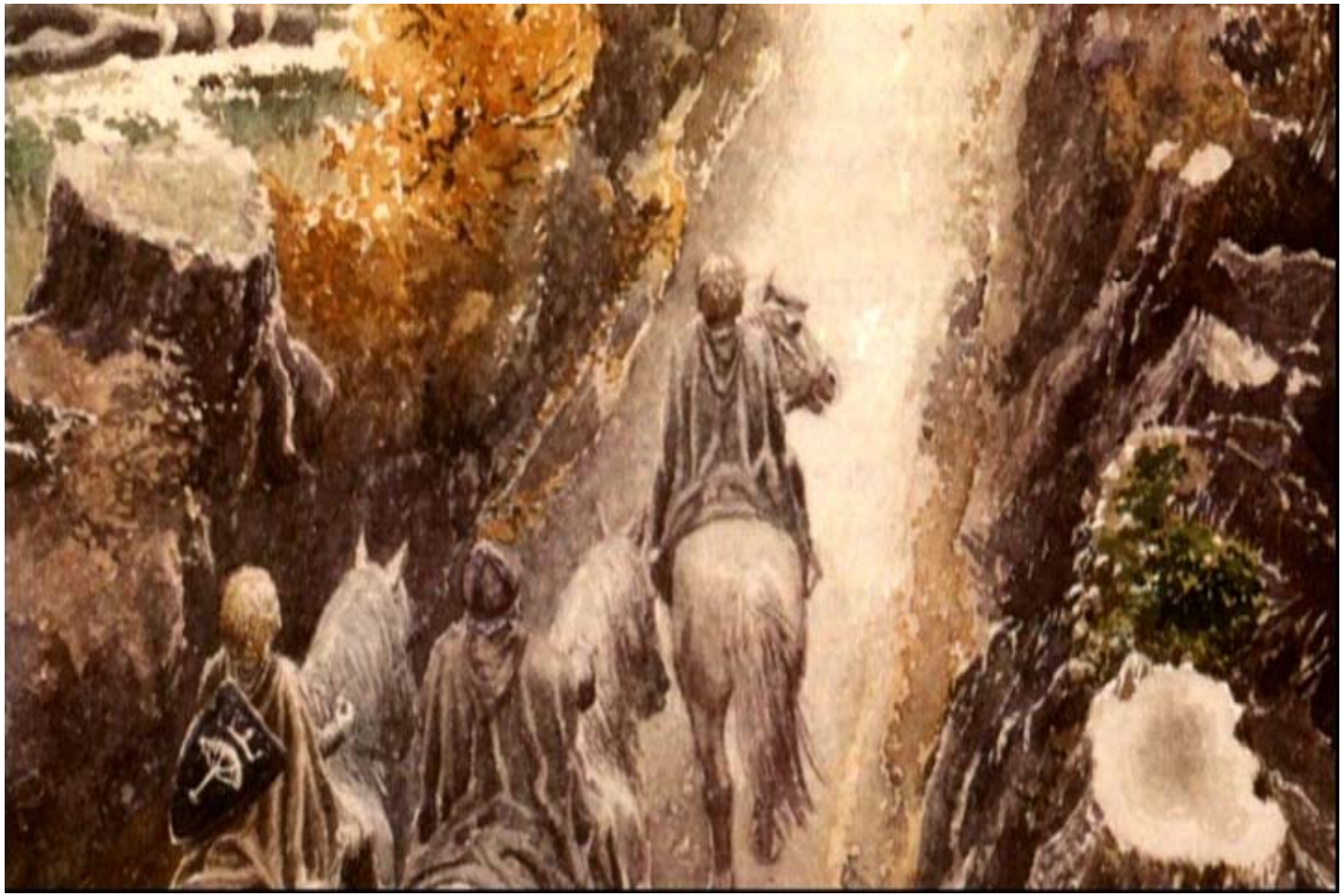
Production pipeline



Preproduction

Storyboard

Preproduction



Artwork

Preproduction

Reference & Research

Production

Shooting

Post-production

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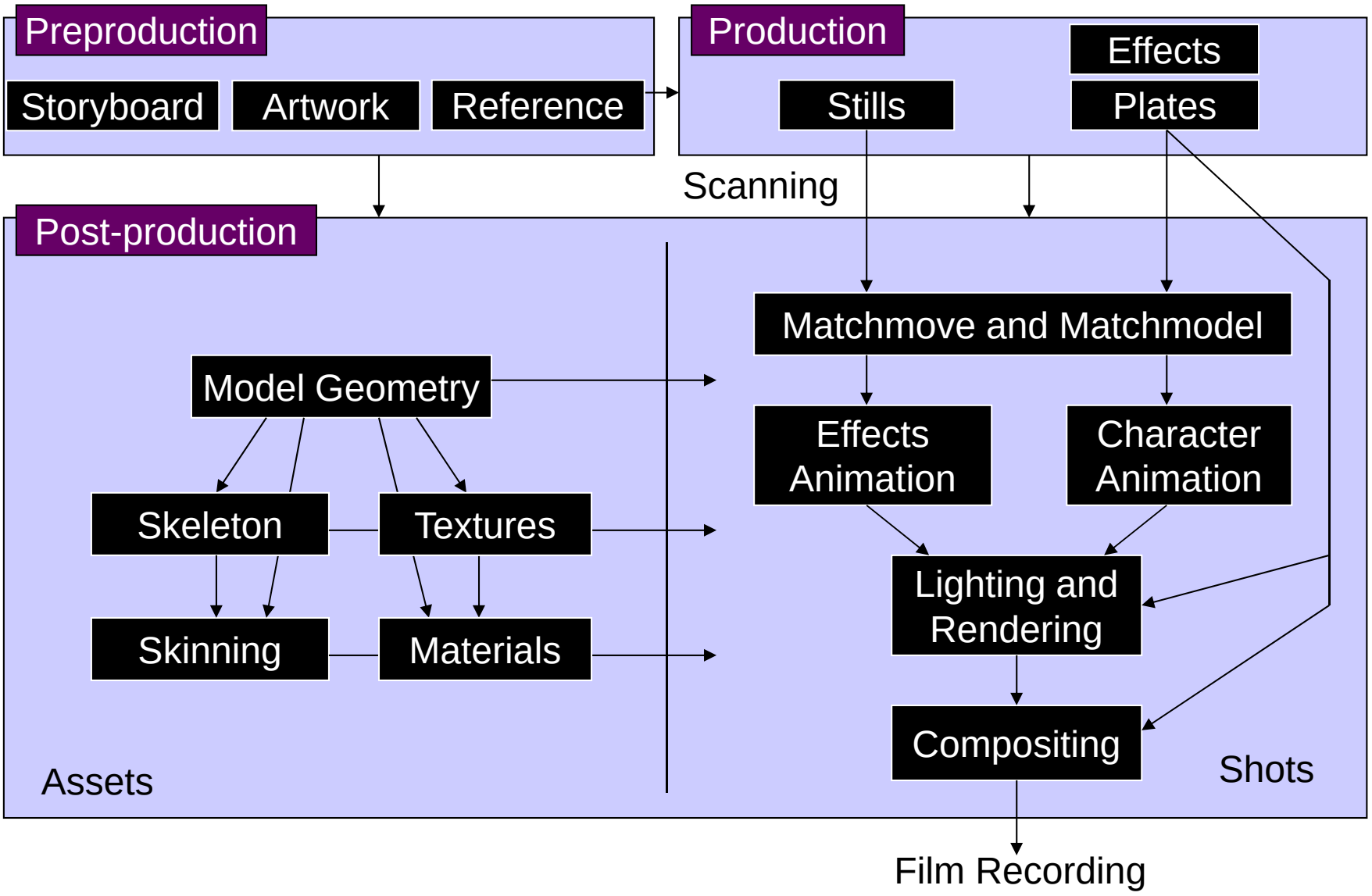
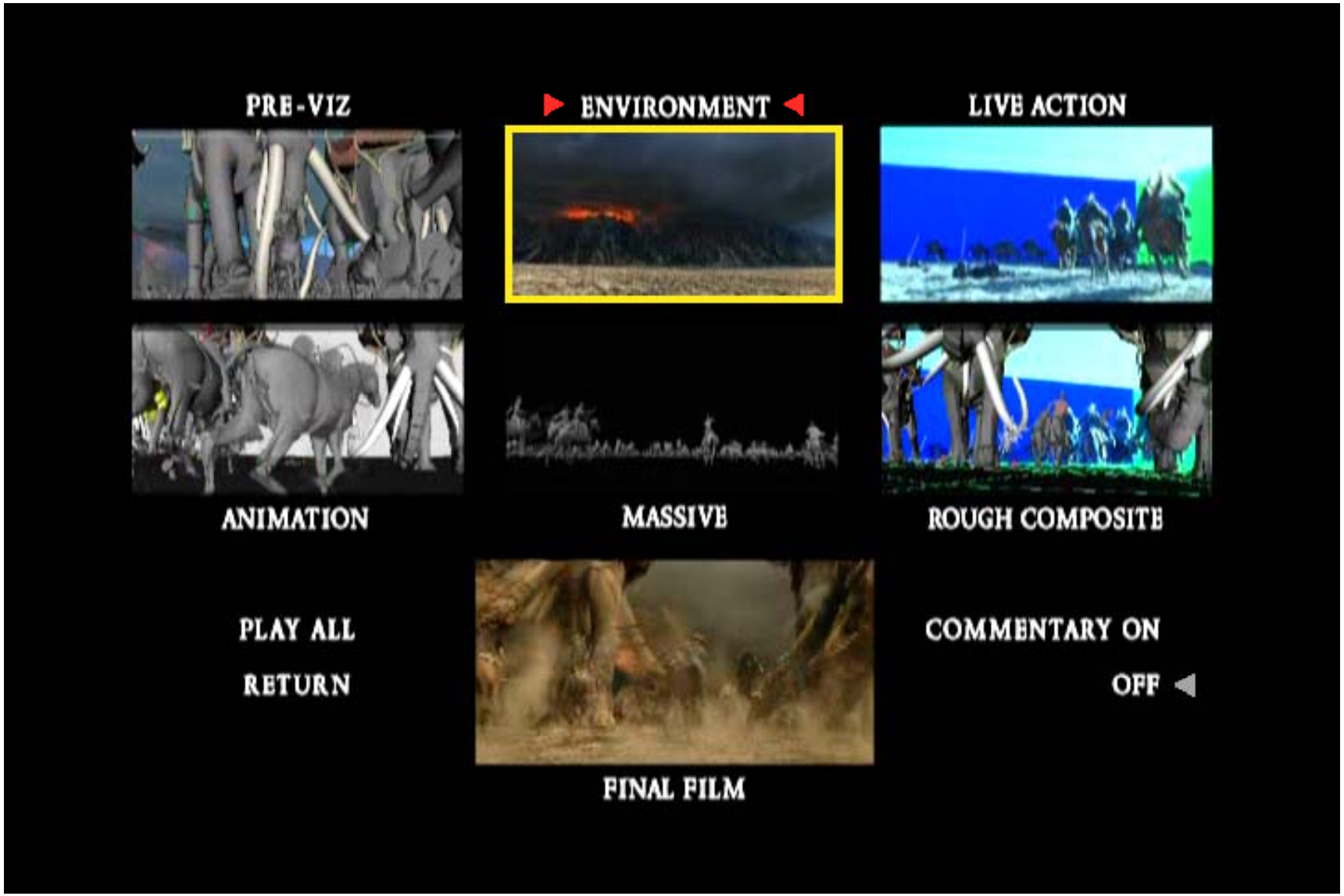
Visual effects production



Visual effects post-production



A case study

405: The Movie

- This movie were created solely by two visual effects artists in the year of 2000. It was a process that took over three months of nights, weekends and any spare moments that they could find.
- http://www.405themovie.com/

405: The Movie

DigiVFX

Making of 405

DigiVFX

Step 0: script and shooting plan

Shot#	Description	Full CG	CG	Length Frames
01	Title Animation	X	X	401
02	Freeway speeds beneath car			123
03	Speed Limit 65			120
04	LA Freeway from Overpass			238
05	Empty Freeway--Car enters frame	X	X	150
06	Pan From Freeway J looks at lack of traffic			237
07	Plane swings into landing position toward freeway	X	X	139
08	Hand on Gear shift			36
09	Plane lowers into view through rear window		X	84
10	Plane nears Car	X	X	65
11	J looks to side mirror--plane visible behind		X	84
12	Plane in sideview mirror		X	65
13	J looks from side view to rear view mirror -- plane behind		X	27
14	J eyes react in rear view mirror--remove traffic		X	33
15	Plane chases Car toward camera	X	X	77

Making of 405

DigiVFX

Step 1: shooting

two days with a Canon Optura DV camera with progressive mode.

⇨ a 70-minute raw footage

initial editing

⇨ pickup shots

Cuts to Driving with plane closing from behind

Cuts from Side then Rear view mirror looks

Making of 405

DigiVFX

Step 2: building CG world

total 62 shots, 42 enhanced with digital VFX.

19 shots are entirely digital creations.

plane, two cars, freeway background are digital

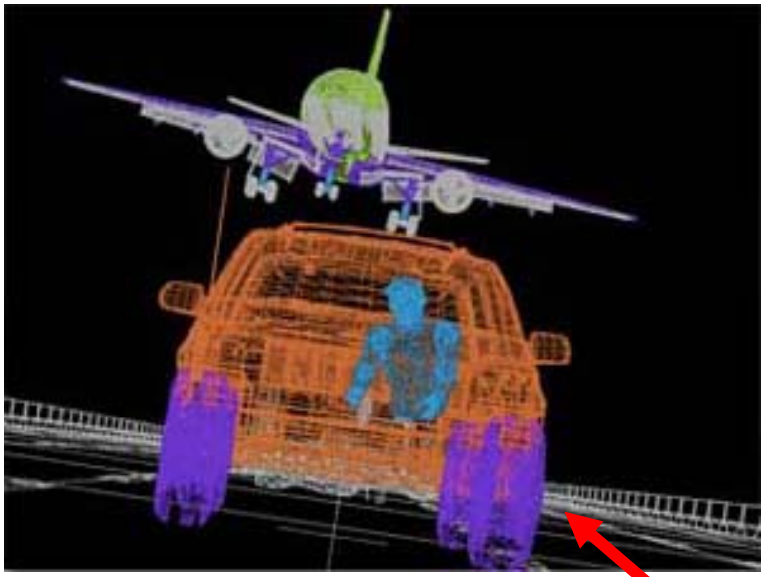


photo-based 3D environment

Making of 405

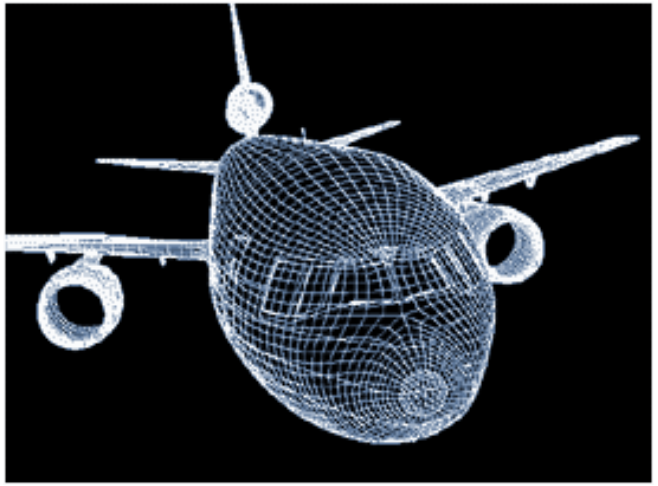
Real cars were used for close-up and interior shots

A low-resolution mesh scanned by a cyberscanner.
Mapped with photographs.

Making of 405

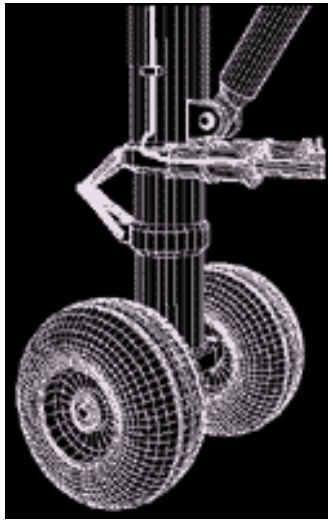
DigiVFX

DC-10 plane took a month to model in details for the needs of close-up shots.

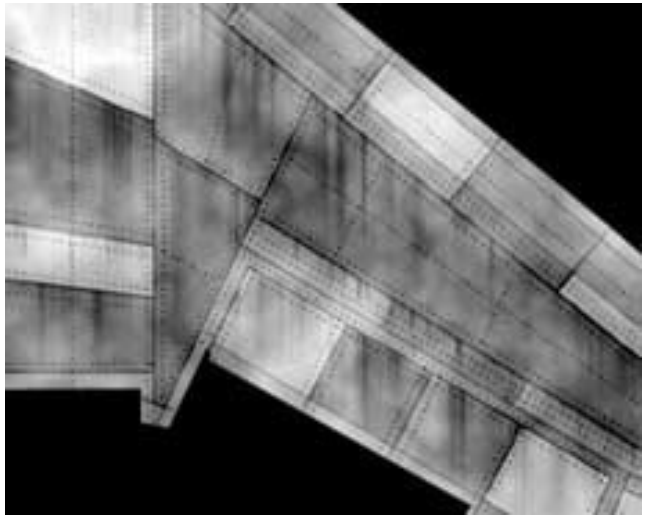


59 objects, 142,439 polygons

reference



modeling



material painting

Making of 405

Step 3: traffic clearing

clean plate

close-up shots

inpainting

Making of 405

DigiVFX

Step 4: compositing

shot with the vehicle standing still in a backyard

Making of 405

DigiVFX

Making of 405

DigiVFX

Step 5: fine touchup

3D hat

compositing and inpainting

Making of 405

DigiVFX

Step 6: music and delivery

Bloody Omaha

Topics we plan to cover

Image warping/morphing

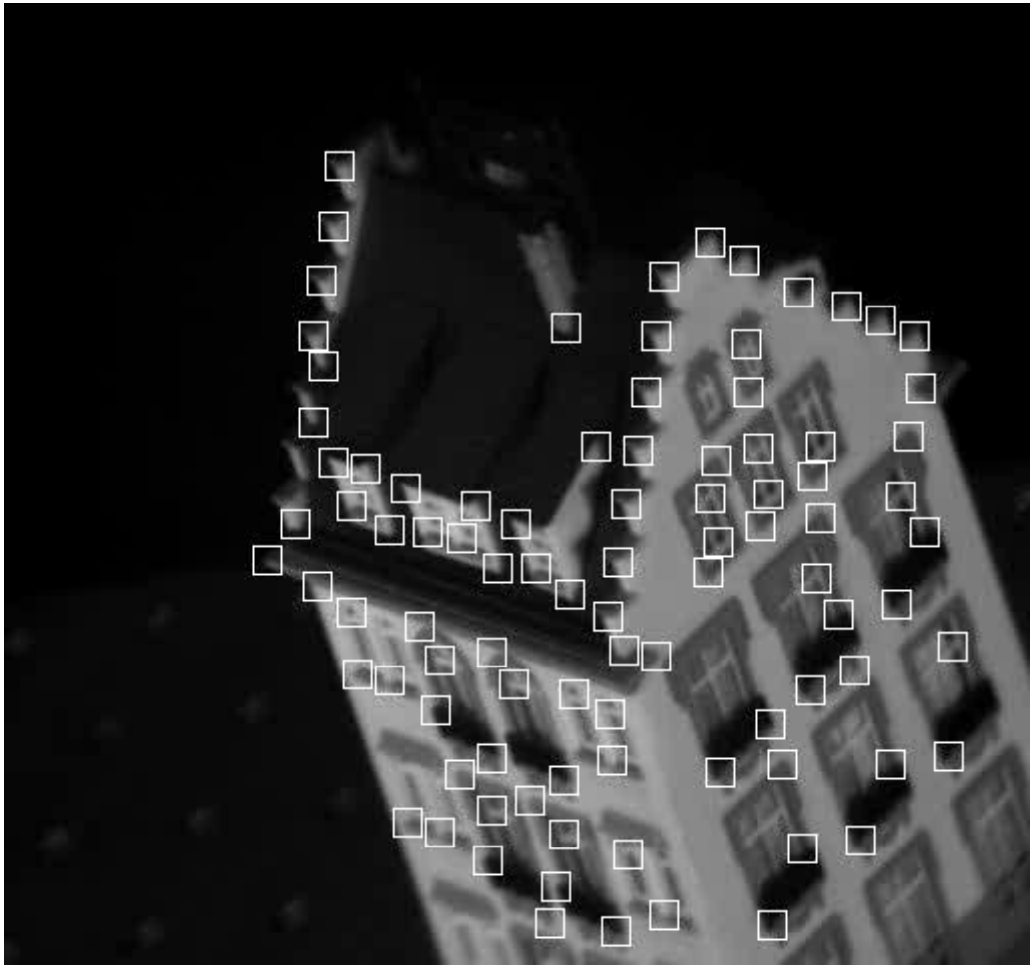
someone not that famous

someone very famous

video

Image warping/morphing

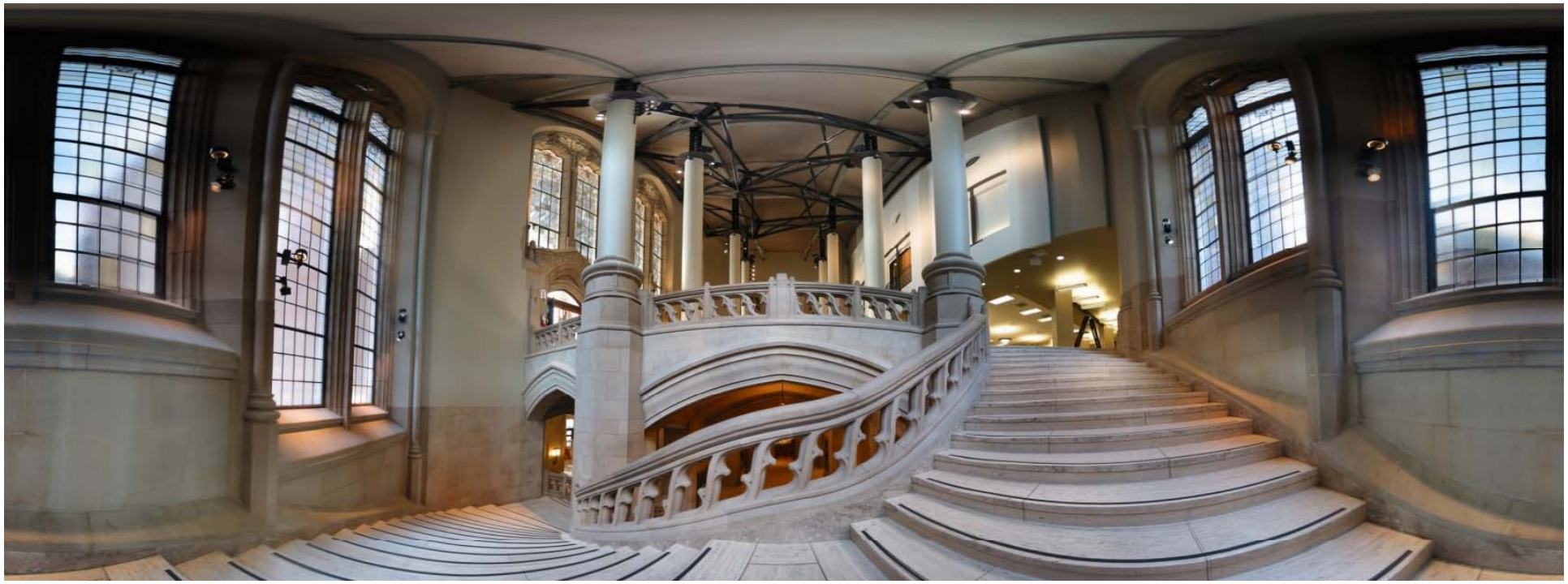
Tracking



Feature tracking

Image stitching

DigiVFX



MatchMove

Move matching using scene planes

Matchmove

Move matching using scene planes

Matchmove

Move matching using scene planes

Photo tourism

Video matching

Matrix *MOCO (Motion control camera)*

Video matching

Video matching

Matting and compositing

Titanic

Matting

DigiVFX

Object selection

LazySnapping

Image-based modeling

photogrammetric modeling and projective texture-mapping

Image-based modeling

DigiVFX

photogrammetric modeling and projective texture-mapping

Image-based modeling

photogrammetric modeling and projective texture-mapping

Image-based modeling

Tour into a picture

Image-based modeling

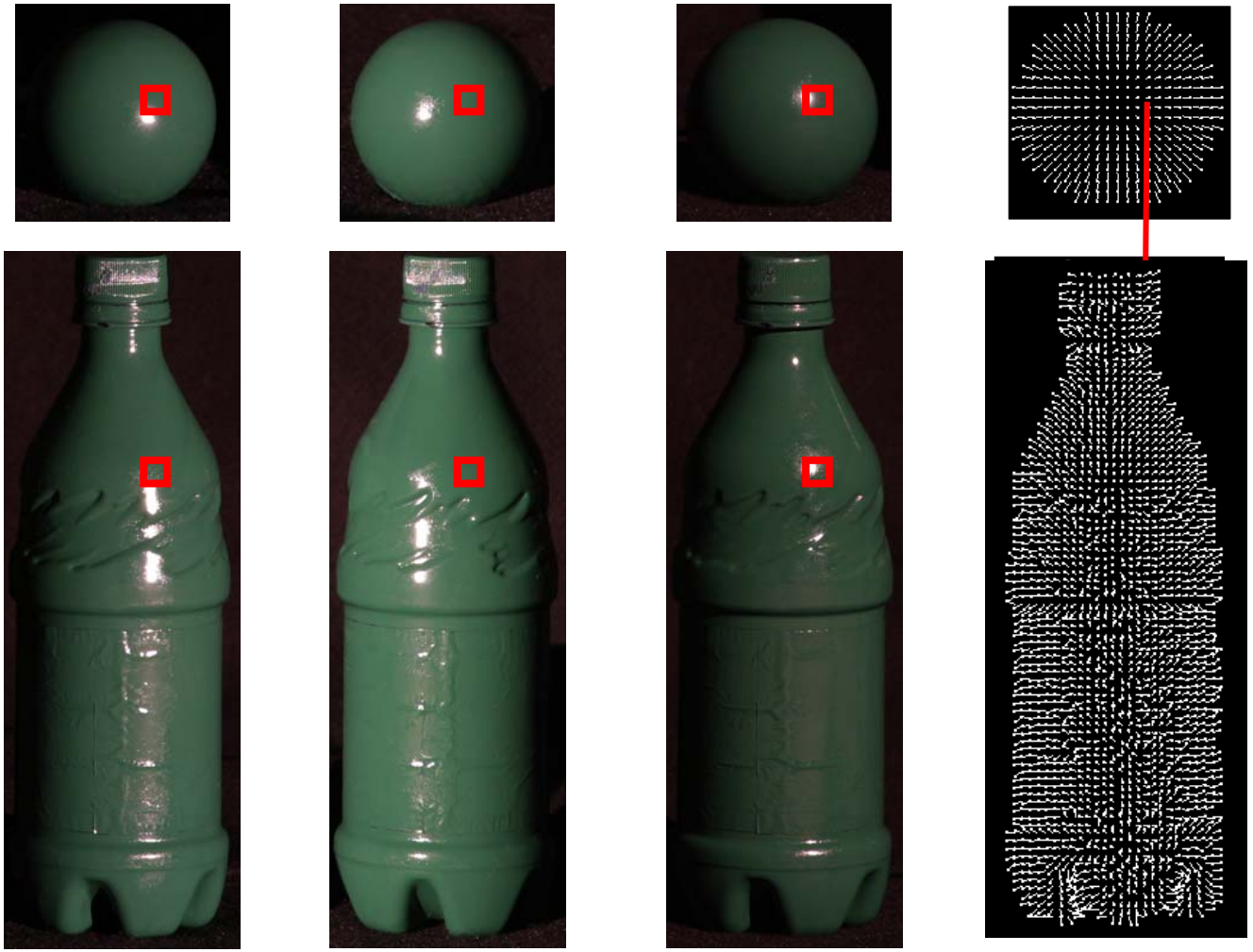
DigiVFX

Tour into a picture

3D photography (active)

Cyberware whole body scanner

3D photography (active)

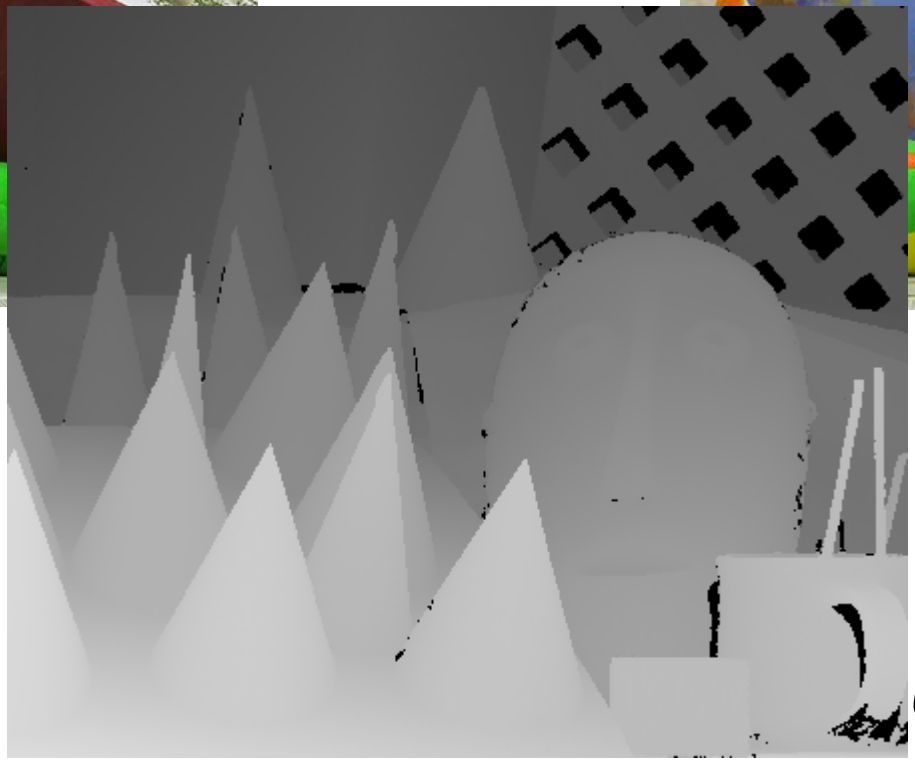


Photometric stereo

3D photography (passive)

left

right



depth

Stereo

Image-based rendering

Surface lightfield

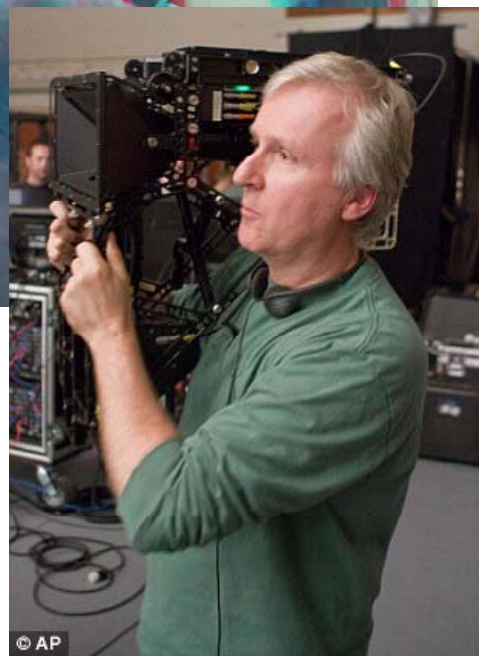
View interpolation

Bullet time video

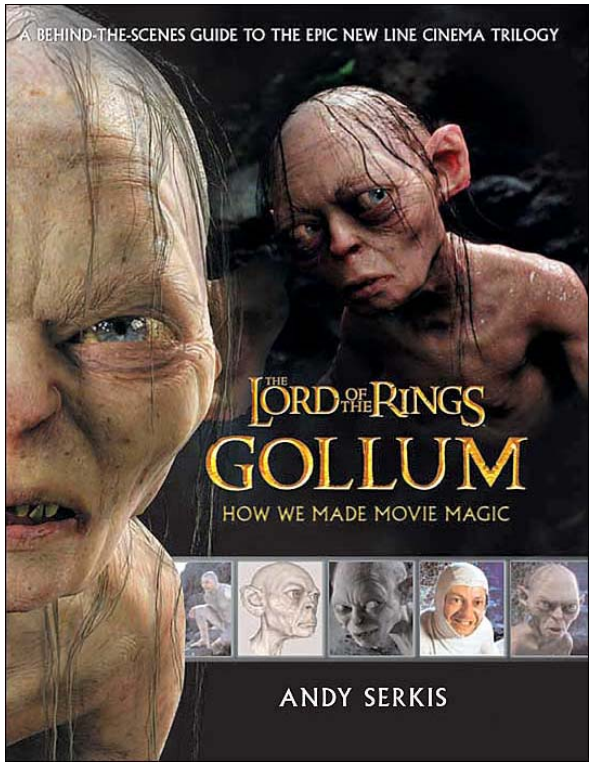
View interpolation

High-Quality Video View Interpolation

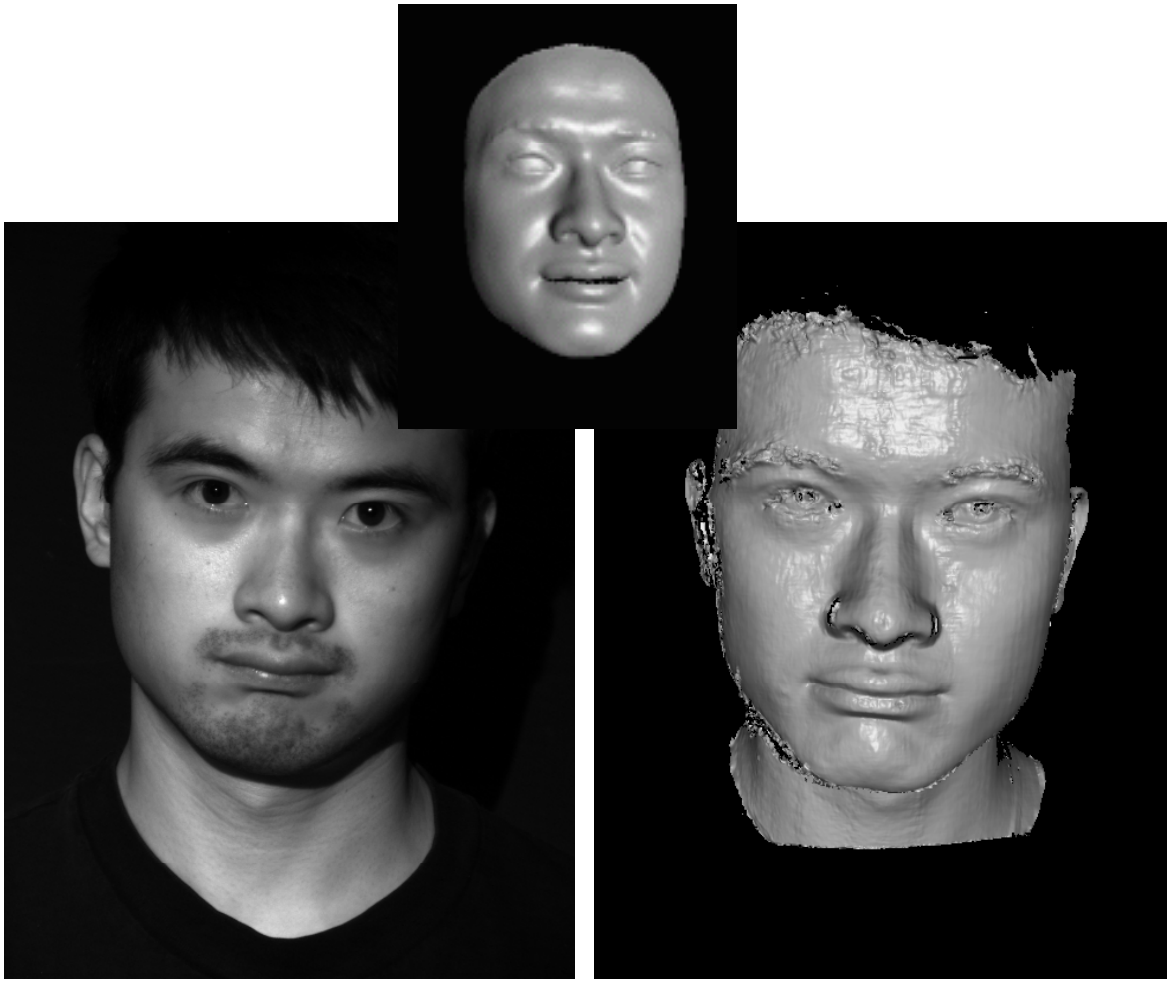
Stereoscopic films



Making face



Gollum



Spacetime face

Video rewrite

Trainable videorealistic speech animation

Inpainting (wire removal)

Inpainting

Texture synthesis/replacement

Texture replacement

Semi-automatic matte painting

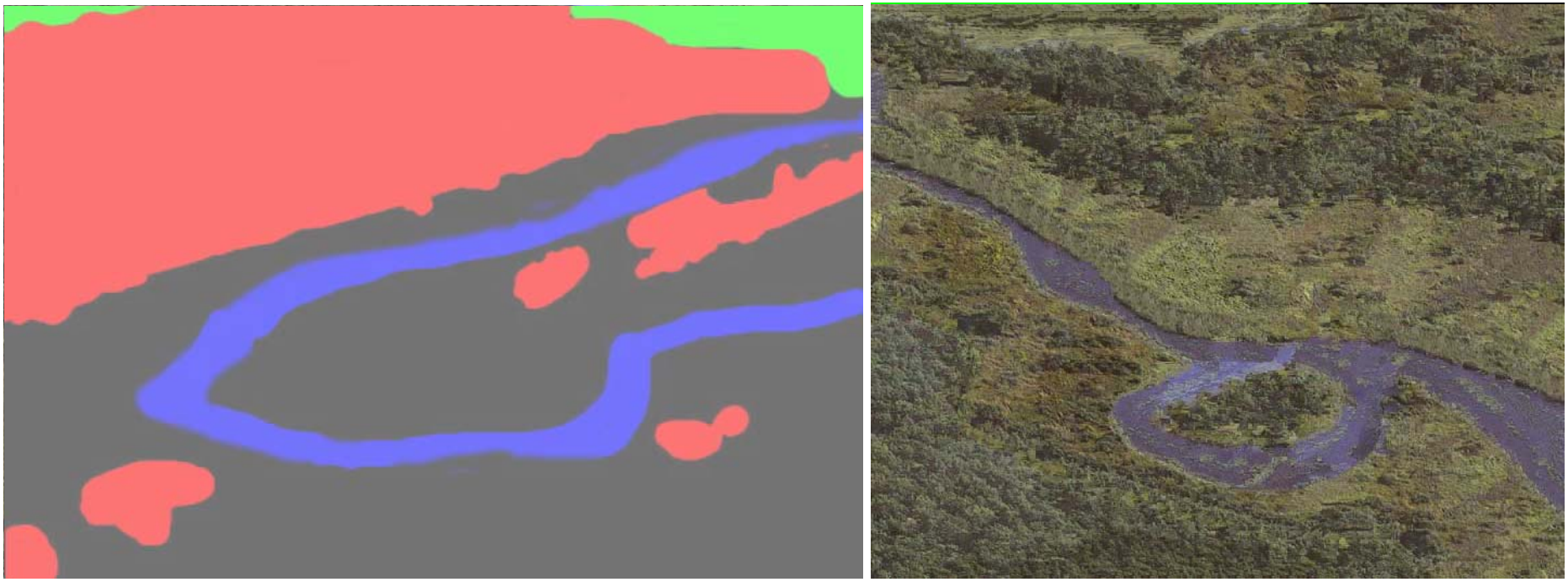
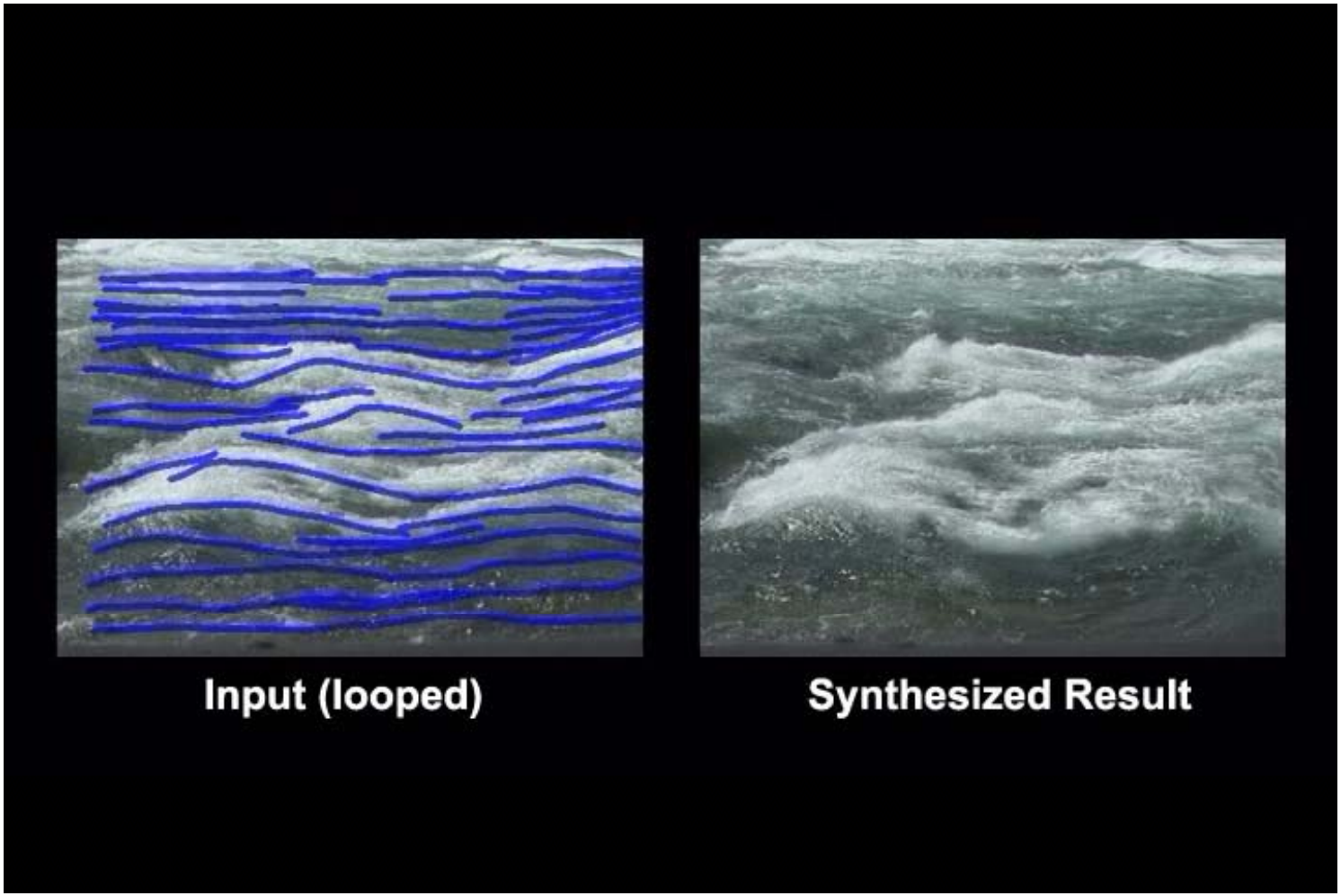


Image analogies

Video editing



Flow-based video editing

Grading (subject to change)

DigiVFX

- 3 programming assignments (60%)
  - Morphing (18%)
  - AutoStitch (24%)
  - MatchMove (18%)
- Class participation (5%)
- Final project (35%)
  - Research
  - System
  - Film

Morphing

source

morph

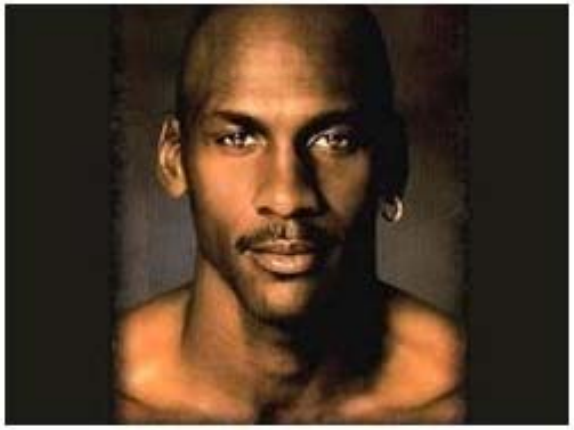
destination

source

morph

destination

Morphing



source #1

source #2

source #3

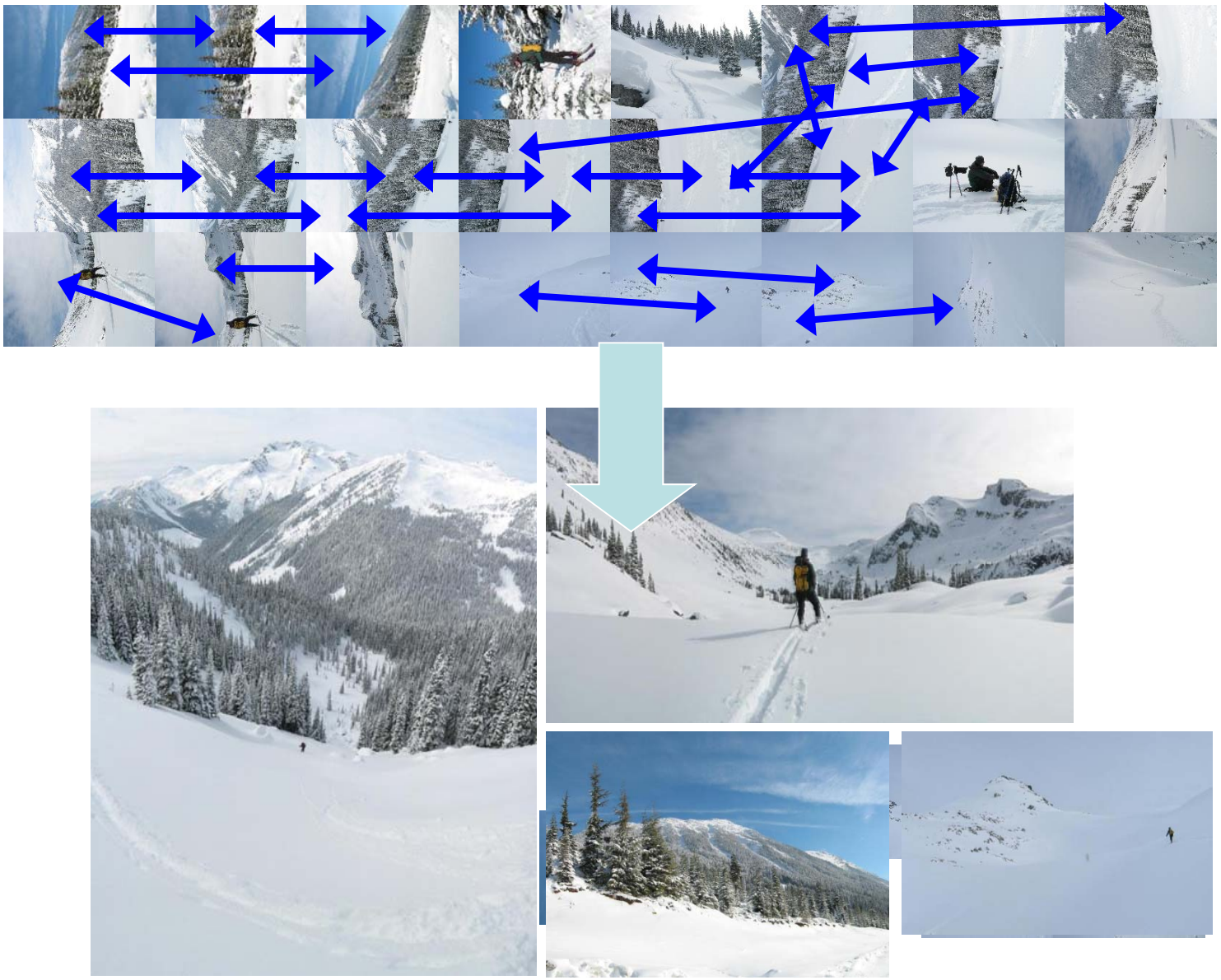
source

morph

destination

AutoStitch

DigiVFX

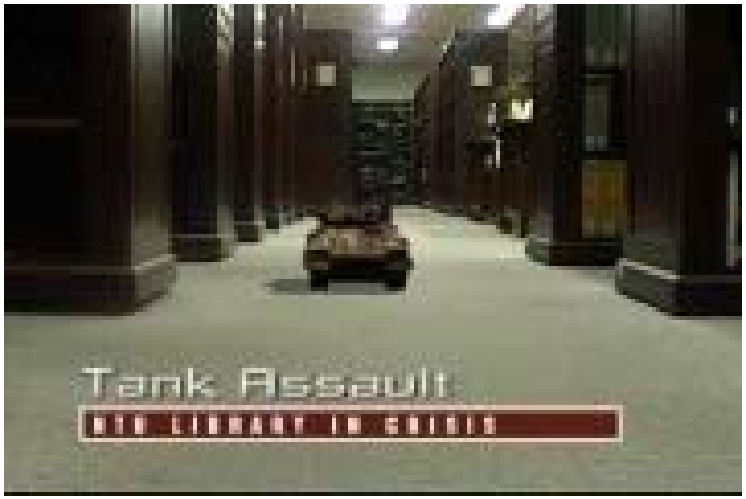


AutoStitch

羅聖傑

連奕婷 張宇蓓

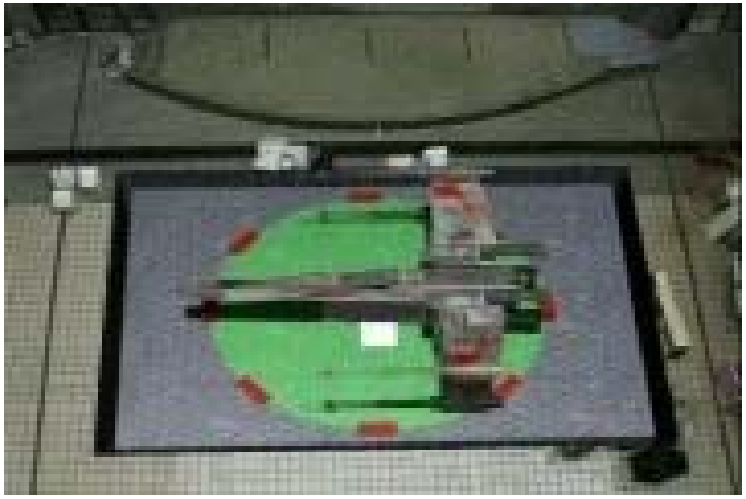
MathMove



梁家愷 鐘志遠

姜任遠 林立峯

楊宗碩 林柏劭



翁憲政 洪韶憶

Final projects from a similar course in Georgia Tech.

Life in Paints

DigiVFX

Life in Paints, GaTech DVFX 2003

Tour into pictures

Making of *Life in Paints*

In Your Face

In Your Face, GaTech DVFX 2002

Stop action

Making of *In Your Face*

Tennis

DigiVFX

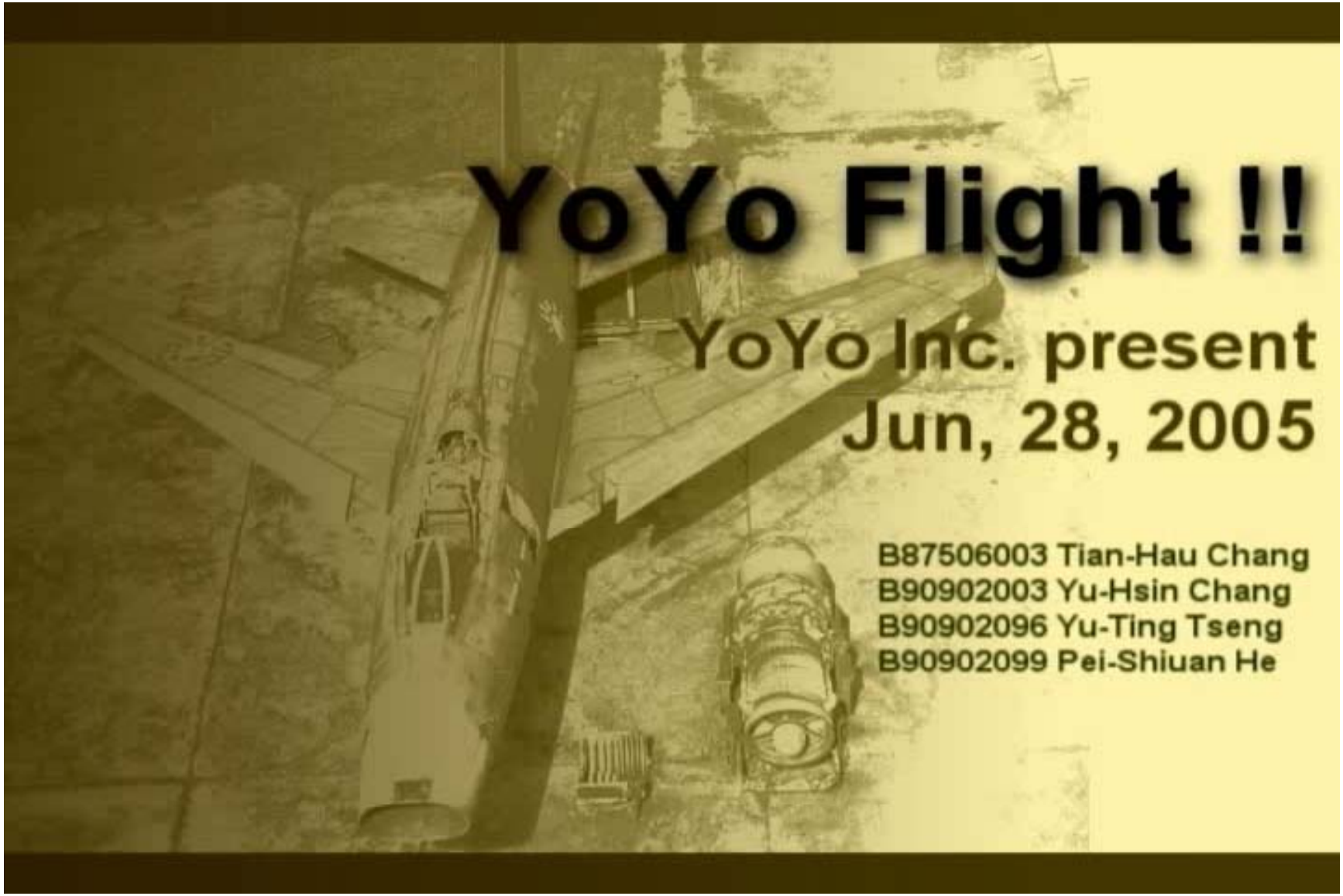
Tennis, GaTech DVFX 2007

MatchMove/CGI

Making of Tennis

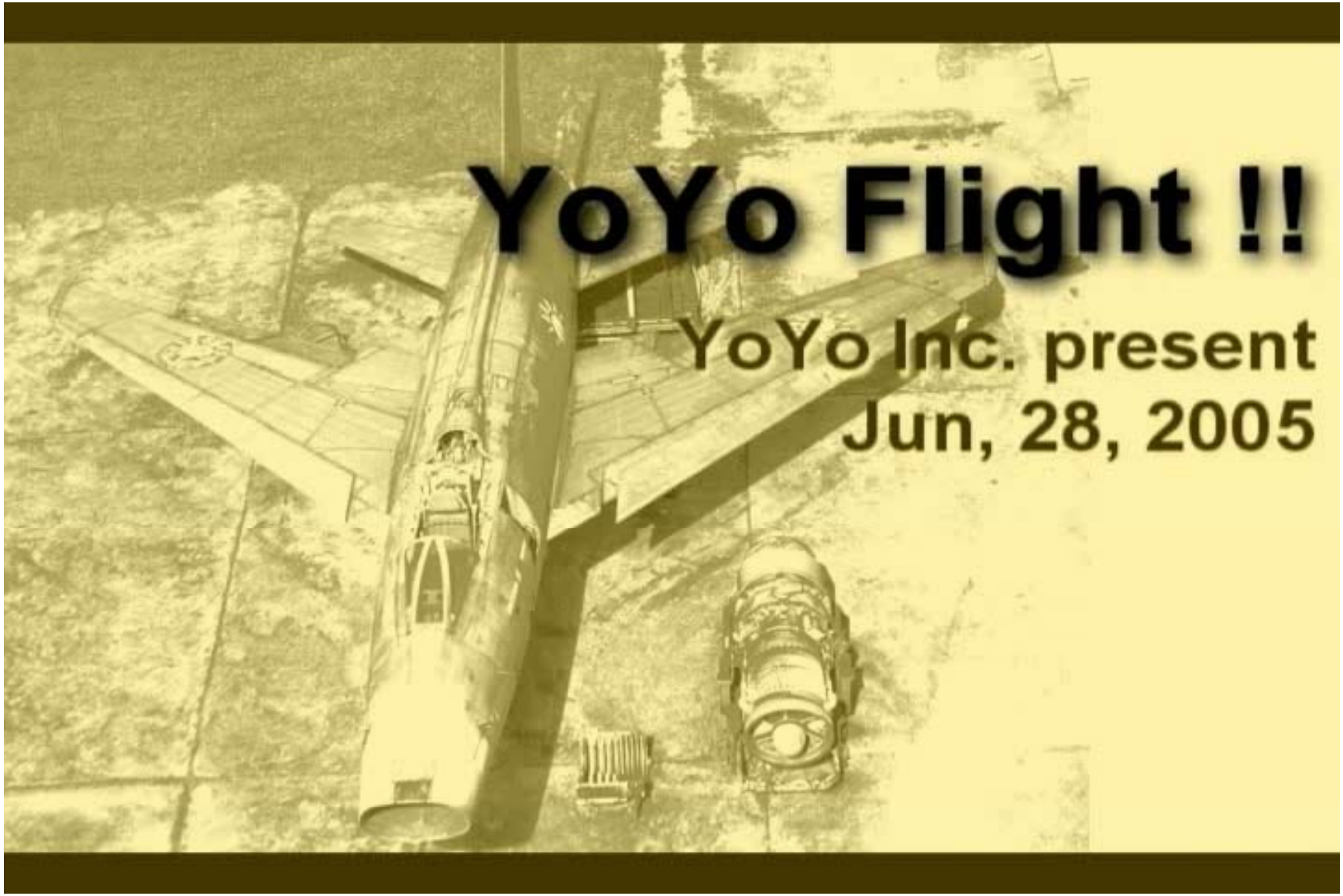
Final projects from the past.

YoYo Flight


YoYo Flight !!
YoYo Inc. present
Jun, 28, 2005
B87506003 Tian-Hau Chang
B90902003 Yu-Hsin Chang
B90902096 Yu-Ting Tseng
B90902099 Pei-Shiuan He

Making of YoYo Flight

DigiVFX



That's it for today!

DigiVFX

- Don't forget to subscribe the mailing list.
- Check out the course website.