CS 6630 Project Process Book
Visualizing SIGGRAPH Publications

Kui Wu and Duong Hoang
u0931640 and u0930062
u0931640@utah.edu and u0933062@utah.edu

December 4, 2015

1 Overview

When surveying a new field, researchers often want an overview look at the important papers in the field, how they are related, and how popular trends in topics or techniques have been evolving over the years. Traditional search engines such as Google Scholar and digital libraries such as the ACM's can alleviate the task, but only when the researcher has a good idea of what he should look for. Even then, the information obtained from those tools at any given moment is not only too specific but also presented in a non-visual form, making it difficult for the user to see a bigger picture.

Being both interested in doing research in computer graphics, in this project we aim to develop a tool to visualize connections between papers published over the years in SIGGRAPH, the most important conference in computer graphics. The tool should show in one place: the citation relationships among SIGGRAPH papers, important papers in each sub-field, prolific authors and their collaboration patterns, popular topics and methods in recent years, and active research institutions in each sub-field. It is our hope that such a tool can be particularly helpful to someone who wants to survey a field and summarize major results. It could also help new researchers in finding not only interesting problems to work on but also pointers to relevant publications for reference. Lastly, prospective graduate students can use information provided by the tool to make more informed decision in their application process.

2 Related Work

When searching for project ideas, we stumbled upon Autodesk's Citeology and this work gives us motivations to propose the current project. More tools to visualize connections between academic publications can be found in http://proto-knowledge.blogspot.com/2015/02/tools-to-visualize-connections-between.html

3 Questions

Our project aims to answer the following questions:

- What papers are influential in the field, in terms of citation count?
- Given a paper of interest, what papers does it cite? What are the papers citing it?
- What topics and techniques are popular, and in which time periods?
- Given a set of keywords, what are the most relevant papers/authors/institutions to these keywords?
- Who does each author collaborate with the most?
- What institutions are more active in a given field, in terms of publication count?

Answering the above questions will put a make a researcher more informed about what papers/authors/topics/techniques to pay more attention to, thereby saving time in the beginning of a survey task. It can also reveal interesting patterns and trends in the past that can help him or her better decide on future research directions for a particular topic of interest.

4 Data

Our data comes from multiple sources.

- Paper texts are downloaded from the ACM Digital Library. From these we extract the title, authors and their affiliations, references, and important keywords.
- BibTeX information for all papers is downloaded from the Digital Bibliographic Library Browser.
- Citation count information is queried from Google Scholar.

5 Exploratory Data Analysis

We expect our raw data to require a substantial cleanup process. So far we have collected all the SIGGRAPH papers's pdf files from 2002 to 2015, totaling 17GB of data. These pdf files will be converted to text format, from which we will extract from each paper its title, authors and their affiliations, references and keywords. The extraction process is done using a combination of homemade Python scripts and opensource tools such as ParsCit.

Meaningful keyword extraction is the most difficult step of the extraction process. Most papers provide a set of "keywords" after the abstract but in our experience, these keywords are not meaningful enough: in any given year, most keywords are used by only one paper.

We are looking into using an auto-summarizing tools for this step. Because of the uncertainty of keyword extraction, all features that require keywords will be optional.

We have done cursory testing of our tools and they seemed to be able to extract the required information with high accuracy, thanks to the uniformity in format of the papers. There is still some chance that noise will show up in the extracted data, in which case some post-process cleaning has to be done. We will finally need to remove all non-SIGGRAPH papers from the list of references to make our data more self-contained and easier to work with.

Since our data is highly relational, we plan to store it in an SQL database and query the data with Javascript. At the moment sql.js and node-sqlite3 seem to be promising candidates. Tentatively, there will be different tables, one for each of the following: papers, authors, institutions, keywords. Each entry in a table will have necessary fields, for example a paper will contain links to its authors and keywords, an author entry will have links back to his or her papers, and (optionally) links to the institution where he/she worked when a paper was published.

An alternative design is to flatten all the SQL tables into JSON files and load those instead. The SQL approach allows us to not having to load everything into memory at once, perhaps at the cost of more processing time each time users change their query/filter of the data. It is not yet clear to us how big the data will be, and which one of the two approaches will work better.

Our data acquisition and processing pipeline is as follows:

- We start by downloading all SIGGRAPH publications (in PDF format) since 2002 from the ACM Digital Library.
- Download BibTeX files (in XML format) for all SIGGRAPH and TOG papers from the Digital Bibliographic Library Browser
- Use a PDF processing tool to perform OCR and convert all the PDF files to TXT.
- Based on the TXT files, use ParsCit to extract the title and abstract from each paper.
- Use a homegrown tool (written in Python) to extract the list of references from each paper.
- Use another homegrown tool (in Python) to query Google Scholar to get the number of citations for all papers. This step is needed because we want to account for citations from non-SIGGRAPH papers as well.
- To extract the keywords, we use a Web service called Alchemy API (from IBM). The keywords returned by this tool will be combined with the keywords extracted directly from each paper's Keywords section.
- Finally we use a Python script to combine all the extracted information into a data structure in memory, from which we write several JSON files ready to be used by our Vis scripts.

At the moment, we have finished extracting all the essential information (title, author, year, references, citation count, DOI link) from our paper database, and produced working JSON files that have been used in our prototype. Below is an excerpt from our main JSON file:

```
”2002”: [
{
    ”authors”: [
    ”Jeffrey Smith”,
    ”Jessica K. Hodgins”,
    ”Irving Oppenheim”,
    ”Andrew P. Witkin”
    ],
    ”cited_by”: [
    1349,
    1384,
    1543,
    1752,
    1704,
    1846
    ],
    ”id”: 69,
    ”link”: ”http://doi.acm.org/10.1145/566654.566580”,
    ”references”: [],
    ”title”: ”Creating models of truss structures with optimization”,
    ”year”: ”2002”
},
{
    ”authors”: [
    ”Timothy J. Purcell”,
    ”Ian Buck”,
    ”William R. Mark”,
    ”Pat Hanrahan”
    ],
    ”cited_by”: [
    163,
    124,
    134,
    93,
    120,
    190
    ],
    ”id”: 63,
    ”link”: ”http://doi.acm.org/10.1145/566654.566640”,
    ”references”: [],
    ”title”: ”Ray tracing on programmable graphics hardware”,
    ”year”: ”2002”
},
```

This database will be updated once the keyword extraction step finishes, in at most two days, at which point there will be no data gathering tasks left. Compared to what was written in the proposal, it turned out that extracting the affiliation information for the authors from the paper texts is too difficult, hence we have decided to drop the Institution view from the project.

6 Design Evolution

6.1 Original design

Our initial design consists of four different views (Fig. 1):

Paper view (the main view). Here we show all the papers, grouped by year. Each year occupies one column. This view will be wide enough to show about ten years but will be scroll-able horizontally to move the focus to a different period of time. Each paper's title will appear on one row and be click-able. When a paper is clicked on, the papers that this paper cites and the ones that cite it will be highlighted. Moreover, when a paper is mouse over, a pop-up will show the paper's full title, author lists, keywords, and DOI link. A bar will appear right under each paper's title, the length of which is proportional to the paper's number of citations (this is not yet shown in our design sketches). This help the user identify influential papers at a glance.

This whole paper view can be sorted either alphabetically or by citation count. The papers can also be filtered by citation count, to hide papers with lesser impacts. We provide two checkboxes and a slider for these purposes.

Institution view. Here we show a map of all the institutions that have published papers to SIGGRAPH. They will appear as circles on a projected world map. The bigger the circle is, the more publications that institution has in the selected time period. Mousing over an institution will show its name and address. We chose a map for this view because for an institution, the geographical information can be important, for example, to a prospective graduate student looking for a school to apply to. Displaying a large amount of items using circles is also space-conserving.

Author view. In this view we show all paper authors and their collaboration relationships as a node-link diagram. Each author is a node, and two authors are linked if they have written a paper together. Bigger nodes represent more prolific authors, in terms of some metrics such as the H-index. Mousing over an author will show his/her name and affiliations. The reason we chose a node-link diagram for this view is because it highlights quite nicely the clusters between subsets of nodes, and the view is dynamic so it is easier to put any

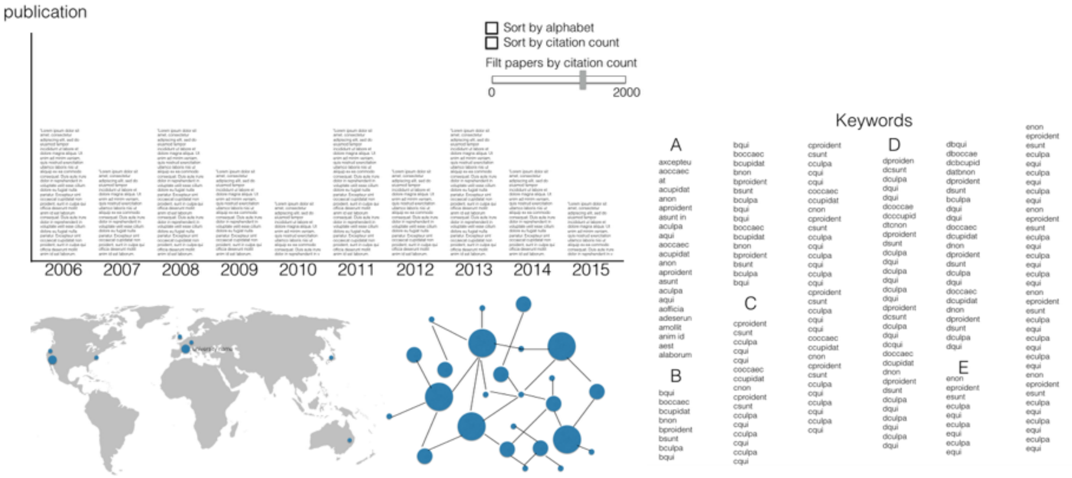


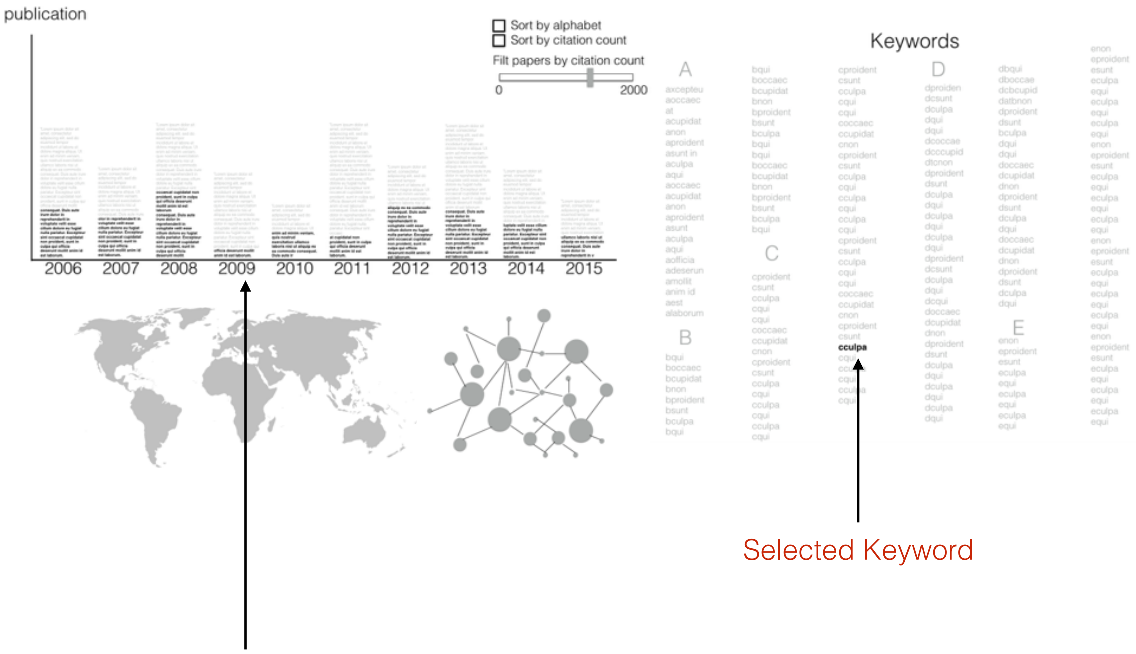
Figure 1: Overview

author at the center (for example, when his paper is being selected).

Keyword view. This view acts both as a view and a filter. Here we list all the keywords extracted from all the papers in alphabetical order. Keywords are selectable, and each time a keyword is clicked on, the related keywords are highlighted. This feature is particularly useful when the user clicks on a topic keyword (for example: "global illumination"), and the related keywords show common techniques used to solve problems related to that topic (for example: "path tracing", "radiosity", "photon mapping" which are common methods in graphics to achieve "global illumination"). Two keywords are related if they appear together in many papers. Moreover, selecting a set of keywords will reduce the amount of information shown in the other views, to retain only the papers/authors/institutions that are related to the selected set of keywords. This is useful because the list of papers/authors/institutions can be quite large. Fig 2 shows an initial design of this idea, where the list of papers was not really filtered by simply highlighted and re-sorted. This feature can be very interesting because a glance at the paper view can tell us the popularity of the current selected set of keywords throughout the years.

6.2 Final design

Data format Because the amount of data we deal with is rather large for a visualization project, initially we thought organizing our data in SQL databases would save storage and data loading time. During the course of implementing the project, however, we have found that our data loading speed is not a problem, even when loading our biggest data files in JSON format (each file is about 2MB each). We therefore forwent the idea of SQL and instead organized our data into multiple JSON files which really simplified the data preparation and loading step.



Selected Keyword

Resort paper titles and highlight papers, which have selected keyword

Figure 2: Keyword filtering

Paper view During data processing and implement, we realized that the amount of papers in the each year is quite large, which is about 150 papers per year. As a result, there is no way to arrange the entire paper view, 14 years and 100 papers per year, to one view with proper font size. The initial version of our implementation is shown as Figure 3.

There are two options to solve this issue. The first one is using zoom in and zoom out to let users explore paper views. We attempt to avoid that method because users may lose the entire view on their mind due to the change blindness. Hence, we added fisheye distortion

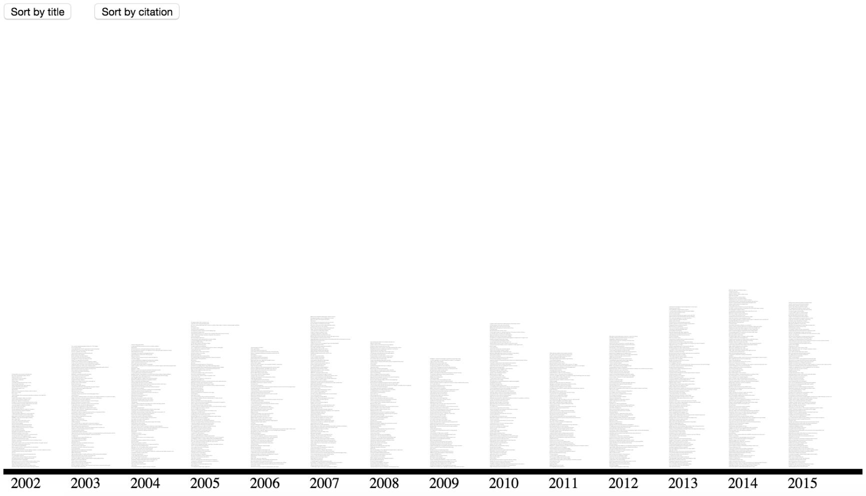


Figure 3: The initial version of our paper view implementation

to enable users to only zoom in texts in a small region as shown in Figure 4. However, the fisheye plugin we used is not suitable for zooming in texts. Also, because of the high density of texts, even if we rearrange texts to make it look better, it is still very messy for users to view.

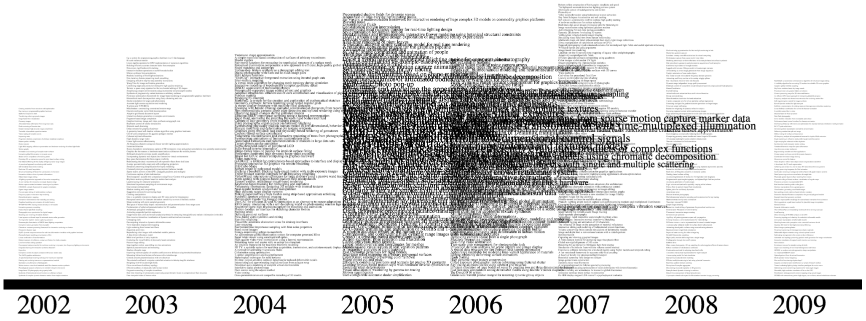
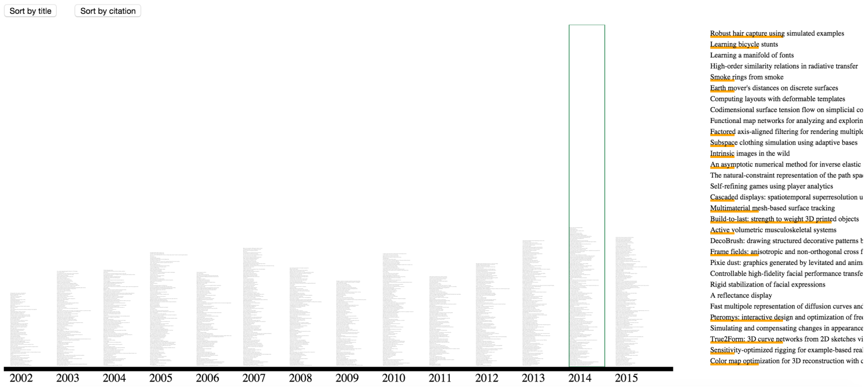


Figure 4: Paper view with fish eye

After that, we decided to add a side bar for the selected year papers as shown in Figure 5. When users select one year, the side bar will show all papers in that year and allow users to scroll. We believe this should be the best solution for our issue without zoom in and out. Users can get details as well as overall view at the same time at least.

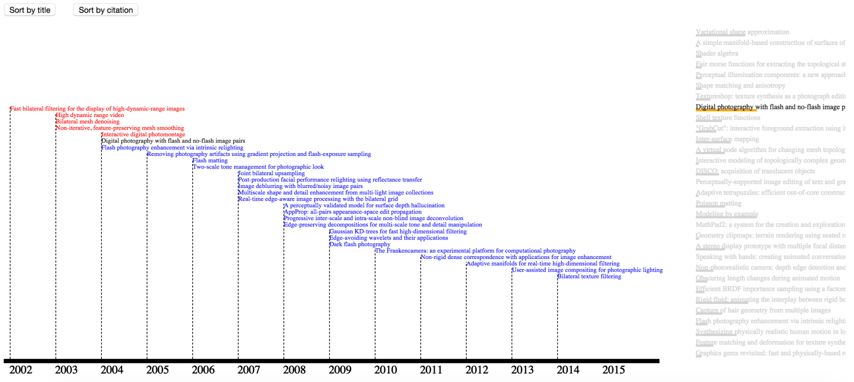
However, we meet another question, which is how represent reference and citation relationship between papers in the paper view. As we mentioned before, it is too small to read



Robust hair capture using simulated examples
Learning bicycle stunts
Learning a manifold of fonts
High-order similarity relations in radiative transfer
Smoke rings from smoke
Earth mover's distances on discrete surfaces
Computing layouts with deformable templates
Codimensional surface tension flow on simplicial co
Functional map networks for analyzing and explorin
Factored axis-aligned filtering for rendering multiple
Subspace clothing simulation using adaptive bases
Intrinsic images in the wild
An asymptotic numerical method for inverse elastic
The natural-constraint representation of the path spa
Self-refining games using player analytics
Cascaded displays: spatiotemporal superresolution u
Multimaterial mesh-based surface tracking
Build-to-last: strength to weight 3D printed objects
Active volumetric musculoskeletal systems
DecoBrush: drawing structured decorative patterns b
Frame fields: anisotropic and non-orthogonal cross f
Pixie dust: graphics generated by levitated and anim
Controllable high-fidelity facial performance transfe
Rigid stabilization of facial expressions
A reflectance display
Fast multipole representation of diffusion curves and
Pteromys: interactive design and optimization of free
Simulating and compensating changes in appearance
True2Form: 3D curve networks from 2D sketches vi
Sensitivity-optimized rigging for example-based real
Color map optimization for 3D reconstruction with c

Figure 5: Paper view with side bar

and we cannot keep our original design as shown in Figure 1. Fortunately, at the worst case, the total amount of reference and citation by one paper is 52. We determined to enlarge the font size of those papers and arrange them by stair shape as shown in Figure 6. We use red and blue to highlight references and cited by papers for now.



Fast bilateral filtering for the display of high-dynamic-range images
High dynamic range video
Bilateral mesh denoising
Non-iterative, feature-preserving mesh smoothing
Interactive digital photomontage
Digital photography with flash and no-flash image pairs
Flash photography enhancement via intrinsic relighting
Removing photography artifacts using gradient projection and flash-exposure sampling
Flash matting
Two-scale tone management for photographic look
Joint bilateral upsampling
Post-production facial performance relighting using reflectance transfer
Image deblurring with blurred/noisy image pairs
Multiscale shape and detail enhancement from multi-light image collections
Real-time edge-aware image processing with the bilateral grid
A perceptually validated model for surface depth hallucination
AppProp: all-pairs appearance-space edit propagation
Progressive inter-scale and intra-scale non-blind image deconvolution
Edge-preserving decompositions for multi-scale tone and detail manipulation
Gaussian KD-trees for fast high-dimensional filtering
Edge-avoiding wavelets and their applications
Dark flash photography
The Frankencamera: an experimental platform for computational photography
Non-rigid dense correspondence with applications for image enhancement
Adaptive manifolds for real-time high-dimensional filtering
User-assisted image compositing for photographic lighting
Bilateral texture filtering

Variational shape approximation
A simple manifold-based construction of surfaces of
Shader algebra
Fair morse functions for extracting the topological st
Perceptual illumination components: a new approach
Shape matching and anisotropy
Textureshop: texture synthesis as a photograph editi
Digital photography with flash and no-flash image p
Shell texture functions
"GrabCut": interactive foreground extraction using i
Inter-surface mapping
A virtual node algorithm for changing mesh topolog
Interactive modeling of topologically complex geom
DISCO: acquisition of translucent objects
Perceptually-supported image editing of text and gra
Adaptive tetrapuzzles: efficient out-of-core construc
Poisson matting
Modeling by example
MathPad2: a system for the creation and exploration
Geometry clipmaps: terrain rendering using nested r
A stereo display prototype with multiple focal distan
Speaking with hands: creating animated conversatio
Non-photorealistic camera: depth edge detection and
Obscuring length changes during animated motion
Efficient BRDF importance sampling using a factore
Rigid fluid: animating the interplay between rigid bo
Capture of hair geometry from multiple images
Flash photography enhancement via intrinsic relighti
Synthesizing physically realistic human motion in lo
Feature matching and deformation for texture synthe
Graphics gems revisited: fast and physically-based r

Figure 6: Paper view with reference and citation for one selected paper

Besides that, we also implemented functions, like "sort title by citation count" and "sort title by letter". More functionalities will be added before final submission.

After milestone 1, we still looked for a better implementation for paper view and attempted to implement our initial design by some alternative ways. Fortunately, we found using scrolling down/up to control zoom in/out is able to provide users a better view control and more freedom to explore the view. Figure 7 shows our final implementation. Moreover, we add zoom in/out button on the top left of the view to give users hint that the view is zoom-able.

Paper detail view Another benefit for zoom-able paper view is providing more apparently view for user to explore the cited and reference relationship between papers (as shown in Figure 8). The main drawback of this alternative is tool-tip may block several papers and

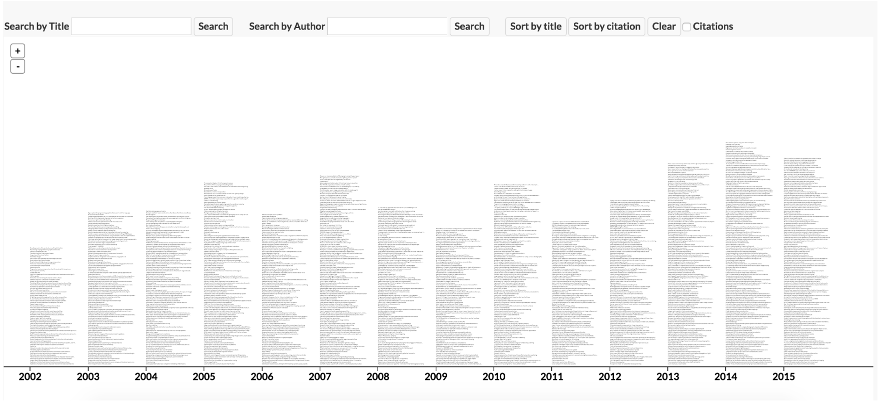
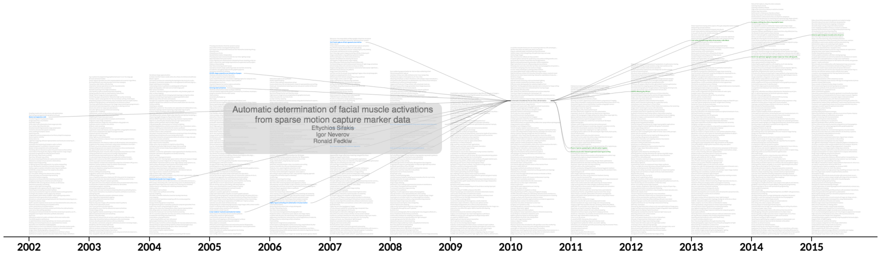


Figure 7: Final version of paper view

cannot contain too many details. Therefore, we add another view for paper details, which include title, authors, abstract, year, keywords, and citation number. Also, in order to give users a brief idea about reference information, we also add a subset paper view here, which only displays the highlighted papers in the paper view. Users can also to use fisheye effect to see titles (as shown in Figure 9).

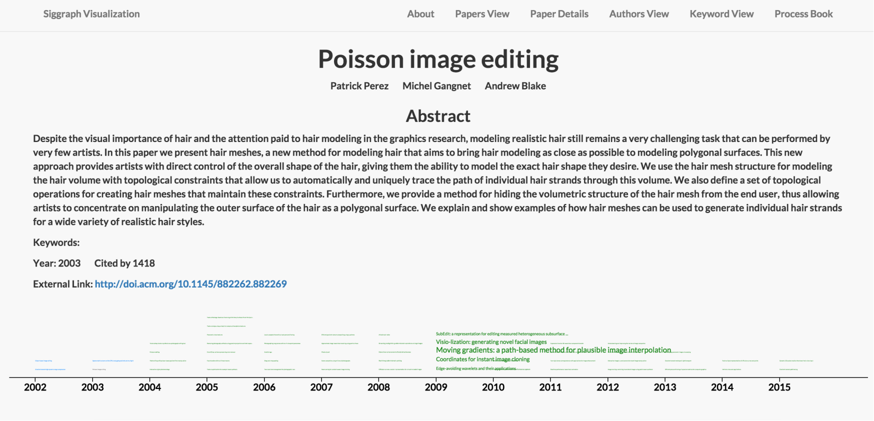


Automatic determination of facial muscle activations from sparse motion capture marker data
Eftychios Sifakis
Igor Neverov
Ronald Fedkiw

Figure 8: Paper view with selected paper

Institution view In the meantime, we also realized it is quite difficult to do a university maps view as we promised in the proposal because it is hard to get coordination of universities. So, we decided to get rid of it and add more functionalities to papers view instead, such as searching title. Meanwhile, we can spend more time on keyword view, which we believe is much more useful for users to explore papers.

Author view There are about 3500 nodes in the author view, 2200 authors and 1300 papers. It is unreadable if we put all nodes in the view at the same time. Alternatively, we only display the selected paper, its authors, and its authors' publications. Even though it is a much smaller set compared with original one, the view allows user to click and change the selected papers as well. Figure 11) demonstrates that mouse-over and tool-tip to show some paper details.



Poisson image editing

Patrick Perez Michel Gangnet Andrew Blake

Abstract

Despite the visual importance of hair and the attention paid to hair modeling in the graphics research, modeling realistic hair still remains a very challenging task that can be performed by very few artists. In this paper we present hair meshes, a new method for modeling hair that aims to bring hair modeling as close as possible to modeling polygonal surfaces. This new approach provides artists with direct control of the overall shape of the hair, giving them the ability to model the exact hair shape they desire. We use the hair mesh structure for modeling the hair volume with topological constraints that allow us to automatically and uniquely trace the path of individual hair strands through this volume. We also define a set of topological operations for creating hair meshes that maintain these constraints. Furthermore, we provide a method for hiding the volumetric structure of the hair mesh from the end user, thus allowing artists to concentrate on manipulating the outer surface of the hair as a polygonal surface. We explain and show examples of how hair meshes can be used to generate individual hair strands for a wide variety of realistic hair styles.

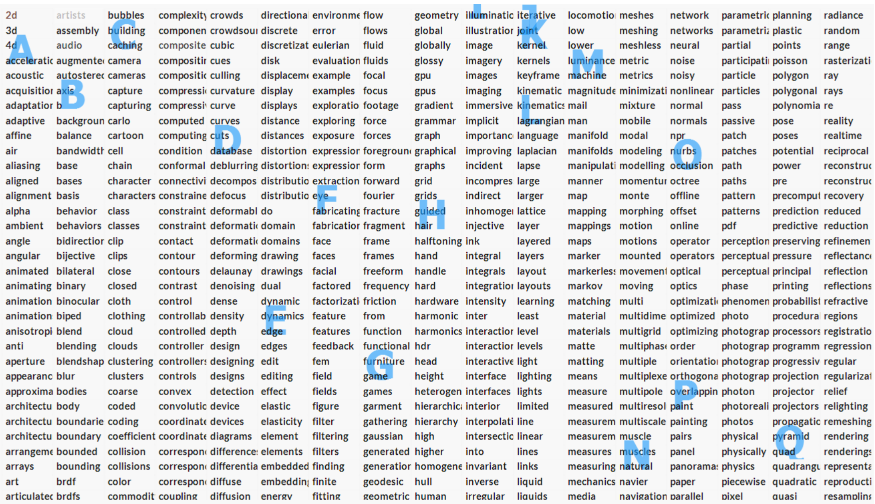
Keywords:

Year: 2003 Cited by 1418

External Link: http://doi.acm.org/10.1145/882262.882269

SubEdit: a representation for editing measured heterogeneous subsurface ...
Visio-lization: generating novel facial images
Moving gradients: a path-based method for plausible image interpolation
Coordinates for instant image cloning
Edge-avoiding wavelets and their applications
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

Figure 9: Paper details view



2d
3d
4d
acceleratic
acoustic
acquisitior
adaptatior
adaptive
affine
air
aliasing
aligned
alignment
alpha
ambient
angle
angular
animated
animating
animation
animation:
anisotropi
anti
aperture
appearanc
approxima
architectu
architectu
architectu
arrangeme
arrays
art
articulatec

artists
assembly
audio
augmentec
autosterec
axis
b
backgroun
balance
bandwidth
base
bases
basis
behavior
behaviors
bidirectior
bijective
bilateral
binary
binocular
biped
blend
blending
blendshap
blur
bodies
body
boundarie
boundary
bounded
bounding
brdf
brdfs

bubbles
building
caching
camera
cameras
capture
capturing
carlo
cartoon
cell
chain
character
characters
class
classes
clip
clips
close
closed
cloth
clothing
cloud
clouds
clustering
clusters
coarse
coded
coding
coefficient
collision
collisions
color
commodit

complexity
componen
composite
compositir
compositic
compressi
compressiv
computed
computing
condition
conformal
connectivi
constraine
constraint
constraint
contact
contour
contours
contrast
control
controllab
controlled
controller
controllers
controls
convex
convolutic
coordinate
coordinate
correspon
correspon
correspon
coupling

crowds
crowdsour
cubic
cues
culling
curvature
curve
curves
cuts
database
deblurring
decompos
defocus
deformabl
deformatic
deformatic
deforming
delaunay
denoising
dense
density
depth
design
designing
designs
detection
device
devices
diagrams
differences
differentia
diffuse
diffusion

directional
discrete
discretizat
disk
displaceme
display
displays
distance
distances
distortion
distortions
distributio
distributio
do
domain
domains
drawing
drawings
dual
dynamic
dynamics
edge
edges
edit
editing
effect
elastic
elasticity
element
elements
embedded
embedding
energy

environme
error
eulerian
evaluation
example
examples
exploratio
exploring
exposure
expressior
expressior
extraction
eye
fabricating
fabricatior
face
faces
facial
factored
factorizati
feature
features
feedback
fem
field
fields
figure
filter
filtering
filters
finding
finite
fitting

flow
flows
fluid
fluids
focal
focus
footage
force
forces
foregroun
form
forward
fourier
fracture
fragment
frame
frames
freeform
frequency
friction
from
function
functional
furniture
game
games
garment
gathering
gaussian
generated
generatior
geodesic
geometric

geometry
global
globally
glossy
gpu
gpus
gradient
grammar
graph
graphical
graphs
grid
grids
guided
hair
halftoning
hand
handle
hard
hardware
harmonic
harmonics
hdr
head
height
heterogen
hierarchica
hierarchy
high
higher
homogene
hull
human

illuminatic
illustratior
image
imagery
images
imaging
immersive
implicit
importanc
improving
incident
incompres
indirect
inhomoger
injective
ink
integral
integrals
integratior
intensity
inter
interactior
interactior
interactive
interface
interfaces
interior
interpolati
intersectic
into
invariant
inverse
irregular

iterative
joint
kernel
kernels
keyframe
kinematic
kinematics
lagrangian
language
laplacian
lapse
large
larger
lattice
layer
layered
layers
layout
layouts
learning
least
level
levels
light
lighting
lights
limited
line
linear
lines
links
liquid
liquids

locomotio
low
lower
luminance
machine
magnitude
mail
man
manifold
manifolds
manipulati
manner
map
mapping
mappings
maps
marker
markerless
markov
matching
material
materials
matte
matting
means
measure
measured
measurem
measurem
measures
measuring
mechanics
media

meshes
meshing
meshless
metric
metrics
minimizati
mixture
mobile
modal
modeling
modelling
momentur
monte
morphing
motion
motions
mounted
movement
moving
multi
multidime
multigrid
multiphase
multiple
multiplexe
multipole
multiresol
multiscale
muscle
muscles
natural
navier
navigation

network
networks
neural
noise
noisy
nonlinear
normal
normals
npr
nurbs
occlusion
octree
offline
offset
online
operator
operators
optical
optics
optimizatio
optimized
optimizing
order
orientatior
orthogona
overlappin
paint
painting
pairs
panel
panoramas
paper
parallel

parametric
parametriz
partial
participati
particle
particles
pass
passive
patch
patches
path
paths
pattern
patterns
pdf
perception
perceptual
perceptual
phase
phenomen
photo
photograp
photograp
photograp
photograp
photon
photoreali
photos
physical
physically
physics
piecewise
pixel

planning
plastic
points
poisson
polygon
polygonal
polynomia
pose
poses
potential
power
pre
precomput
prediction
predictive
preserving
pressure
principal
printing
probabilist
procedural
processors
programm
progressiv
projection
projector
projectors
propagatic
pyramid
quad
quadrangu
quadratic
quasi

radiance
random
range
rasterizati
ray
rays
re
reality
realtime
reciprocal
reconstruc
reconstruc
recovery
reduced
reduction
refinemen
reflectance
reflection
reflections
refractive
regions
registratio
regression
regular
regularizat
relief
relighting
remeshing
rendering
renderings
representa
reproducti
resampling

Figure 10: Keyword view

Keyword view The final design for this view largely follows the initially proposed design. At the time of Milestone 1 we wanted to try out the "bubble" design where the keywords are laid out in circles, using a force-directed method. However, the sheer amount of keywords that we have renders this approach unsuitable. Furthermore, it is better to keep the keywords static (as opposed to making them movable with the mouse), so that the user can rely on his or her memory to locate a keyword quickly. For these reasons, we use a grid layout for the keywords, and provide a search function to help users find the keywords of interest quickly. We also show large characters of the alphabet where that character first appears as the first character of a keyword. These serve as a kind of index into the list of keywords, again, to help with the keyword locating task (Figure 10).

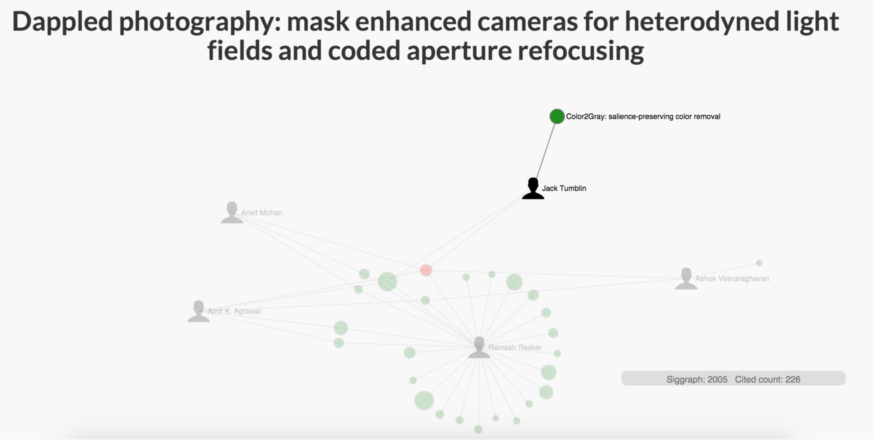

Dappled photography: mask enhanced cameras for heterodyned light fields and coded aperture refocusing
Color2Gray: salience-preserving color removal
Jack Tumblin
Ankit Mohan
Ashok Veeraraghavan
Amit K. Agrawal
Ramesh Raskar
Siggraph: 2005 Cited count: 226

Figure 11: Author view

7 Implementation

Our project includes four view, paper view, paper details view, author view, and keyword view.

7.1 Paper view

In paper view, we have we show all the papers, grouped by year. Each year occupies one column. This view is scroll-able horizontally to zoom in/out the view. Zoom in/out button is provided on the left top as well.

Papers' title appears on one row and be click-able. When a paper is clicked on, the papers that this paper cites and the ones that cite it will be highlighted with different color. Curved links are display to show the relationship between papers. Moreover, when a paper is mouse over, a pop-up will show the paper's full title, author lists.

This whole paper view can be sorted either alphabetically or by citation count. We provide a checkbox to display/hide citation count bar. The citation bar appears right under each paper's title, the length of which is proportional to the paper's number of citations and scaled within the year, because it is unfair to compare two papers published in different years. This help the user identify influential papers at a glance.

There are also two search buttons, which allows user to search author name or paper title. If more than papers are returned, all of them will be highlighted as black. If only return one result, the result will set as selected paper and showing its reference.

Once paper is selected, paper details and author view will be updated correspondingly based on the selection.

7.2 Paper details view

Paper view shows all details about the selected paper, including title, authors, abstract, keywords, cited count, year, and its external link, which points to ACM web-site.

Keywords are click-able. Once keywords is clicked, it will be set as ”selected” and update keyword view.

Also, in order to give users a brief idea about reference information, a subset paper view is added here, which only displays the highlighted papers in the paper view. Titles here also can be enlarged when mouse over it.

7.3 Author view

Author view only displays the selected paper, its authors, and its authors' publications. Each green circle represents one paper and is scaled by its cited count. Even though it is a much smaller set compared with original one, the view allows user to click and change the selected papers with transition.

When users mouse-over it, a tool-tip will show on the right bottom to show published year and cited count. In the mean time, other unconnected nodes will be transparent so to highlight mouse-over-ed paper and its author or mouse-over-ed author and all his/her publications.

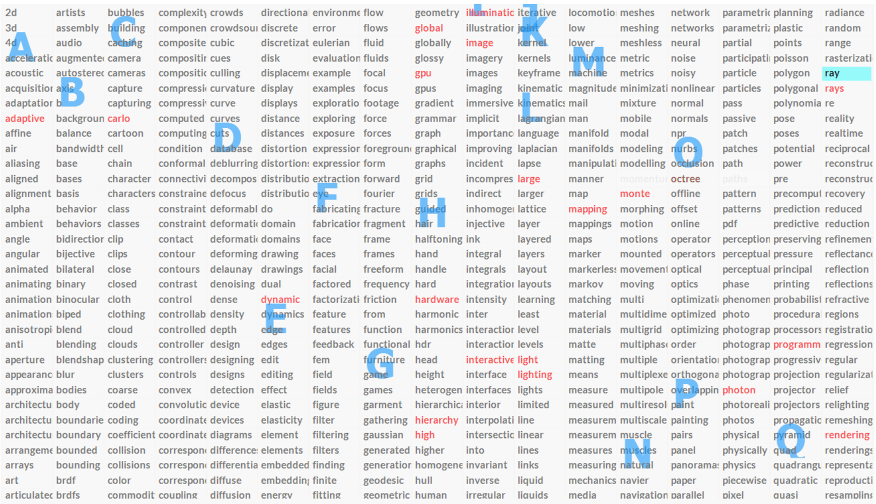
7.4 Keyword view

In this view we display all the keywords extracted from our paper database. Since the number of keywords are large (we have nearly a thousand keywords), we opted for a simple view where the keywords are sorted in alphabetical order and shown in a grid. Some keywords are long and will thus be truncated in the view, but will be shown in full when the user moves the mouse over. We achieved this by fading out the two adjacent keywords. The list of keywords can be filtered using a search box (irrelevant keywords will be grayed out). Keywords are clickable. When a keyword is clicked on, it will be highlighted, together with all its related keywords. Two keywords are related if they appear together in more than one papers (Figure 12).

Selecting a set of keywords will have an effect on the paper view. Papers having all the selected keywords will be highlighted. This is very useful for exploration of the paper database based on keywords.

8 Evaluation

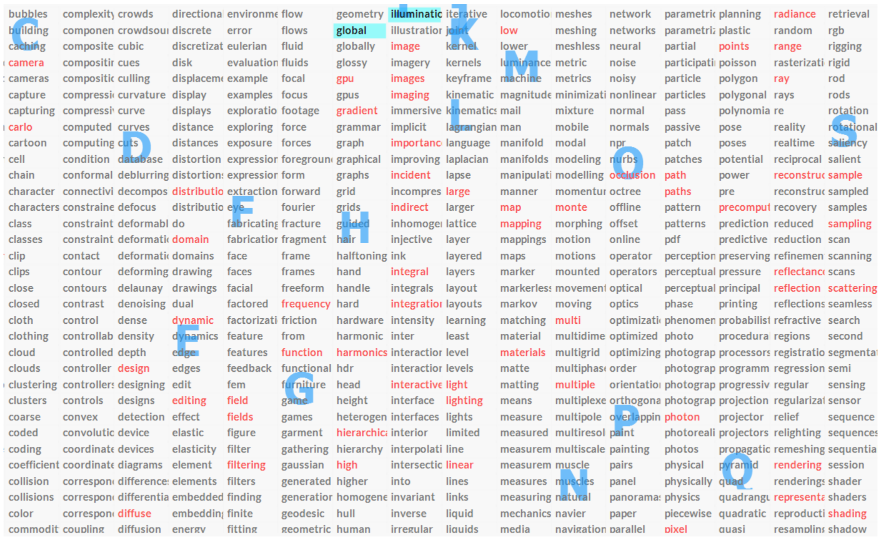
In this section, we demonstrate a typical usage scenario of our tool. Let's say the user is interested in all papers that address the problem of ”global illumination”. This is one of the fundamental, long-standing problems in computer graphics.



2d	artists	bubbles	complexity	crowds	directiona	environme	flow	geometry	illuminatic	iterative	locomotio	meshes	network	parametric	planning	radiance
3d	assembly	building	componen	crowdsour	discrete	error	flows	global	illustratior	joint	low	meshing	networks	parametriz	plastic	random
4d	audio	caching	composite	cubic	discretizat	eulerian	fluid	globally	image	kernel	lower	meshless	neural	partial	points	range
acceleratic	augmentec	camera	compositir	cues	disk	evaluation	fluids	glossy	imagery	kernels	luminance	metric	noise	participati	poisson	rasterizati
acoustic	autosterec	cameras	compositic	culling	displaceme	example	focal	gpu	images	keyframe	machine	metrics	noisy	particle	polygon	ray
acquisitior	axis	capture	compressi	curvature	display	examples	focus	gpus	imaging	kinematic	magnitude	minimizati	nonlinear	particles	polygonal	rays
adaptatior	b	capturing	compressiv	curve	displays	exploratio	footage	gradient	immersive	kinematics	mail	mixture	normal	pass	polynomia	re
adaptive	backgroun	carlo	computed	curves	distance	exploring	force	grammar	implicit	lagrangian	man	mobile	normals	passive	pose	reality
affine	balance	cartoon	computing	cuts	distances	exposure	forces	graph	importanc	language	manifold	modal	npr	patch	poses	realtime
air	bandwidth	cell	condition	database	distortion	expressior	foregroun	graphical	improving	laplacian	manifolds	modeling	nurbs	patches	potential	reciprocal
aliasing	base	chain	conformal	deblurring	distortions	expressior	form	graphs	incident	lapse	manipulati	modelling	occlusion	path	power	reconstruc
aligned	bases	character	connectivi	decompos	distributio	extraction	forward	grid	incompres	large	manner	momentur	octree	paths	pre	reconstruc
alignment	basis	characters	constraine	defocus	distributio	eye	fourier	grids	indirect	larger	map	monte	offline	pattern	precomput	recovery
alpha	behavior	class	constraint	deformabl	do	fabricating	fracture	guided	inhomoge	lattice	mapping	morphing	offset	patterns	prediction	reduced
ambient	behaviors	classes	constraint	deformati	domain	fabricatior	fragment	hair	injective	layer	mappings	motion	online	pdf	predictive	reduction
angle	bidirectior	clip	contact	deformati	domains	face	frame	halftoning	ink	layered	maps	motions	operator	perception	preserving	refinemen
angular	bijective	clips	contour	deforming	drawing	faces	frames	hand	integral	layers	marker	mounted	operators	perceptual	pressure	reflectance
animated	bilateral	close	contours	delaunay	drawings	facial	freeform	handle	integrals	layout	markerless	movement	optical	perceptual	principal	reflection
animating	binary	closed	contrast	denoising	dual	factored	frequency	hard	integratior	layouts	markov	moving	optics	phase	printing	reflections
animation	binocular	cloth	control	dense	dynamic	factorizati	friction	hardware	intensity	learning	matching	multi	optimizati	phenomen	probabilist	refractive
animation	biped	clothing	controllab	density	dynamics	feature	from	harmonic	inter	least	material	multidime	optimized	photo	procedura	regions
anisotropi	blend	cloud	controlled	depth	edge	features	function	harmonics	interactior	level	materials	multigrid	optimizing	photograp	processors	registratio
anti	blending	clouds	controller	design	edges	feedback	functional	hdr	interactior	levels	matte	multiphase	order	photograp	programm	regression
aperture	blendshap	clustering	controllers	designing	edit	fem	furniture	head	interactive	light	matting	multiple	orientatior	photograp	progressiv	regular
appearanc	blur	clusters	controls	designs	editing	field	game	height	interface	lighting	means	multiplexe	orthogona	photograp	projection	regularizat
approxima	bodies	coarse	convex	detection	effect	fields	games	heterogen	interfaces	lights	measure	multipole	overlappin	photon	projector	relief
architectu	body	coded	convolutic	device	elastic	figure	garment	hierarchica	interior	limited	measured	multiresol	paint	photoreali	projectors	relighting
architectu	boundarie	coding	coordinate	devices	elasticity	filter	gathering	hierarchy	interpolati	line	measurem	multiscale	painting	photos	propagatic	remeshing
architectu	boundary	coefficient	coordinate	diagrams	element	filtering	gaussian	high	intersectic	linear	measurem	muscle	pairs	physical	pyramid	rendering
arrangeme	bounded	collision	correspon	differences	elements	filters	generated	higher	into	lines	measures	muscles	panel	physically	quad	renderings
arrays	bounding	collisions	correspon	differentia	embedded	finding	generatior	homogene	invariant	links	measuring	natural	panoramas	physics	quadrangu	representa
art	brdf	color	correspon	diffuse	embedding	finite	geodesic	hull	inverse	liquid	mechanics	navier	paper	piecewise	quadratic	reproducti
articulatec	brdfs	commodit	coupling	diffusion	energy	fitting	geometric	human	irregular	liquids	media	navigation	parallel	pixel	quasi	resamplin

Figure 12: Keyword view with a keyword selected

We start by looking at the keywords and clicking on ”global” and ”illumination”. These keywords can be found by either starting the search at the letter ”G” and ”I”, or by using the search textbox. Once these two keywords are clicked on, other related keywords are also highlighted (Figure 13).



bubbles	complexity	crowds	directiona	environme	flow	geometry	illuminatic	iterative	locomotio	meshes	network	parametric	planning	radiance	retrieval
building	componen	crowdsour	discrete	error	flows	global	illustratior	joint	low	meshing	networks	parametriz	plastic	random	rgb
caching	composite	cubic	discretizat	eulerian	fluid	globally	image	kernel	lower	meshless	neural	partial	points	range	rigging
camera	compositir	cues	disk	evaluation	fluids	glossy	imagery	kernels	luminance	metric	noise	participati	poisson	rasterizati	rigid
cameras	compositic	culling	displaceme	example	focal	gpu	images	keyframe	machine	metrics	noisy	particle	polygon	ray	rod
capture	compressi	curvature	display	examples	focus	gpus	imaging	kinematic	magnitude	minimizati	nonlinear	particles	polygonal	rays	rods
capturing	compressiv	curve	displays	exploratio	footage	gradient	immersive	kinematics	mail	mixture	normal	pass	polynomia	re	rotation
carlo	computed	curves	distance	exploring	force	grammar	implicit	lagrangian	man	mobile	normals	passive	pose	reality	rotational
cartoon	computing	cuts	distances	exposure	forces	graph	importanc	language	manifold	modal	npr	patch	poses	realtime	saliency
cell	condition	database	distortion	expressior	foregroun	graphical	improving	laplacian	manifolds	modeling	nurbs	patches	potential	reciprocal	salient
chain	conformal	deblurring	distortions	expressior	form	graphs	incident	lapse	manipulati	modelling	occlusion	path	power	reconstruc	sample
character	connectivi	decompos	distributio	extraction	forward	grid	incompres	large	manner	momentur	octree	paths	pre	reconstruc	sampled
characters	constraine	defocus	distributio	eye	fourier	grids	indirect	larger	map	monte	offline	pattern	precomput	recovery	samples
class	constraint	deformabl	do	fabricating	fracture	guided	inhomoge	lattice	mapping	morphing	offset	patterns	prediction	reduced	sampling
classes	constraint	deformati	domain	fabricatior	fragment	hair	injective	layer	mappings	motion	online	pdf	predictive	reduction	scan
clip	contact	deformati	domains	face	frame	halftoning	ink	layered	maps	motions	operator	perception	preserving	refinemen	scanning
clips	contour	deforming	drawing	faces	frames	hand	integral	layers	marker	mounted	operators	perceptual	pressure	reflectance	scans
close	contours	delaunay	drawings	facial	freeform	handle	integrals	layout	markerless	movement	optical	perceptual	principal	reflection	scattering
closed	contrast	denoising	dual	factored	frequency	hard	integratior	layouts	markov	moving	optics	phase	printing	reflections	seamless
cloth	control	dense	dynamic	factorizati	friction	hardware	intensity	learning	matching	multi	optimizati	phenomen	probabilist	refractive	search
clothing	controllab	density	dynamics	feature	from	harmonic	inter	least	material	multidime	optimized	photo	procedura	regions	second
cloud	controlled	depth	edge	features	function	harmonics	interactior	level	materials	multigrid	optimizing	photograp	processors	registratio	segmentat
clouds	controller	design	edges	feedback	functional	hdr	interactior	levels	matte	multiphase	order	photograp	programm	regression	semi
clustering	controllers	designing	edit	fem	furniture	head	interactive	light	matting	multiple	orientatior	photograp	progressiv	regular	sensing
clusters	controls	designs	editing	field	game	height	interface	lighting	means	multiplexe	orthogona	photograp	projection	regularizat	sensor
coarse	convex	detection	effect	fields	games	heterogen	interfaces	lights	measure	multipole	overlappin	photon	projector	relief	sequence
coded	convolutic	device	elastic	figure	garment	hierarchica	interior	limited	measured	multiresol	paint	photoreali	projectors	relighting	sequences
coding	coordinate	devices	elasticity	filter	gathering	hierarchy	interpolati	line	measurem	multiscale	painting	photos	propagatic	remeshing	sequentia
coefficient	coordinate	diagrams	element	filtering	gaussian	high	intersectic	linear	measurem	muscle	pairs	physical	pyramid	rendering	session
collision	correspon	differences	elements	filters	generated	higher	into	lines	measures	muscles	panel	physically	quad	renderings	shader
collisions	correspon	differentia	embedded	finding	generatior	homogene	invariant	links	measuring	natural	panoramas	physics	quadrangu	representa	shaders
color	correspon	diffuse	embedding	finite	geodesic	hull	inverse	liquid	mechanics	navier	paper	piecewise	quadratic	reproducti	shading
commodit	coupling	diffusion	energy	fitting	geometric	human	irregular	liquids	media	navigation	parallel	pixel	quasi	resamplin	shadow

Figure 13: ”global” and ”illumination” keywords selected

In the paper view, papers with both the keywords are highlighted (Figure 14).

There are two highlighted papers in 2015, one of them having significantly more citations than the other. Since we are interested in the state-of-the-art research, we click on the one in 2015 with more citations. This paper is called ”Gradient domain path tracing” (Figure 15).

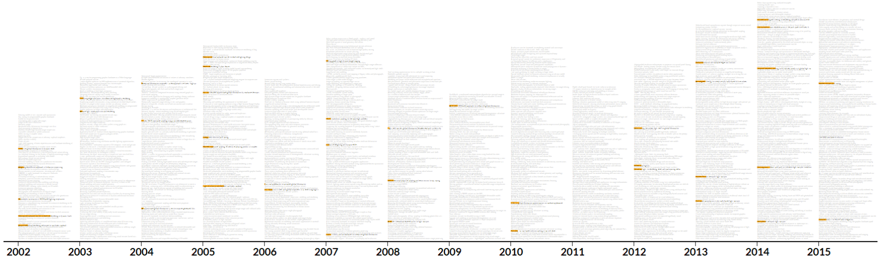
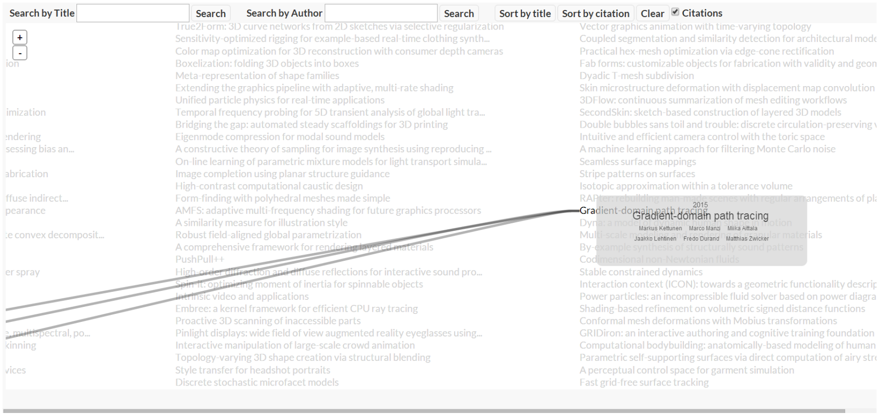


Figure 14: Papers with both keywords: ”global” and ”illumination” keywords selected



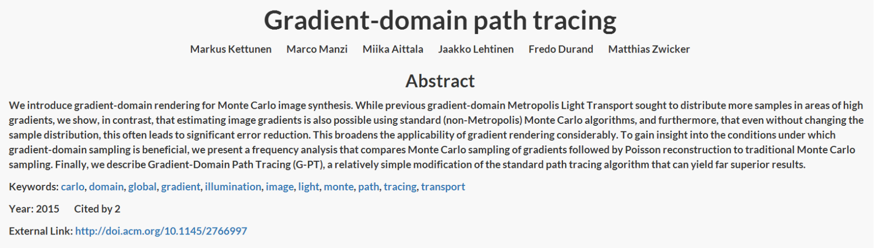
True2Form: 3D curve networks from 2D sketches via selective regularization
Sensitivity-optimized rigging for example-based real-time clothing synth...
Color map optimization for 3D reconstruction with consumer depth cameras
Boxelization: folding 3D objects into boxes
Meta-representation of shape families
Extending the graphics pipeline with adaptive, multi-rate shading
Unified particle physics for real-time applications
Temporal frequency probing for 5D transient analysis of global light tra...
Bridging the gap: automated steady scaffoldings for 3D printing
Eigenmode compression for modal sound models
A constructive theory of sampling for image synthesis using reproducing ...
On-line learning of parametric mixture models for light transport simula...
Image completion using planar structure guidance
High-contrast computational caustic design
Form-finding with polyhedral meshes made simple
AMFS: adaptive multi-frequency shading for future graphics processors
A similarity measure for illustration style
Robust field-aligned global parametrization
A comprehensive framework for rendering layered materials
PushPull++
High-order diffraction and diffuse reflections for interactive sound pro...
Spin-it: optimizing moment of inertia for spinnable objects
Intrinsic video and applications
Embree: a kernel framework for efficient CPU ray tracing
Proactive 3D scanning of inaccessible parts
Pinlight displays: wide field of view augmented reality eyeglasses using...
Interactive manipulation of large-scale crowd animation
Topology-varying 3D shape creation via structural blending
Style transfer for headshot portraits
Discrete stochastic microfacet models

Vector graphics animation with time-varying topology
Coupled segmentation and similarity detection for architectural mode
Practical hex-mesh optimization via edge-cone rectification
Fab forms: customizable objects for fabrication with validity and geon
Dyadic T-mesh subdivision
Skin microstructure deformation with displacement map convolution
3DFlow: continuous summarization of mesh editing workflows
SecondSkin: sketch-based construction of layered 3D models
Double bubbles sans toil and trouble: discrete circulation-preserving v
Intuitive and efficient camera control with the toric space
A machine learning approach for filtering Monte Carlo noise
Seamless surface mappings
Stripe patterns on surfaces
Isotopic approximation within a tolerance volume
RAPter: rebuilding man-made scenes with regular arrangements of pla
Gradient-domain path tracing
Dyna: a model of dynamic human shape in motion
Multi-scale modeling and rendering of granular materials
By-example synthesis of structurally sound patterns
Codimensional non-Newtonian fluids
Stable constrained dynamics
Interaction context (ICON): towards a geometric functionality descrip
Power particles: an incompressible fluid solver based on power diagra
Shading-based refinement on volumetric signed distance functions
Conformal mesh deformations with Mobius transformations
GRIDiron: an interactive authoring and cognitive training foundation
Computational bodybuilding: anatomically-based modeling of human
Parametric self-supporting surfaces via direct computation of airy stre
A perceptual control space for garment simulation
Fast grid-free surface tracking

2015
Gradient-domain path tracing
Markus Kettunen Marco Manzi Miika Aittala
Jaakko Lehtinen Fredo Durand Matthias Zwicker

Figure 15: ”Gradient domain path tracing” paper selected

In the paper detail view, we can read the selected paper’s abstract, as well as see a list of keywords associated with this paper (Figure 16).



Gradient-domain path tracing

Markus Kettunen Marco Manzi Miika Aittala Jaakko Lehtinen Fredo Durand Matthias Zwicker

Abstract

We introduce gradient-domain rendering for Monte Carlo image synthesis. While previous gradient-domain Metropolis Light Transport sought to distribute more samples in areas of high gradients, we show, in contrast, that estimating image gradients is also possible using standard (non-Metropolis) Monte Carlo algorithms, and furthermore, that even without changing the sample distribution, this often leads to significant error reduction. This broadens the applicability of gradient rendering considerably. To gain insight into the conditions under which gradient-domain sampling is beneficial, we present a frequency analysis that compares Monte Carlo sampling of gradients followed by Poisson reconstruction to traditional Monte Carlo sampling. Finally, we describe Gradient-Domain Path Tracing (G-PT), a relatively simple modification of the standard path tracing algorithm that can yield far superior results.

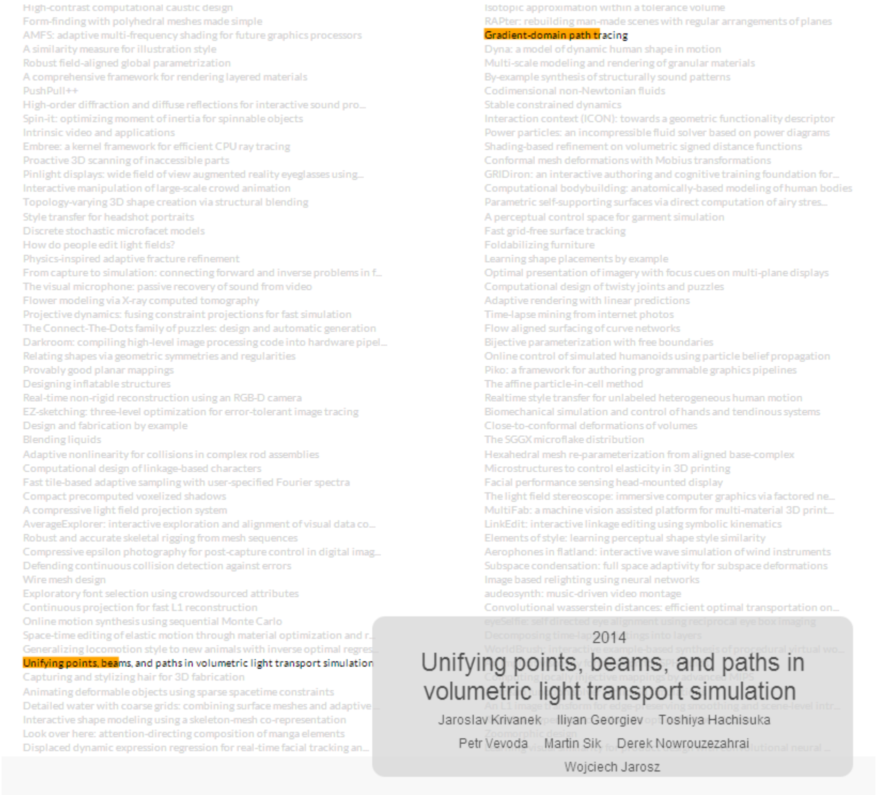
Keywords: carlo, domain, global, gradient, illumination, image, light, monte, path, tracing, transport

Year: 2015 Cited by 2

External Link: http://doi.acm.org/10.1145/2766997

Figure 16: ”Gradient domain path tracing” paper abstract

After reading the abstract and having a look at the keywords, we are interested in the keyword ”path tracing”, which is a technique to achieve global illumination. Clicking on these two words (”path” and ”tracing”) in the paper detail view bring us to the keyword view where these two keywords are selected (in addition to ”global” and ”illumination” which were selected before). Going back to the paper view, which now highlights all the papers with these four keywords. Looking at the recent years we notice there are two highlighted papers, one of which is the one that we have already seen (Figure 17).



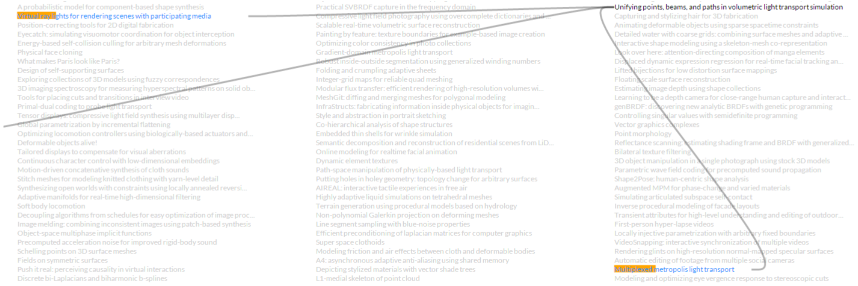
High-contrast computational caustic design
Form-finding with polyhedral meshes made simple
AMFS: adaptive multi-frequency shading for future graphics processors
A similarity measure for illustration style
Robust field-aligned global parametrization
A comprehensive framework for rendering layered materials
PushPull++
High-order diffraction and diffuse reflections for interactive sound pro...
Spin-it: optimizing moment of inertia for spinnable objects
Intrinsic video and applications
Embree: a kernel framework for efficient CPU ray tracing
Proactive 3D scanning of inaccessible parts
Pinlight displays: wide field of view augmented reality eyeglasses using...
Interactive manipulation of large-scale crowd animation
Topology-varying 3D shape creation via structural blending
Style transfer for headshot portraits
Discrete stochastic microfacet models
How do people edit light fields?
Physics-inspired adaptive fracture refinement
From capture to simulation: connecting forward and inverse problems in f...
The visual microphone: passive recovery of sound from video
Flower modeling via X-ray computed tomography
Projective dynamics: fusing constraint projections for fast simulation
The Connect-The-Dots family of puzzles: design and automatic generation
Darkroom: compiling high-level image processing code into hardware pipel...
Relating shapes via geometric symmetries and regularities
Provably good planar mappings
Designing inflatable structures
Real-time non-rigid reconstruction using an RGB-D camera
EZ-sketching: three-level optimization for error-tolerant image tracing
Design and fabrication by example
Blending liquids
Adaptive nonlinearity for collisions in complex rod assemblies
Computational design of linkage-based characters
Fast tile-based adaptive sampling with user-specified Fourier spectra
Compact precomputed voxelized shadows
A compressive light field projection system
AverageExplorer: interactive exploration and alignment of visual data co...
Robust and accurate skeletal rigging from mesh sequences
Compressive epsilon photography for post-capture control in digital imag...
Defending continuous collision detection against errors
Wire mesh design
Exploratory font selection using crowdsourced attributes
Continuous projection for fast L1 reconstruction
Online motion synthesis using sequential Monte Carlo
Space-time editing of elastic motion through material optimization and r...
Generalizing locomotion style to new animals with inverse optimal regres...
Unifying points, beams, and paths in volumetric light transport simulation
Capturing and stylizing hair for 3D fabrication
Animating deformable objects using sparse spacetime constraints
Detailed water with coarse grids: combining surface meshes and adaptive ...
Interactive shape modeling using a skeleton-mesh co-representation
Look over here: attention-directing composition of manga elements
Displaced dynamic expression regression for real-time facial tracking an...

Isotopic approximation within a tolerance volume
RAPter: rebuilding man-made scenes with regular arrangements of planes
Gradient-domain path tracing
Dyna: a model of dynamic human shape in motion
Multi-scale modeling and rendering of granular materials
By-example synthesis of structurally sound patterns
Codimensional non-Newtonian fluids
Stable constrained dynamics
Interaction context (ICON): towards a geometric functionality descriptor
Power particles: an incompressible fluid solver based on power diagrams
Shading-based refinement on volumetric signed distance functions
Conformal mesh deformations with Mobius transformations
GRIDiron: an interactive authoring and cognitive training foundation for...
Computational bodybuilding: anatomically-based modeling of human bodies
Parametric self-supporting surfaces via direct computation of airy stres...
A perceptual control space for garment simulation
Fast grid-free surface tracking
Foldabilizing furniture
Learning shape placements by example
Optimal presentation of imagery with focus cues on multi-plane displays
Computational design of twisty joints and puzzles
Adaptive rendering with linear predictions
Time-lapse mining from internet photos
Flow aligned surfacing of curve networks
Bijective parameterization with free boundaries
Online control of simulated humanoids using particle belief propagation
Piko: a framework for authoring programmable graphics pipelines
The affine particle-in-cell method
Realtime style transfer for unlabeled heterogeneous human motion
Biomechanical simulation and control of hands and tendinous systems
Close-to-conformal deformations of volumes
The SGGX microflake distribution
Hexahedral mesh re-parameterization from aligned base-complex
Microstructures to control elasticity in 3D printing
Facial performance sensing head-mounted display
The light field stereoscope: immersive computer graphics via factored ne...
MultiFab: a machine vision assisted platform for multi-material 3D print...
LinkEdit: interactive linkage editing using symbolic kinematics
Elements of style: learning perceptual shape style similarity
Aerophones in flatland: interactive wave simulation of wind instruments
Subspace condensation: full space adaptivity for subspace deformations
Image based relighting using neural networks
audeosynth: music-driven video montage
Convolutional wasserstein distances: efficient optimal transportation on...
eyeSelfie: self directed eye alignment using reciprocal eye box imaging

2014
Unifying points, beams, and paths in volumetric light transport simulation
Jaroslav Krivanek Iliyan Georgiev Toshiya Hachisuka
Petr Vevoda Martin Sik Derek Nowrouzezahrai
Wojciech Jarosz

Figure 17: Papers having the four keywords ”global”, ”illumination”, ”path” and ”tracing”

We click on the the other paper which is titled ”Unifying points, beams, and paths in volumetric light transport simulation”. After going to the paper detail view to read its abstract, we are interested in this paper and want to find papers that are related to it. We go back to the paper view and see that this paper references another paper in the same year, with a title that seems like it could be of interest to us: ”Multiplexed metropolis light transport” (Figure 18).



A probabilistic model for component-based shape synthesis
Virtual ray lights for rendering scenes with participating media
Position-correcting tools for 2D digital fabrication
Eyecatch: simulating visuomotor coordination for object interception
Energy-based self-collision culling for arbitrary mesh deformations
Physical face cloning
What makes Paris look like Paris?
Design of self-supporting surfaces
Exploring collections of 3D models using fuzzy correspondences
3D imaging spectroscopy for measuring hyperspectral patterns on solid ob...
Tools for placing cuts and transitions in interview video
Primal-dual coding to probe light transport
Tensor displays: compressive light field synthesis using multilayer disp...
Global parametrization by incremental flattening
Optimizing locomotion controllers using biologically-based actuators and...
Deformable objects alive!
Tailored displays to compensate for visual aberrations
Continuous character control with low-dimensional embeddings
Motion-driven concatenative synthesis of cloth sounds
Stitch meshes for modeling knitted clothing with yarn-level detail
Synthesizing open worlds with constraints using locally annealed reversi...
Adaptive manifolds for real-time high-dimensional filtering
Soft body locomotion
Decoupling algorithms from schedules for easy optimization of image proc...
Image melding: combining inconsistent images using patch-based synthesis
Object-space multiphase implicit functions
Precomputed acceleration noise for improved rigid-body sound
Schelling points on 3D surface meshes
Fields on symmetric surfaces
Push it real: perceiving causality in virtual interactions
Discrete bi-Laplacians and biharmonic b-splines

Practical SVBRDF capture in the frequency domain
Compressive light field photography using overcomplete dictionaries and ...
Scalable real-time volumetric surface reconstruction
Painting by feature: texture boundaries for example-based image creation
Optimizing color consistency in photo collections
Gradient-domain metropolis light transport
Robust inside-outside segmentation using generalized winding numbers
Folding and crumpling adaptive sheets
Integer-grid maps for reliable quad meshing
Modular flux transfer: efficient rendering of high-resolution volumes wi...
MeshGit: diffing and merging meshes for polygonal modeling
InfraStructs: fabricating information inside physical objects for imagin...
Style and abstraction in portrait sketching
Co-hierarchical analysis of shape structures
Embedded thin shells for wrinkle simulation
Semantic decomposition and reconstruction of residential scenes from LiD...
Online modeling for realtime facial animation
Dynamic element textures
Path-space manipulation of physically-based light transport
Putting holes in holey geometry: topology change for arbitrary surfaces
AIREAL: interactive tactile experiences in free air
Highly adaptive liquid simulations on tetrahedral meshes
Terrain generation using procedural models based on hydrology
Non-polynomial Galerkin projection on deforming meshes
Line segment sampling with blue-noise properties
Efficient preconditioning of laplacian matrices for computer graphics
Super space clothoids
Modeling friction and air effects between cloth and deformable bodies
A4: asynchronous adaptive anti-aliasing using shared memory
Depicting stylized materials with vector shade trees
L1-medial skeleton of point cloud

Unifying points, beams, and paths in volumetric light transport simulation
Capturing and stylizing hair for 3D fabrication
Animating deformable objects using sparse spacetime constraints
Detailed water with coarse grids: combining surface meshes and adaptive ...
Interactive shape modeling using a skeleton-mesh co-representation
Look over here: attention-directing composition of manga elements
Displaced dynamic expression regression for real-time facial tracking an...
Lifted bijections for low distortion surface mappings
Floating scale surface reconstruction
Estimating image depth using shape collections
Learning to be a depth camera for close-range human capture and interact...
genBRDF: discovering new analytic BRDFs with genetic programming
Controlling singular values with semidefinite programming
Vector graphics complexes
Point morphology
Reflectance scanning: estimating shading frame and BRDF with generalized...
Bilateral texture filtering
3D object manipulation in a single photograph using stock 3D models
Parametric wave field coding for precomputed sound propagation
Shape2Pose: human-centric shape analysis
Augmented MPM for phase-change and varied materials
Simulating articulated subspace self-contact
Inverse procedural modeling of facade layouts
Transient attributes for high-level understanding and editing of outdoor...
First-person hyper-lapse videos
Locally injective parametrization with arbitrary fixed boundaries
VideoSnapping: interactive synchronization of multiple videos
Rendering glints on high-resolution normal-mapped specular surfaces
Automatic editing of footage from multiple social cameras
Multiplexed metropolis light transport
Modeling and optimizing eye vergence response to stereoscopic cuts

Figure 18: Papers that our paper of interest references

Clicking on the paper ”Multiplexed metropolis light transport”, we can read its abstract and furthermore look at its authors. We notice that one of its authors, Carsten Dachsbacher, has written a paper in SIGGRAPH 2007 about a method that addresses the problem of ”interactive global illumination” (the paper’s title is ”Implicit visibility and antiradiance for interactive global illumination”) (Figure 19. We are interested in knowing more about this paper because unlike path tracing, which is a general but very slow solution to the problem of global illumination, this paper seems to propose a method that can compute global illumination at interactive rates.

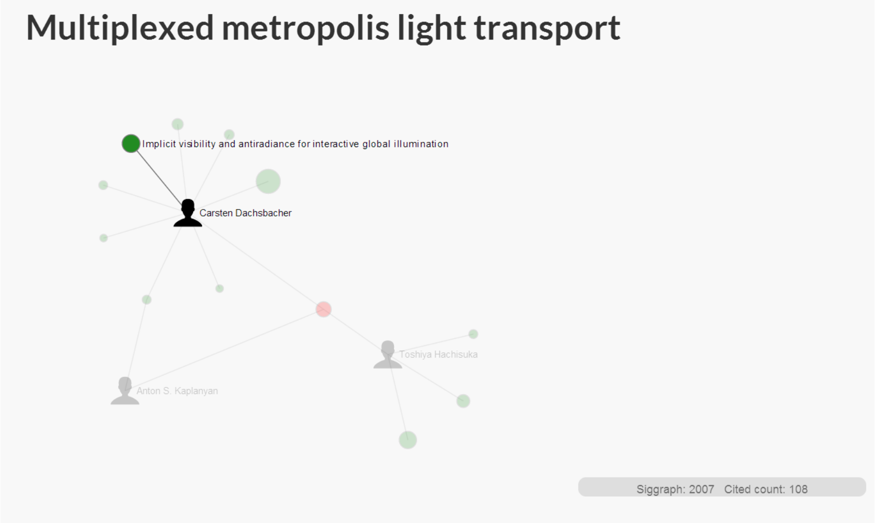
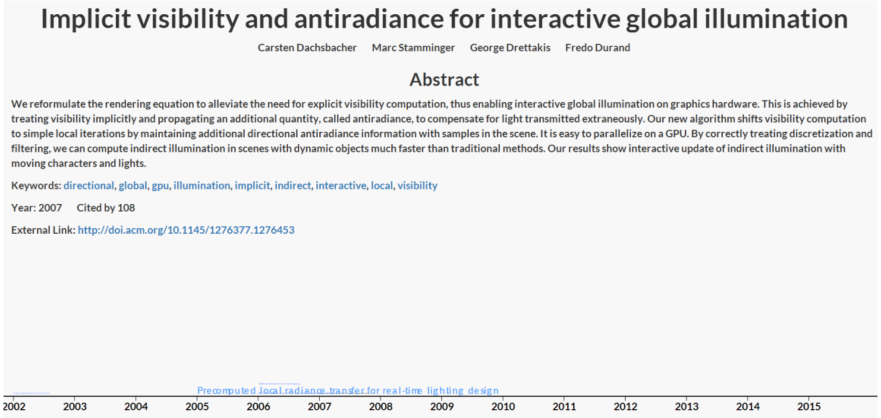

Multiplexed metropolis light transport
Implicit visibility and antiradiance for interactive global illumination
Carsten Dachsbacher
Toshiya Hachisuka
Anton S. Kaplanyan
Siggraph: 2007 Cited count: 108

Figure 19: Carsten Dachsbacher’s SIGGRAPH publications

We then click on the paper ”Implicit visibility and antiradiance for interactive global illumination” in the author view to select it. Back to the paper detail view we can read this paper’s abstract and look at the list of papers that it references (Figure 20). And from this we can continue our exploration of the space of papers that try to solve the global illumination problem in one way or another.



Implicit visibility and antiradiance for interactive global illumination

Carsten Dachsbacher Marc Stamminger George Drettakis Fredo Durand

Abstract

We reformulate the rendering equation to alleviate the need for explicit visibility computation, thus enabling interactive global illumination on graphics hardware. This is achieved by treating visibility implicitly and propagating an additional quantity, called antiradiance, to compensate for light transmitted extraneously. Our new algorithm shifts visibility computation to simple local iterations by maintaining additional directional antiradiance information with samples in the scene. It is easy to parallelize on a GPU. By correctly treating discretization and filtering, we can compute indirect illumination in scenes with dynamic objects much faster than traditional methods. Our results show interactive update of indirect illumination with moving characters and lights.

Keywords: directional, global, gpu, illumination, implicit, indirect, interactive, local, visibility

Year: 2007 Cited by 108

External Link: http://doi.acm.org/10.1145/1276377.1276453

Precomputed local radiance transfer for real-time lighting design
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

Figure 20: Antiradiance paper details

Conclusion We have shown that our tool provides several ways to navigate the space of papers that are related to certain topics of interest. One can use either the reference relationships, the common keyword relationships, or the common author relationships to get to the papers of interest and read their abstract to understand them more. On our way of exploring the data, we also learn more about the various techniques employed and get an idea about who publish frequently in this topic. All of these can work together to help the user quickly get a high-level understanding of the field of research he or she is interested in.