

THE SPINNINGGLASS PROJECT

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THE REAL VOYAGE OF DISCOVERY CONSISTS NOT IN SEEKING NEW
LANDSCAPES BUT IN HAVING NEW EYES.

- MARCEL PROUST, FRENCH NOVELIST

	TOPIC		PAGE
TITLE		1	
INDEX		3	
CONCEPT		4	
WORK FLOW		5	
PROCESSING		8	
ACCESS		9	
PROJECT INFORMATION		10	
FILE SELECTION		11	
EDIT		12	
KEY MAPPING		19	
COLOR AVERAGING		20	
ANALYSIS		21	
REFERENCES		24	
ICON QUICK REFERENCE GUIDE		25	

BACKGROUND

IN RECENT YEARS, AIRLINES HAVE INTRODUCED A NEW BUSINESS MODEL SHIFTING TO SMALLER REGIONAL AIRPORTS IN ORDER TO REDUCE COSTS WHILE AT THE SAME TIME OFFERING CONVENIENCE FOR AIR TRAVELERS. THIS SHIFT, WHILE EASING DEMAND CONSTRAINTS AT LARGER AIRPORTS, WILL INCREASE THE NUMBER OF FLIGHT SEGMENTS ABOVE PUGET SOUND ALTERING THE LAND USES BELOW EACH NEW SEGMENT. THE AVIATION INDUSTRY AND THE FEDERAL AVIATION ADMINISTRATION (FAA) RECOGNIZE THAT THERE ARE CONSTRAINTS AND CONSIDERATIONS IN REGARD TO LAND USE COMPATIBILITIES.

THE AIRLINE INDUSTRY IS HIGHLY SPECULATIVE, AND THE ECONOMIC DRIVERS ASSOCIATED WITH THE AIRLINE INDUSTRY ARE DYNAMIC. OVER THE LAST TWENTY YEARS, BELLINGHAM INTERNATIONAL AIRPORT (BLI) HAS SEEN HIGH TURNOVER WITH SIX CARRIERS CEASING OPERATIONS. THE PORT OF BELLINGHAM HAS SPENT CONSIDERABLE INVESTMENT ON BLI AND CONSIDERS THE NUMBER OF FLIGHTS AND DESTINATIONS BENEFICIAL FOR THE COMMUNITIES OF WHATCOM COUNTY. IT IS PROJECTED THAT COMMERCIAL JET TRAFFIC WILL ANNUALLY INCREASE BETWEEN 2%-5% THROUGH 2050. THE EMERGENCE OF JET AIRCRAFT AND RESIDENTIAL GROWTH, ARE BEGINNING TO CONFLICT ESPECIALLY AS BELLINGHAM SERVICES MORE CANADIAN PASSENGERS. BLI NOT ONLY IMPACTS WHATCOM COUNTY BUT THE ENTIRE PUGET SOUND REGION. AN AIRCRAFT DESCENDS INTO BLI WELL OUTSIDE THE WHATCOM COUNTY REGION ADDING ADDITIONAL RISKS TO OTHER COMMUNITIES. THE CITIES OF EVERETT, SEATTLE (BOEING FIELD) AND BREMERTON ARE INTERESTED IN GROWING THEIR LOCAL AVIATION ECONOMIES. THIS ADDS ADDITIONAL LAYERS INTO LAND USE MITIGATION IN MULTIPLE REGIONS WITHOUT THE CONSENT OF THAT BORDERING REGION.

PROJECT DESCRIPTION

SPINNINGGLASS.ORG ALLOWS INDIVIDUALS TO CONDUCT COMPARATIVE ANALYSIS (IMAGE DIFFERENCING) WITHIN THEIR OWN GRAPHICAL ENVIRONMENT. BY FINDING A COMMON OBJECT ON A SELECTION OF RANDOM IMAGES PROVIDES THE INITIAL STEP INTO MEASURING CHANGE BORDERING THE SELECTED OBJECT. AS THE APPLICATION DRILLS DOWN THROUGH EACH IMAGE, VARIOUS BUFFERING CAN BE CONDUCTED TO FIND PATTERNS, FREQUENCIES, AND CHANGE THAT CAN ASSIST WITH MARKETING, LAND USE, RESEARCH AND OTHER RELATED FIELDS.”

STEPS

- GATHER IMAGES
- FIND COMMON OBJECT
- ADJUST IMAGE
- STACK ANALYSIS

GATHER IMAGES & FIND COMMON OBJECT

THE ABOVE FOUR IMAGES REPRESENT AIRPORT LAND USE MAPS. THE IDEA BEHIND SPINNINGGLASS IS TO FIND A COMMON OBJECT FOR ALIGNMENT. THE BLACK SQUARES REPRESENT THE COMMON OBJECT. THE APPLICATION SCALES EACH IMAGE AND ALIGNS THE IMAGES WITH A MASTER IMAGE AND CREATES A COMMON SCALE.

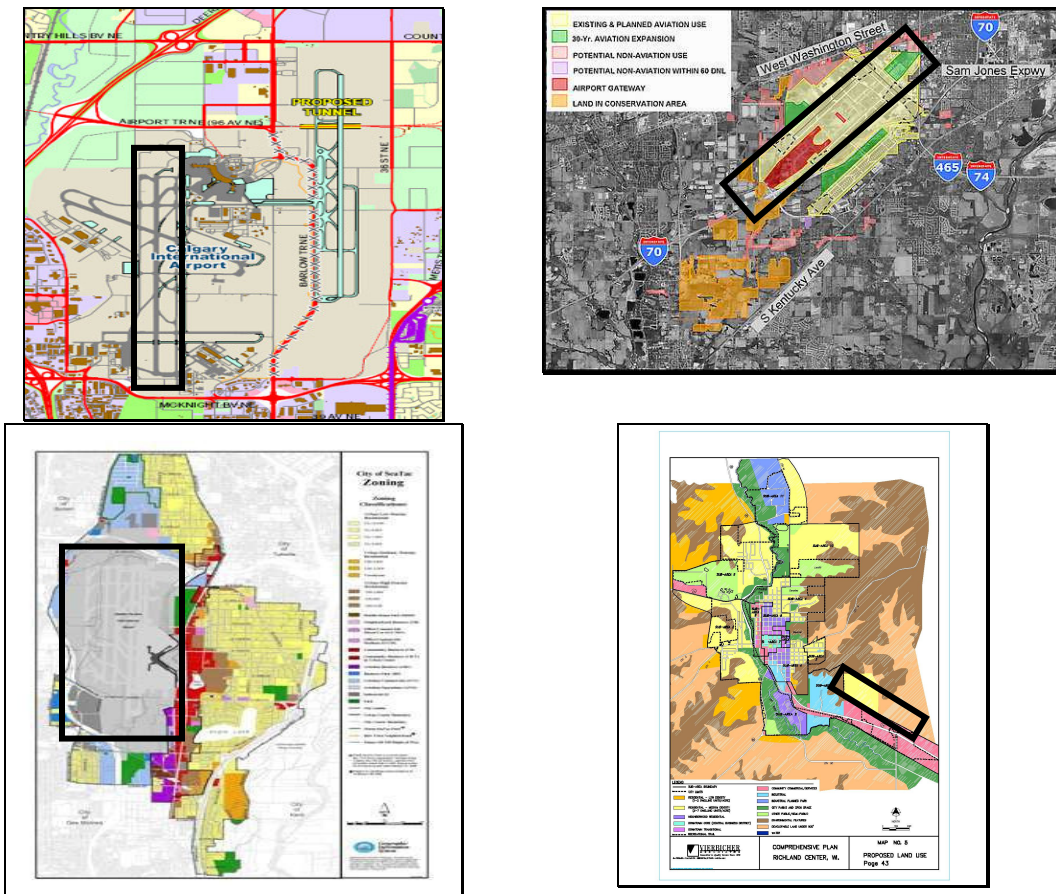


FIGURE 1, EXAMPLE WORK : AIRPORTS

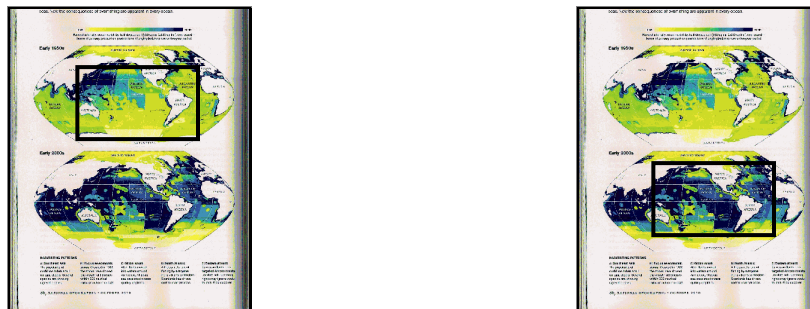


FIGURE 2, OVERFISHING

ADJUSTED IMAGES

THE PRINCIPLE IS TO ROTATE, SCALE, AND CENTER EACH IMAGE FOR OBJECT COMPARISON.

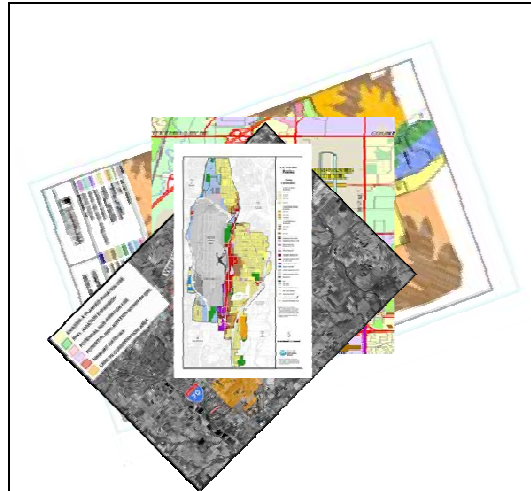


FIGURE 3 SCALED, CENTERED, AND ROTATED

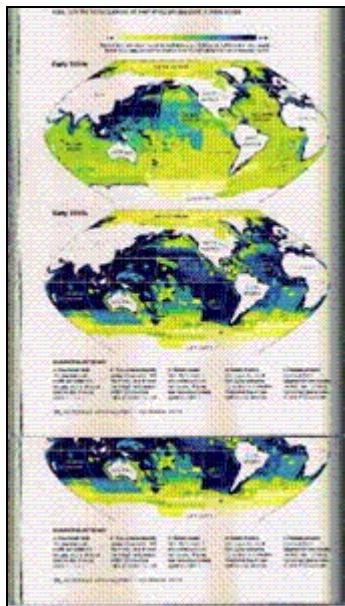


FIGURE 4, SCALED AND CENTERED

ANALYSIS

BUFFERING IS USED TO ANALYZE THE IMAGE LAYERS. THE APPLICATION WILL FIND THE COLORS (THEMES) FOR EACH IMAGE AND DO A COMPARATIVE ANALYSIS FOR THE GIVEN AREA THAT THE BUFFER OVERLAYS.

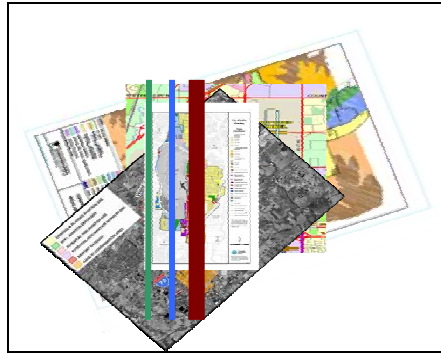


FIGURE 5, DIGITIZED FLIGHT PATTERNS BUFFERED

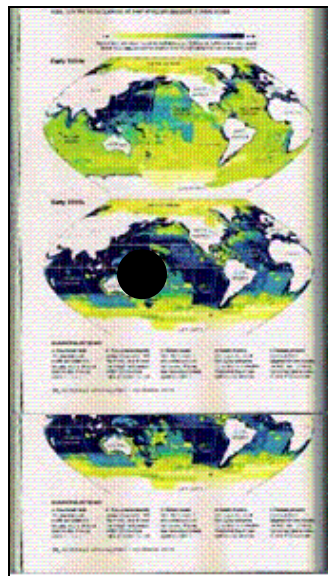
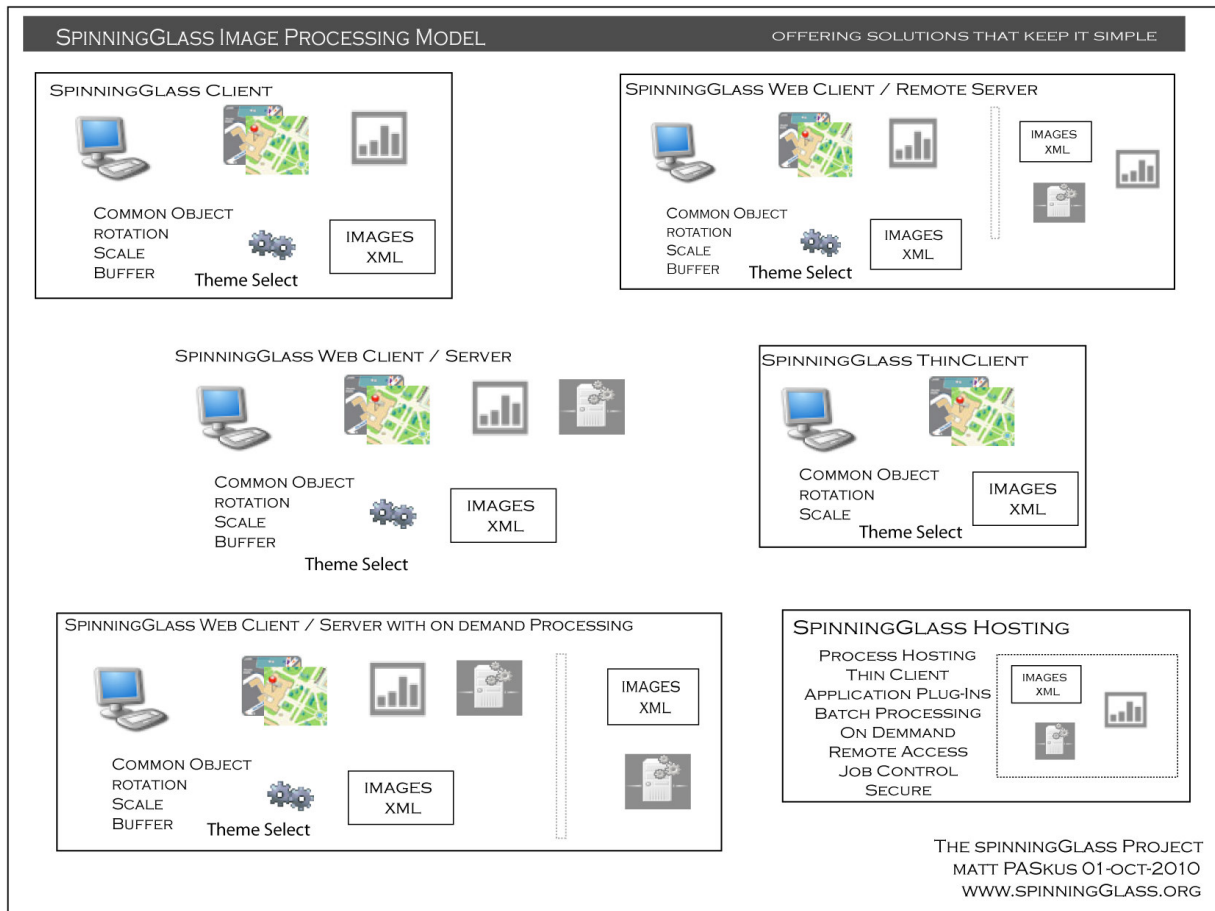


FIGURE 6, OVER FISHING BUFFER

THE ANALYSIS PROVIDES THE PERCENTAGE OF COVERAGE FOR THE GIVEN BUFFERED LAYER FOR EACH FILE AS WELL AS FOR THE TOTAL SAMPLE SIZE.

PROCESSING



TYPES OF PROCESSING IMPLEMENTATIONS

- CLIENT
- CLIENT / SERVER
- WEB CLIENT / SERVER WITH ON DEMAND PROCESSING
- WEB CLIENT / REMOTE SERVER
- THIN CLIENT
- WEB CLIENT/REMOTE SERVER

LEAST COMMON REQUIREMENT

- COMMON OBJECT
- ROTATION
- SCALE
- BUFFER
- THEME

SPINNINGGLASS ACCESS

EMAIL LOGIN

TO LOGIN TO THE APPLICATION, SIMPLY LOGIN USING YOUR EMAIL ACCOUNT. ACCOUNTS CAN BE GRANTED BY SENDING AN EMAIL TO ACCESS@SPINNINGGLASS.ORG.

EMAIL:

PASSWORD:

VIA

SPINNINGGLASS
BETA 1.0

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FIGURE 7, SPINNING GLASS ACCESS

PROJECT INFORMATION



ADDING PROJECTS

PROJECT INFORMATION ALLOWS USERS TO CREATE PROJECTS AND SELECT FILES THAT ASSOCIATE FOR THE PROJECT.

WHEN THE ADD (“+”) SYMBOL IS SELECTED, A TEXT FIELD IS DISPLAYED WHERE USERS CAN ENTER A NEW PROJECT NAME AND WHEN COMPLETE, HIT THE *VIA* KEY. THE PROJECT WILL THEN APPEAR AS A BUTTON ON THE RIGHT.

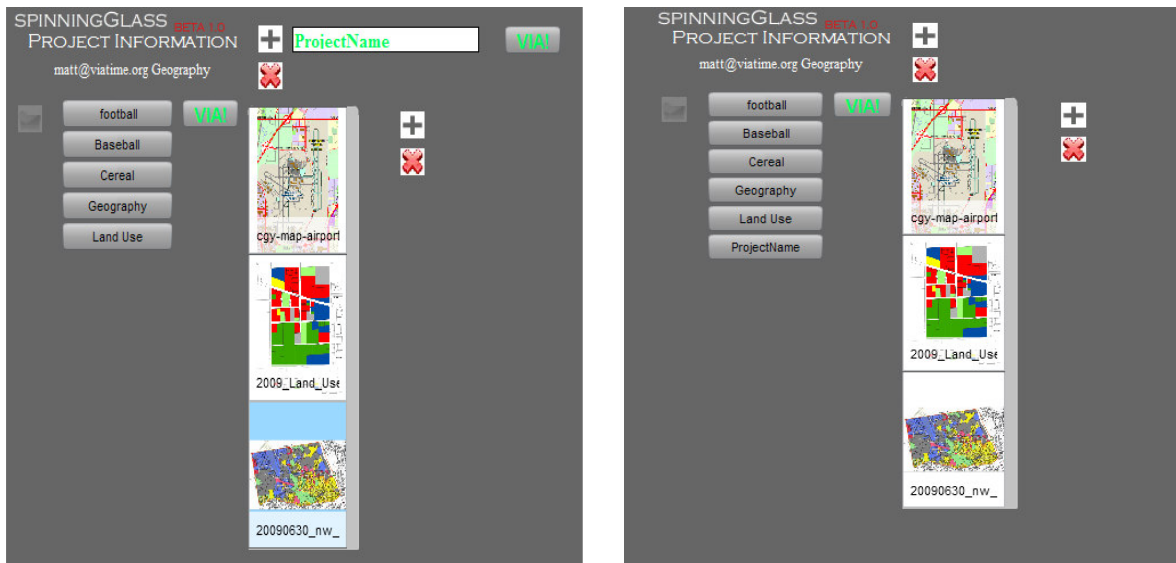


FIGURE 8, ADDING PROJECTS

DELETING PROJECTS

TO DELETE PROJECTS, USERS SELECT THE DELETE BUTTON (“X”) FOR THE PROJECT SELECTED.

FILE SELECTION

ADDING FILES

FILE UPLOADS ALLOWS USERS TO INPUT FILES THAT ASSOCIATE FOR THE PROJECT.

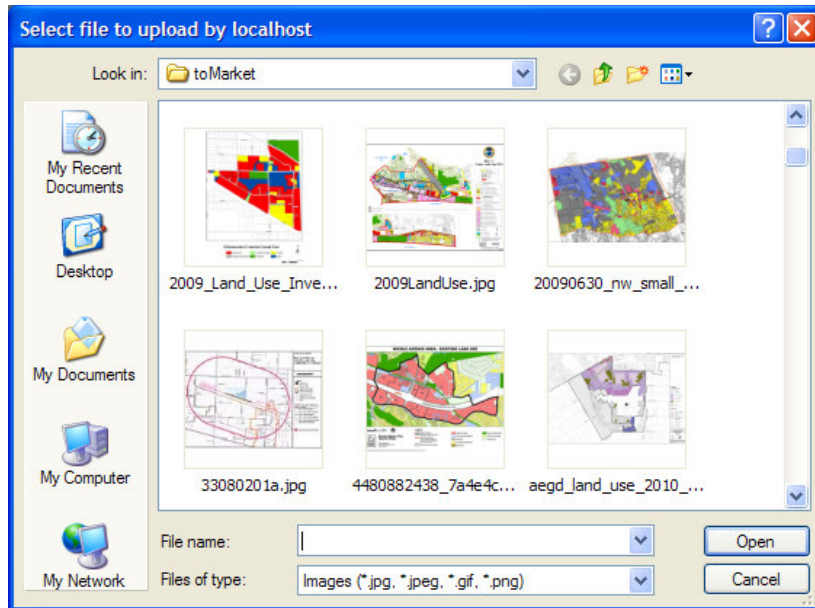


FIGURE 9, FILE SELECTION

WHEN THE ADD (“+”) SYMBOL IS SELECTED, AN UPLOAD BROWSER APPEARS. FILES CAN THEN BE ASSOCIATED AND UPLOADED TO THE PROJECT.

DELETING FILES

TO DELETE FILES, USERS SELECT THE DELETE BUTTON (“X”) FOR EITHER THE FILE SELECTED.



THE EDIT AREA IS WHERE MOST OF THE WORK TAKES PLACE. THE MENU SELECTS ALLOW YOU TO ADJUST, ROTATE AND CENTER THE IMAGE.

EDIT SCREEN MAP

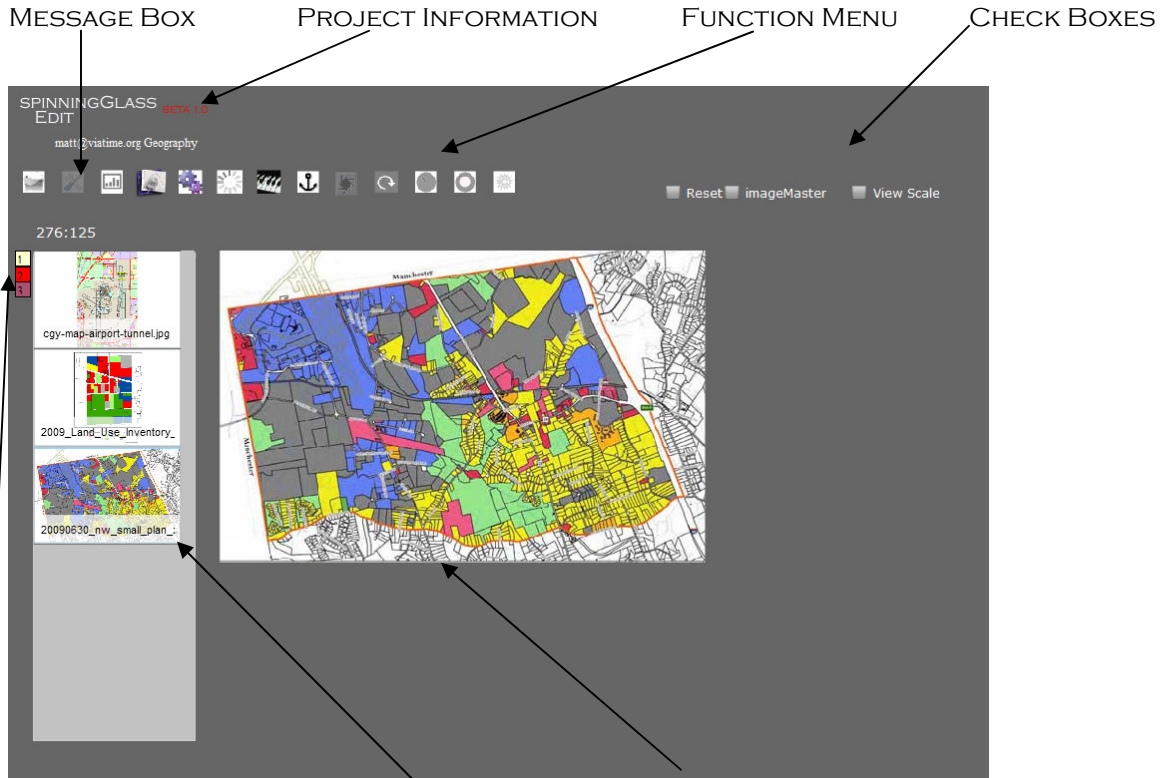


FIGURE 10, EDIT SCREEN MAPPING

FILE PIXEL COLOR INDEX

PROJECT FILES

MAIN VIEWING AREA

MESSAGE BOX

THE MESSAGE BOX DISPLAYS COORDINATES AND BRIEF FUNCTION DESCRIPTIONS

EXAMPLES:

COORDINATES:

276:125

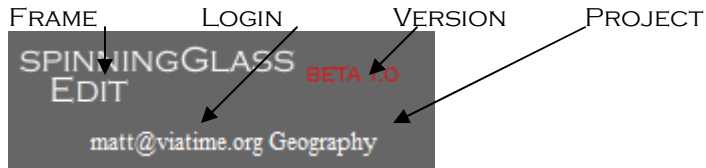
FUNCTION DESCRIPTION

Anchor Selection, this sets Common Object

PROJECT INFORMATION

PROVIDES LOGIN IN INFORMATION AND ASSOCIATED PROJECT.

EXAMPLE:




















FUNCTION MENU

THE FUNCTION MENU ALLOWS USERS TO NAVIGATE WITHIN SPINNINGGLASS.

EXAMPLE:

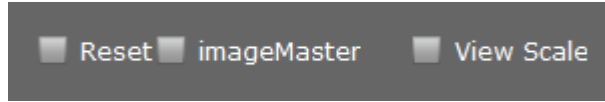


FUNCTION MENU ICON QUICK REFERENCE

PROJECT BUTTONS	SECTION	FUNCTION	DESCRIPTION
	PROJECT	ADD	THIS IS THE ADD BUTTON. THIS ADD FILES AND PROJECTS.
	PROJECT EDIT	DELETE	THE DELETE BUTTON REMOVES FILES AND FOLDERS FROM PROJECT. DELETE IS ALSO USED FOR DELETE KEYS.
	PROJECT	FOLDER	TAKES USERS TO THE PROJECT FRAME
	EDIT ANALYSIS	DIGITIZE	DIGITIZE POINTS ON IMAGE(S). USED FOR ANALYSIS
	EDIT ANALYSIS	STREAM	STREAMS AND DISPLAYS IMAGE(S) COLOR.
	EDIT	EDIT	TAKES USERS TO THE EDIT FRAME.
	EDIT	PROCESS	THIS PROCESSES THE DIGITIZED POINTS AN DISPLAYS COLORS ASSOCIATED WITH DIGITIZED PATH.
	ANALYSIS	ANALYZE	TAKES USERS TO THE ANALYZE FRAME
	EDIT	EDIT	ROTATE IMAGE(S). WHEN SELECTED A SLIDER APPEARS TO INPUT ROTATION ANGLE.
	EDIT	CENTER POINT	SELECT CENTER POINT FOR ROTATION
	EDIT	ANCHOR	THIS ANCHORS OBJECT FOR SCALING. USED WITH ADJUST.
	EDIT	ADJUST	THIS ADJUSTS IMAGE(S) TO MASTER INDEX IMAGE.
	KEY	KEY	TAKES USERS TO THE KEY MAPPING FRAME
	KEY	KEY COUNT	WHEN SELECTED, A GRID CAN BE CREATED TO SELECT KEY REGION FOR SPECIFIED IMAGES.
	COLOR AVERAGE	COLOR AVERAGE	THIS COLOR AVERAGES THE IMAGE. NOT USED. ROUTINE IS USED FOR KEY COLOR MAPPING.
	ANALYSIS	CIRCLE BUFFER	CIRCLE BUFFER CAPTURES IMAGE PIXELS COORDINATES WITHIN THE CIRCLE BUFFER.
	ANALYSIS	ORING BUFFER	ORING BUFFER CAPTURES IMAGE PIXELS COORDINATES WITHIN THE ORING BUFFER

CHECK BOXES

EXAMPLE:



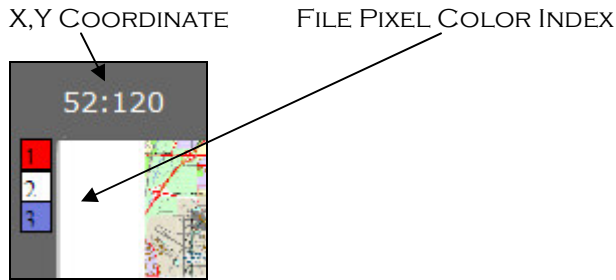
RESET – RESETS THE CURRENT IMAGE IF IT HAS BEEN EITHER ROTATED OR SCALE ADJUSTED.

IMAGE MASTER – THE IMAGE MASTER IS THE MAIN IMAGE THAT ALL OTHER IMAGES ADJUST TOO.

VIEW SCALE – ALLOWS USERS TO TOGGLE ON AND OFF THE SCALE BOXES ASSOCIATED WITH THE COMMON OBJECT.

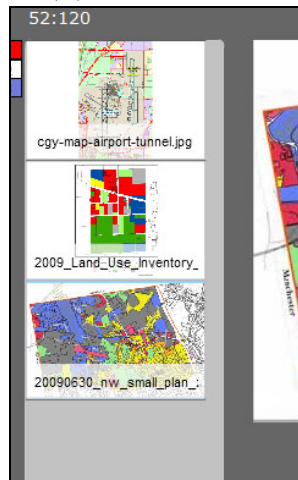
FILE PIXEL COLOR INDEX

THIS REPRESENTS THE PIXEL COLOR FOR EACH FILE AT THE ASSOCIATED X,Y COORDINATE WITHIN THE WORKING WINDOW. THE COLOR BOXES ARE NUMBERED AND ASSOCIATE TO THE FILES ASSOCIATED WITH THE PROJECT.



PROJECT FILES

THIS IS A SELECTABLE COLUMN THAT IS ASSOCIATED WITH THE PROJECT. THE SELECTED FILE IS HIGHLIGHTED IN BLUE AND AFTER SELECTED WILL APPEAR IN THE MAIN VIEWING AREA.



MAIN VIEWING AREA

THE MAIN VIEWING AREA IS THE WORKING ARE FOR EVERY IMAGE.

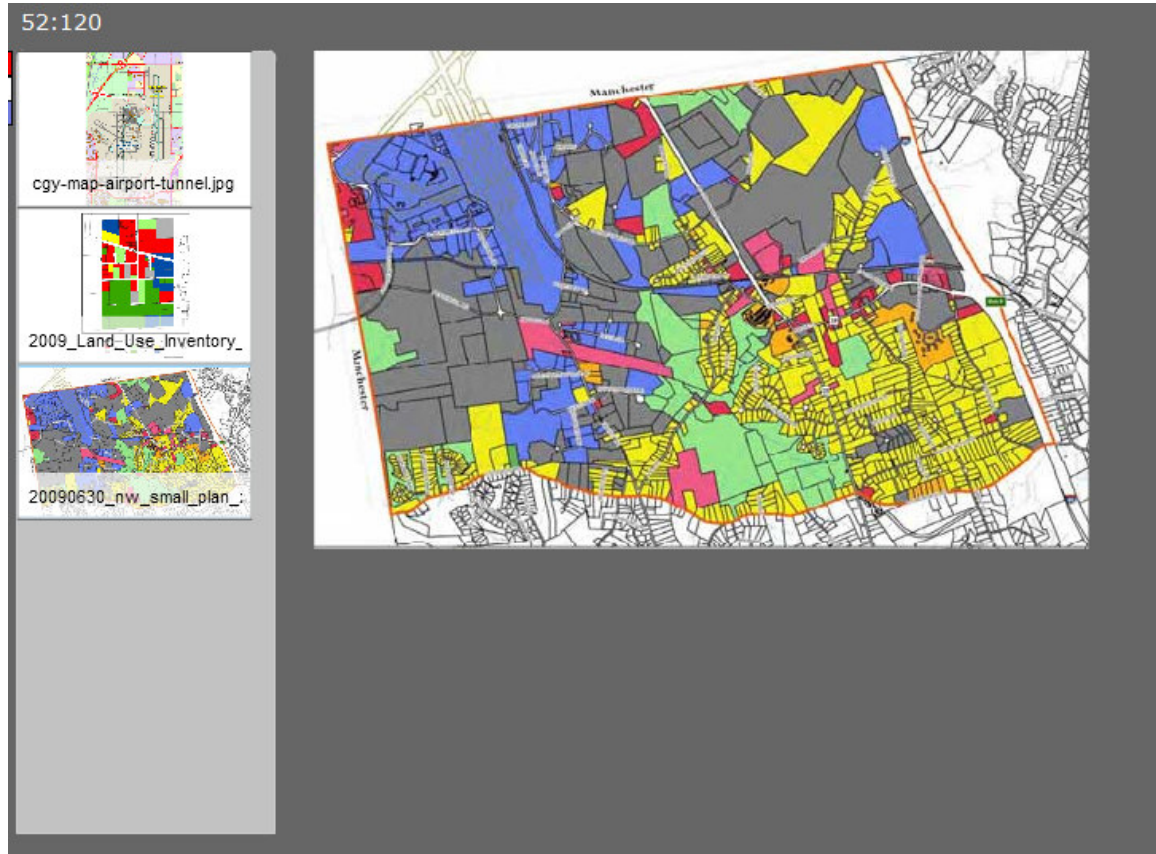


FIGURE 11, MAIN VIEWING AREA



ROTATE

WHEN THE ROTATION ICON IS HIGHLIGHTED, A SLIDER APPEARS WHICH ALLOWS YOU TO CHANGE THE ANGLE OF THE IMAGE.

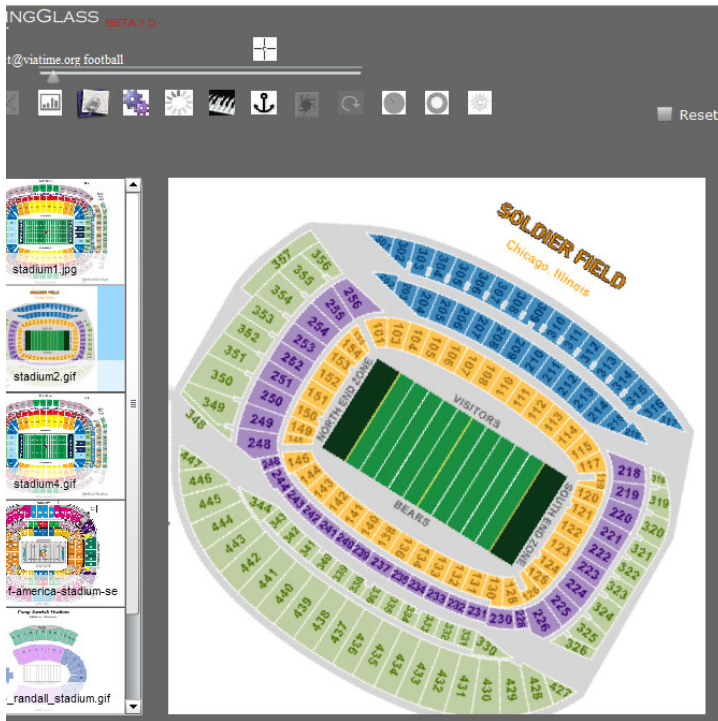


FIGURE 12, ROTATION



CENTERPOINT

THIS ALLOWS YOU TO PICK THE CENTER POINT FOR ROTATION.

ADJUSTING TO IMAGE MASTER

WHEN THE IMAGE MASTER IS SELECTED, THE IMAGE MUST HAVE A COMMON OBJECT THAT ALL THE OTHER IMAGES WILL ADJUST TO. THIS IS DONE BY USING BOTH THE IMAGE MASTER CHECKBOX AND THEN SELECTING THE ANCHOR BUTTON TO HIGHLIGHT THE COMMON OBJECT.

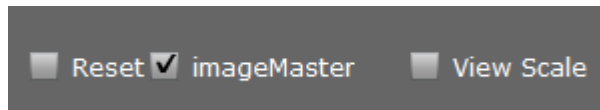


FIGURE 13, SELECTING AND ANCHORING THE COMMON OBJECT



THIS SETS THE ANCHOR FOR ADJUSTING THE IMAGE.

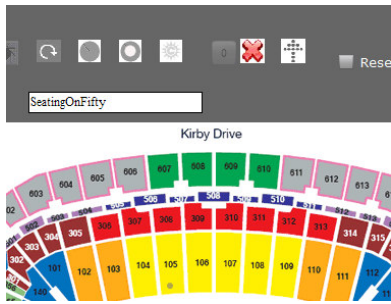


AFTER THE ANCHOR HAS BEEN SET AND THE BOX DEFINED THE IMAGE WILL BE ADJUSTED TO THE MASTER IMAGE ONCE THE ADJUST BUTTON IS SELECTED.

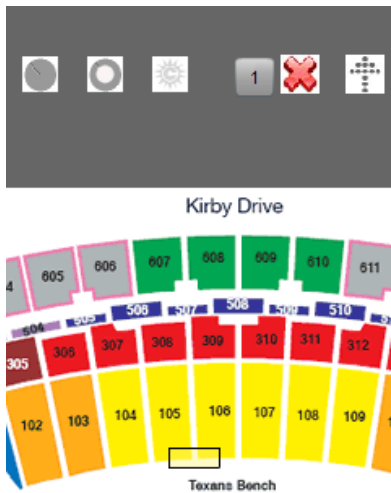
KEYMAPPING

1 LEGEND

THE LEGEND MARKER DEFINES A COMMON COLOR MAPPING BETWEEN ALL THE PRESENTED IMAGES IN THE SPECIFIC PROJECT. THIS DONE TO ANALYZE COMMON THEMES WHEN SELECTING A GIVEN REGION.



WHEN THE FIRST CLICK IS SELECTED, A TEXT BOX IS PRESENTED AND CAN BE USED TO LABEL THE THEME OR KEY FOR FURTHER REFERENCING. THE LEGEND THEN SHOWS A NUMBER INSIDE THE ICON IN ORDER TO LET YOU KNOW WHICH ONE IS BEING SELECTED.



THE ANALYSIS THEN WILL CAPTURE THE COLORS ASSOCIATED WITH EACH IMAGE TO HELP CORRELATE THE CORRECT THEME WITH A GIVEN PIXEL LOCATION.

The screenshot shows a software interface with a legend marker '1' in a box. Below it is a color-coded map of Kirby Drive and Texans Bench. The Kirby Drive section is labeled with numbers like 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

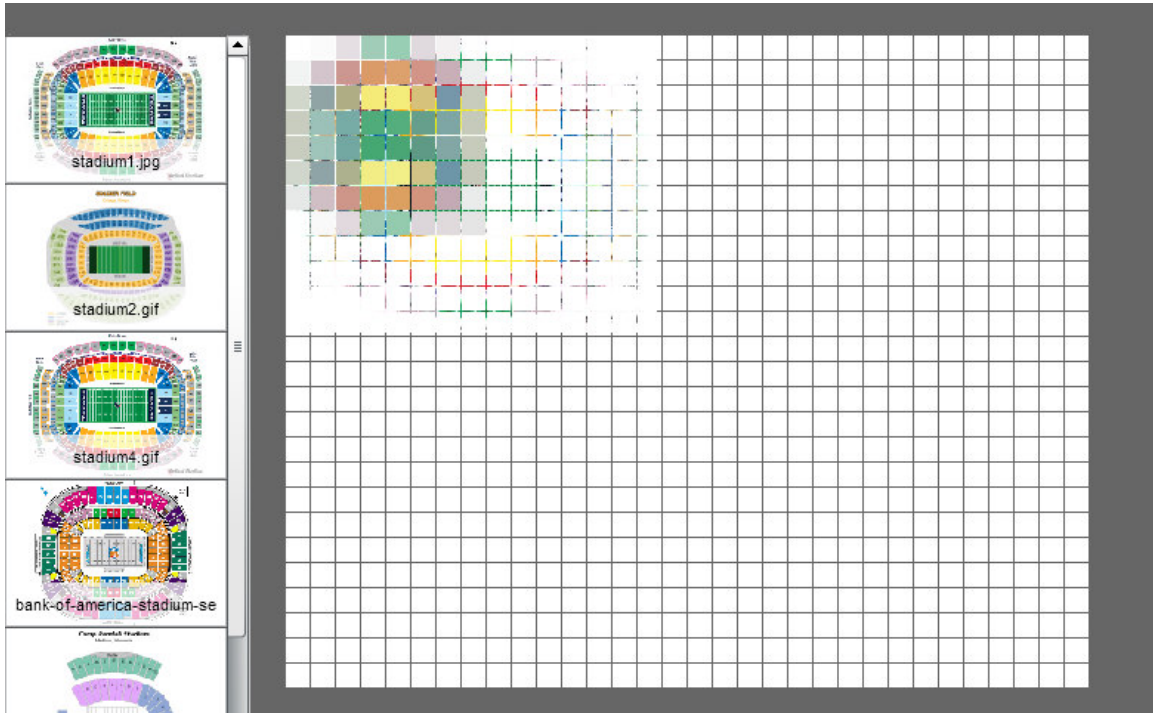
File	Color	Total	Percent
6	0x5B99C1	11	4.47154471
5	0x7FC7B0	133	54.0650406
3	0xFFEF00	144	58.5365853
2	0x1A8F41	16	6.50406504
3	0x008C46	17	6.91056910
6	0xD98737	19	7.72357723

COLOR AVERAGING



COLOR AVERAGE

THIS IS USED TO FIND THE AVERAGE PIXEL COLOR. THIS FEATURE WAS USED TO TROUBLESHOOT.





DIGITIZING

AFTER SELECTING THE DIGITIZER, DRAG THE OVER A GIVEN REGION. THERE IS A STARTING CLICK AND AN ENDING CLICK AFTER FINISHED DIGITIZING. EACH X,Y IS RECORDED AND THE COLORS WILL APPEAR AFTER SELECT PROCESSING.

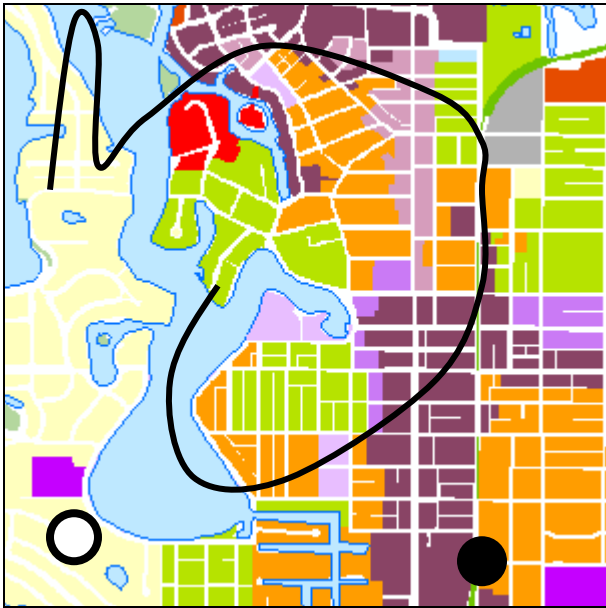


FIGURE 12, DIGITIZING MAP WITH CIRCLE AND ORING BUFFERING

BUFFERING



CIRCLE BUFFER

THE CIRCLE BUFFER CAPTURES THE PIXELS ON EACH LAYER. THE RADIUS IS REQUIRED.



ORING BUFFER

THE ORING BUFFER CAPTURES THE PIXELS ON EACH LAYER. THE RADIUS FOR THE INNER AND OUTER RINGS ARE REQUIRED.



AFTER SELECTING THE PROCESSING ICON, COLORED SQUARES WILL APPEAR. THIS REFERENCES THE DIGITIZED PATH



AFTER THE BUFFERS ARE SELECTED, THE DATA CAN BE ANALYZED BY SELECTING THE ANALYZE BUTTON. THE PERCENTAGE OF A CERTAIN COLOR IS PRESENTED WHICH CAN REPRESENT A THEME, DEPENDING ON THE USERS REQUIREMENTS.

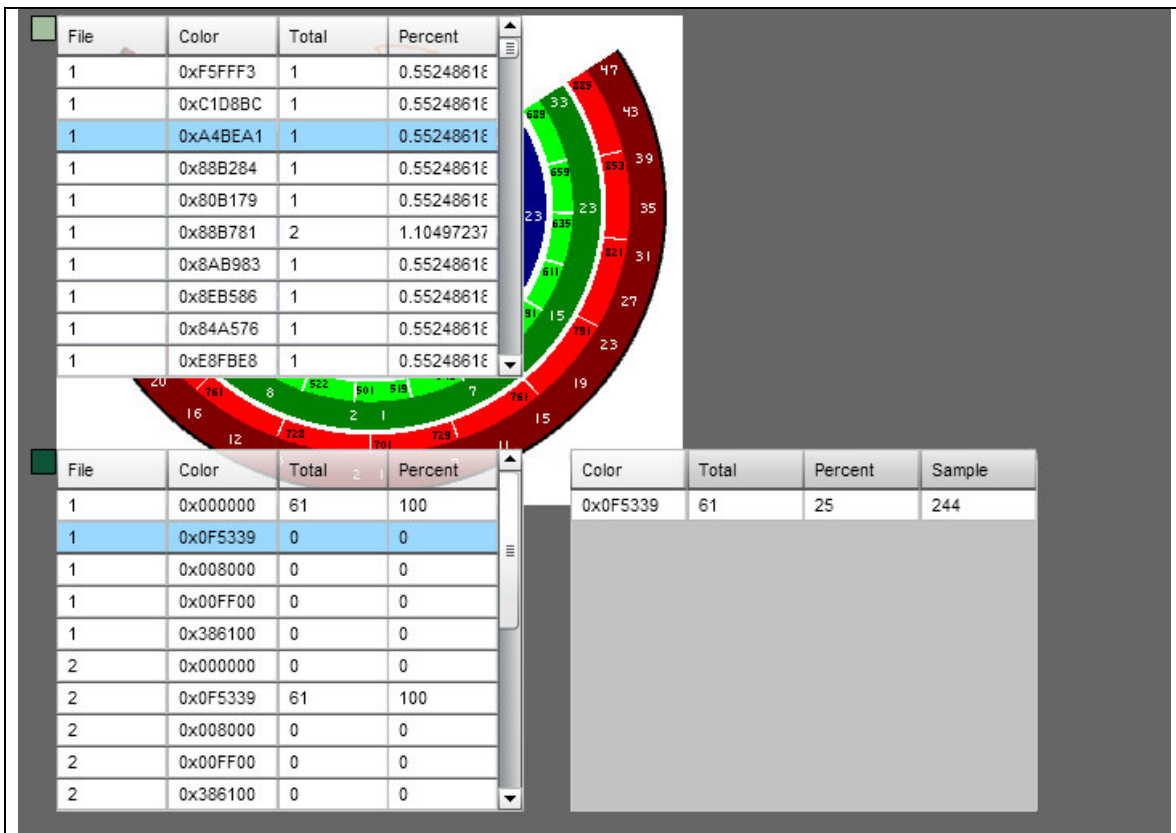


FIGURE 13, ANALYSIS FOR CAPTURE BUFFERS.

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SHUPE, LEARNING ACTIONSCRIPT 3.0: A BEGINNER'S GUIDE, O'REILY MEDIA, INC , OREILY MEDIA INC, 2007, SEBASTOPOL, CA

WEBSITES


















SOULWIRE ARTS AND TECHNOLOGY, BITMAPDATA AVERAGE COLOURS CODE : FINDING THE AVERAGE COLOURS IN AN IMAGE
<[HTTP://BLOG.SOULWIRE.CO.UK/CODE/ACTIONSCRIPT-3/EXTRACT-AVERAGE-COLOURS-FROM-BITMAPDATA](http://blog.soulwire.co.uk/code/actionscript-3/extract-average-colours-from-bitmapdata)>

ADOBE SOFTWARE HELP FILES, VERSION CS4

SOFTWARE

PHP 5.3.21 UBUNTU
VMWARE PLAYER 3.0.1
ADOBE FLASH CS4 , ACTIONSCRIPT
MYSQL 5.1.41
UBUNTU LINUX

ICON QUICK REFERENCE GUIDE

PROJECT BUTTONS	SECTION	FUNCTION	DESCRIPTION
	PROJECT	ADD	THIS IS THE ADD BUTTON. THIS ADD FILES AND PROJECTS.
	PROJECT EDIT	DELETE	THE DELETE BUTTON REMOVES FILES AND FOLDERS FROM PROJECT. DELETE IS ALSO USED FOR DELETE KEYS.
	PROJECT	FOLDER	TAKES USERS TO THE PROJECT FRAME
	EDIT ANALYSIS	DIGITIZE	DIGITIZE POINTS ON IMAGE(S). USED FOR ANALYSIS
	EDIT ANALYSIS	STREAM	STREAMS AND DISPLAYS IMAGE(S) COLOR.
	EDIT	EDIT	TAKES USERS TO THE EDIT FRAME.
	EDIT	PROCESS	THIS PROCESSES THE DIGITIZED POINTS AN DISPLAYS COLORS ASSOCIATED WITH DIGITIZED PATH.
	ANALYSIS	ANALYZE	TAKES USERS TO THE ANALYZE FRAME
	EDIT	EDIT	ROTATE IMAGE(S). WHEN SELECTED A SLIDER APPEARS TO INPUT ROTATION ANGLE.
	EDIT	CENTER POINT	SELECT CENTER POINT FOR ROTATION
	EDIT	ANCHOR	THIS ANCHORS OBJECT FOR SCALING. USED WITH ADJUST.
	EDIT	ADJUST	THIS ADJUSTS IMAGE(S) TO MASTER INDEX IMAGE.
	KEY	KEY	TAKES USERS TO THE KEY MAPPING FRAME
	KEY	KEY COUNT	WHEN SELECTED, A GRID CAN BE CREATED TO SELECT KEY REGION FOR SPECIFIED IMAGES.
	COLOR AVERAGE	COLOR AVERAGE	THIS COLOR AVERAGES THE IMAGE. NOT USED. ROUTINE IS USED FOR KEY COLOR MAPPING.
	ANALYSIS	CIRCLE BUFFER	CIRCLE BUFFER CAPTURES IMAGE PIXELS COORDINATES WITHIN THE CIRCLE BUFFER.
	ANALYSIS	ORING BUFFER	ORING BUFFER CAPTURES IMAGE PIXELS COORDINATES WITHIN THE ORING BUFFER

VERSION: BETA