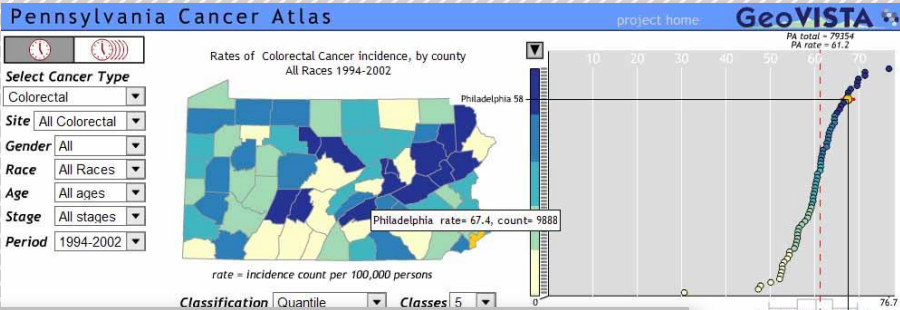
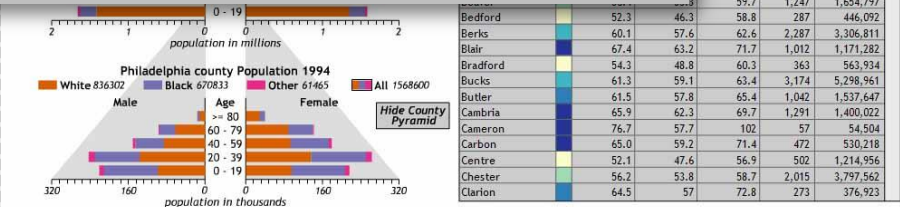


Web-based Geovisualization and GeoCollaboration

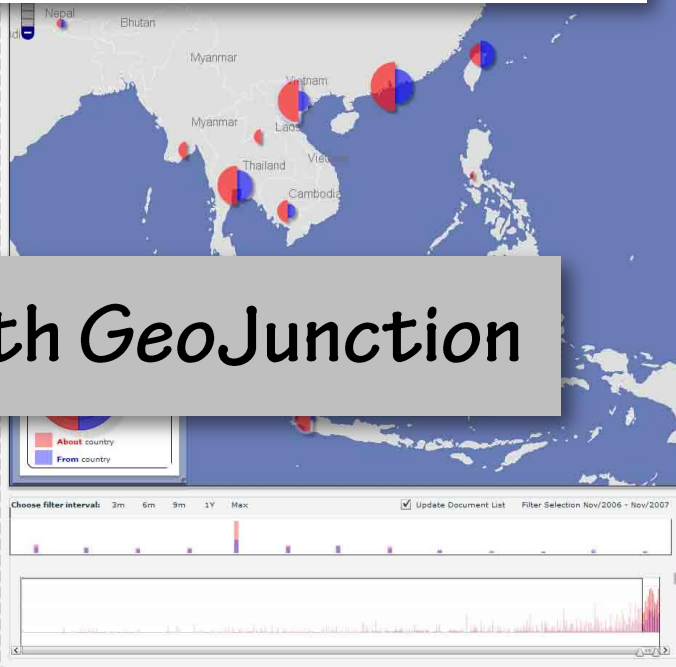
Robert E Roth, Alan M MacEachren, Anthony Robinson, Etien Koua, and Gene Lengerich
reroth@psu.edu | maceachren@psu.edu | arobinson@psu.edu | elkoua@gmail.com | elengerich@psu.edu



1. PA Cancer Atlas



2. Health GeoJunction



welcome to the **G-EX Portal** the geovisual explanation portal

login upload artifact about



3. G-EX Portal

Tag Clouds: MeSH Geographic Hierarchy Geonames Geographic Hierarchy

Published abstract set

disease outbreak avian influenza influenza
influenza viruses chick embryo antiviral agent
h5n1 virus cell line base sequence world health h5n1 influenza human influenza
viral protein united states species specific influenza pandemic pandemic influenza
bird flu hong kong avian flu virus strain middle aged risk factor virus infect
monoclonal antibodies hemagglutination test reassortant viruses neutralization test
viral vaccination international cooperation wild bird influenza outbreak public health sialic acid
risk assessment virus disease gene segment immune sera mdck cell avian species

Tags: One Two Yahoo MeSH Sort: Descending Count 974

Set term frequency threshold: 0

Apply Filters: Place Tag Time

Filtered PubMed abstract set published between Nov/2006 - Nov/2007 about Indonesia

avian influenza disease outbreak h5n1 virus influenza vaccinated h5n1 influenza antiviral agent
base sequence develop countries h5n1 vaccine international cooperation virus infect

Tags: One Two Yahoo MeSH Sort: Descending Count Rank Change: +100 5

Set term frequency threshold: 0

Articles for dates Nov/2006 - Nov/2007 about Indonesia and related to disease outbreak 14 articles returned. Current page results: 1-14

More like this	Place(s)	Abstract	Date	Title	Author(s)
More like this	Places	Abstract	Oct 2006	Avian influenza, Indonesia--update.	
More like this	Places	Abstract	Oct 2006	[Development of attenuated H5N1 avian influenza vaccines using reverse genetic tech...	T-Odajiri
More like this	Places	Abstract	Oct 2006	Outbreak news. Avian influenza, Indonesia--update.	
More like this	Places	Abstract	Mar 2007	Susceptibility of highly pathogenic A(H5N1) avian influenza viruses to the neuraminidase...	IG Banr Shawi...
More like this	Places	Abstract	Nov 2006	Three Indonesian clusters of H5N1 virus infection in 2005.	KH Cheng Same...
More like this	Places	Abstract	Jan 2007	Identification of A/H5N1 influenza viruses using a single gene diagnostic microarr...	DM Dankbar RD...
More like this	Places	Abstract	Jan 2007	Epidemiology, Indonesia: how will the disease be fought?	D. Wom...



Big silo of information

Big database of information

Another silo of information

Big database of information

Another silo of information

Big silo of information

Web 1.0

image adapted from Tom Coates



An aggregate web of
connected data sources
and services

Web 2.0

image adapted from Tom Coates



image from João Rufino

PA Cancer Atlas

disease: colorectal & prostate cancer incidence rates
 source: PA cancer registry, 1994-2002
 design inspiration: State Cancer Profiles

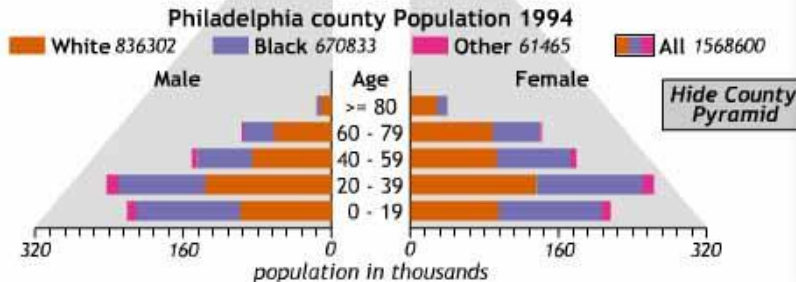
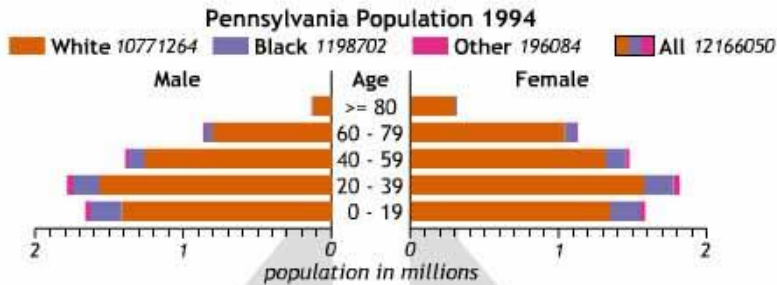
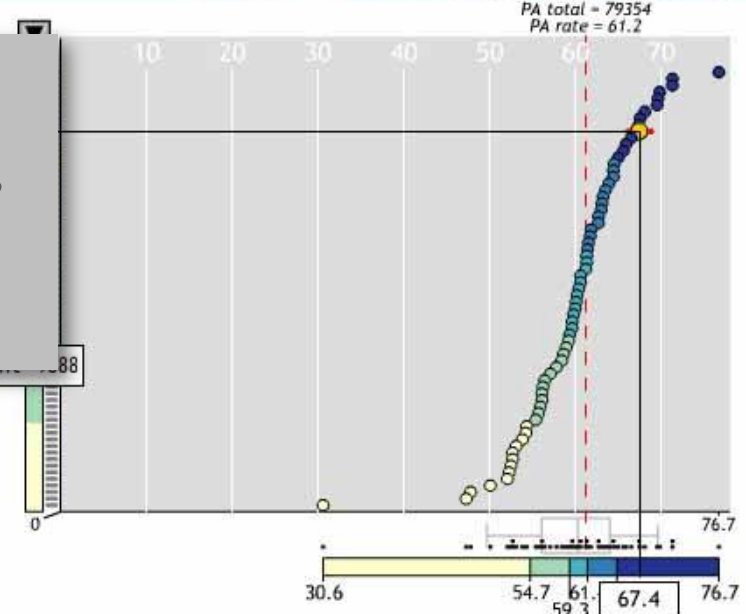
Period 1994-2002



rate = incidence count per 100,000 persons

Classification Quantile Classes 5

Add another map & plot



County	Rate	Lower CI	Upper CI	Count	Population
Adams	60.4	55.3	65.9	518	801,717
Allegheny	61.4	60.1	62.7	9,390	11,676,746
Armstrong	58.9	53.8	64.4	506	656,638
Beaver	56.4	53.3	59.7	1,247	1,654,797
Bedford	52.3	46.3	58.8	287	446,092
Berks	60.1	57.6	62.6	2,287	3,306,811

Movie Clips:

Clip #1: Dynamically Linked Views

Clip #2: Statistical Graphics

Clip #3: Comparison of Multiple Maps & Plots

Clip #1: Dynamically Linked Views

Pennsylvania Cancer Atlas

project home

GeoVISTA



Select Cancer Type

Colorectal

Site All Colorectal

Gender All

Race All Races

Age All ages

Stage All stages

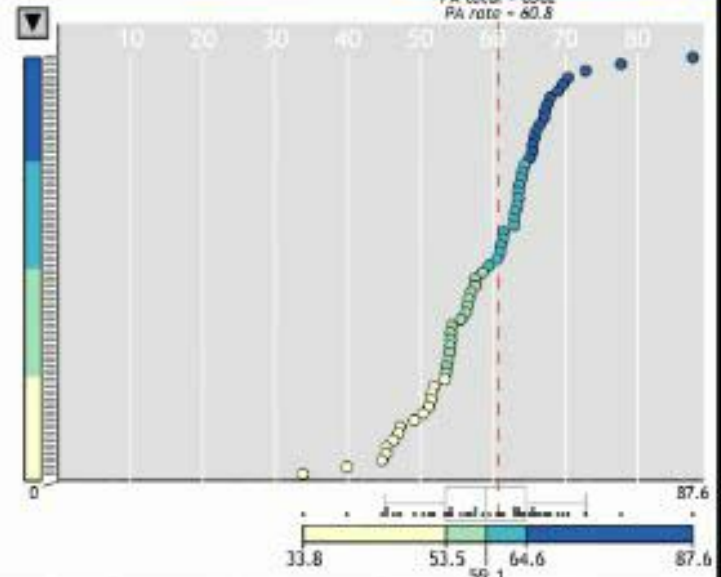
Period 1995

Rates of Colorectal Cancer incidence, by county
All Races 1995

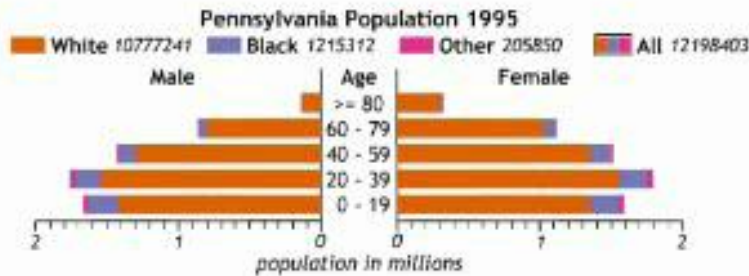


rate = incidence count per 100,000 persons

Classification Quantile Classes 5



Add another map & plot



County	Rate	Lower CI	Upper CI	Count	Population
Adams	61.0	45.6	80.1	53	85,065
Allegheny	63.1	59.4	67.1	1,085	1,322,460
Armstrong	51.5	37.8	69.5	48	73,988
Beaver	57.6	48.3	68.5	139	187,479
Bedford	54.2	36.9	78	32	49,185
Berks	59.5	52.2	67.6	246	357,193
Blair	66.5	54.4	80.7	109	131,807
Bradford	45.3	30.9	65.1	32	62,402
Bucks	63.4	56.8	70.7	339	573,851
Butler	63.0	51.8	76.1	111	165,415
Cambria	51.9	42.6	63	113	159,893
Cameron	No Data	No Data	No Data	6	6,106
Carbon	56.7	41	77.5	45	58,620
Centre	63.5	48.7	81.6	63	131,951
Chester	61.4	53.6	70	226	402,908
Clarion	50.4	31.9	76.9	23	42,387

Clip #2: Statistical Graphics

Pennsylvania Cancer Atlas

Select Cancer Type

Colorectal

Site All Colorectal

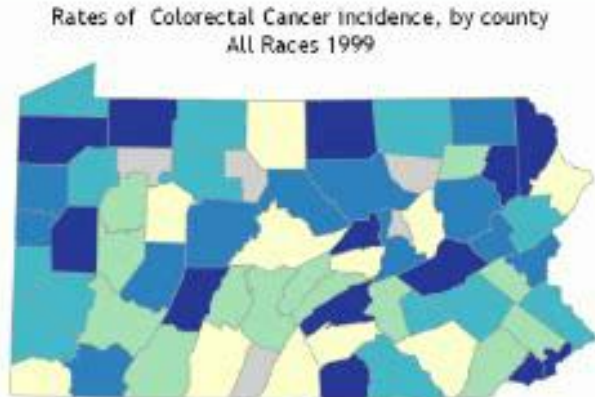
Gender All

Race All Races

Age All ages

Stage All stages

Period 1999

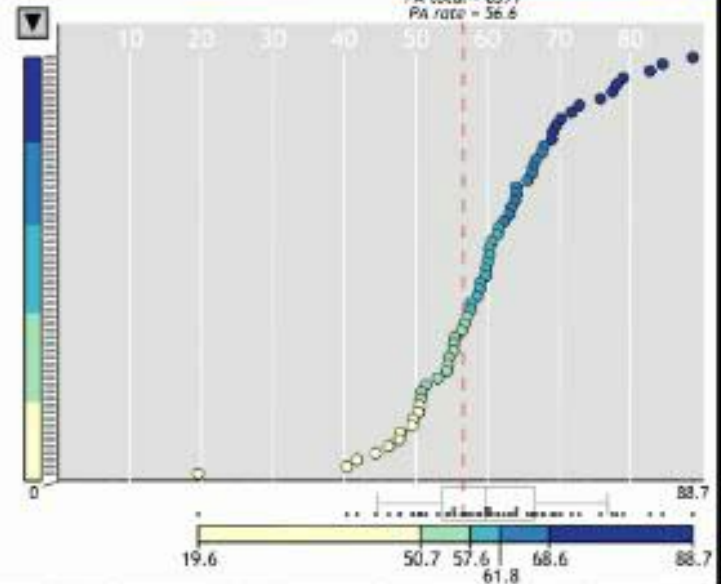


rate = incidence count per 100,000 persons

Classification Quantile Classes 5

Add another map & plot

project home **GeoVISTA**



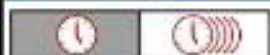
County	Rate	Lower CI	Upper CI	Count	Population
Adams	72.9	57	92.4	71	90,365
Allegheny	59.8	56.1	63.7	1,009	1,287,247
Armstrong	54.3	40.4	72.6	52	72,582
Beaver	57.8	48.6	68.5	144	182,592
Bedford	50.4	34.1	73.2	31	49,855
Berks	61.6	54.3	69.7	260	370,942
Blair	56.8	45.9	70	95	129,763
Bradford	58.6	42.5	80.2	44	62,701
Bucks	59.8	53.7	66.5	351	593,947
Butler	69.6	58.2	82.7	133	172,924
Cambria	69.0	58.2	81.6	152	153,912
Cameron	No Data	No Data	No Data	1	6,134
Carbon	63.1	46.8	84.8	51	58,846
Centre	41.8	30.6	56	46	135,315
Chester	51.4	44.6	58.9	208	428,055
Clarion	55.3	36.4	81.9	27	41,773

Clip #3: Comparison of Multiple Maps & Plots

Pennsylvania Cancer Atlas

project home

GeoVISTA



Select Cancer Type

Colorectal

Site All Colorectal

Gender All

Race All Races

Age All ages

Stage All stages

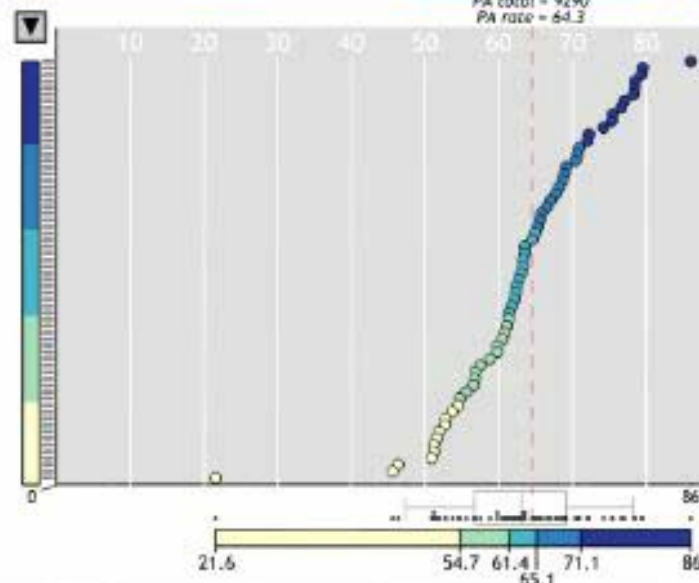
Period 1998

Rates of Colorectal Cancer incidence, by county
All Races 1998

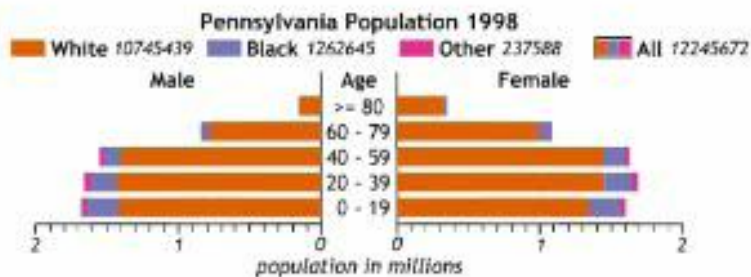


rate = incidence count per 100,000 persons

Classification Quantile Classes 5



Add another map & plot



County	Rate	Lower CI	Upper CI	Count	Population
Adams	69.1	53.4	88.2	66	89,076
Allegheny	63.0	59.2	67	1,076	1,295,026
Armstrong	60.8	46.1	80	59	73,049
Beaver	63.3	53.7	74.6	156	184,315
Bedford	45.6	30.2	67.8	28	49,561
Berks	62.1	54.8	70.2	264	367,082
Blair	75.4	62.8	90.3	127	130,515
Bradford	46.3	32	66.3	34	62,950
Bucks	65.3	58.8	72.3	376	588,475
Butler	61.1	50.4	73.5	115	171,322
Cambria	65.8	55.3	78.3	144	155,678
Cameron	No Data	No Data	No Data	8	6,112
Carbon	75.3	57.1	99	59	58,816
Centre	55.6	42.3	71.9	59	134,657
Chester	62.7	55.2	71.1	249	420,529
Clarion	78.3	55	109.3	37	41,891

PA Cancer Atlas

disease: colorectal & prostate cancer incidence rates
 source: PA cancer registry, 1994-2002
 design inspiration: State Cancer Profiles

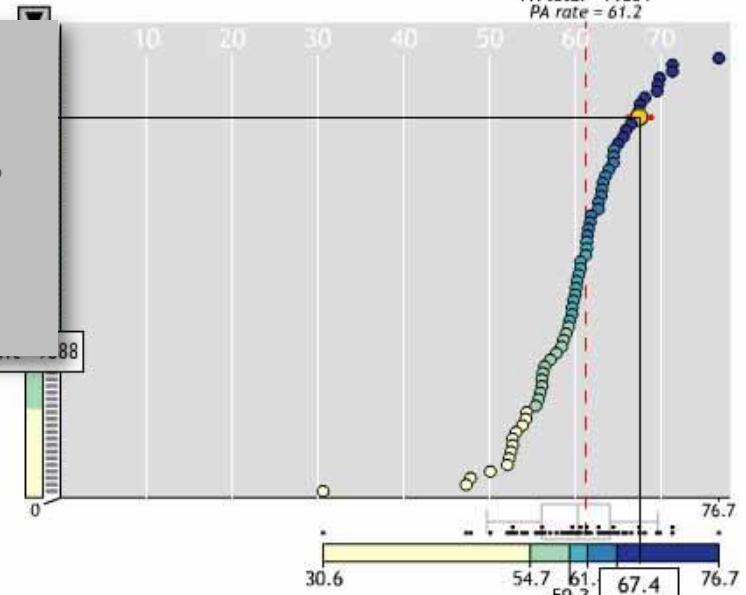
Period 1994-2002



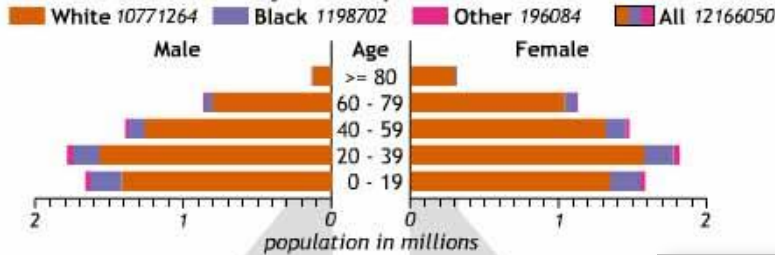
rate = incidence count per 100,000 persons

Classification Quantile Classes 5

Add another map & plot

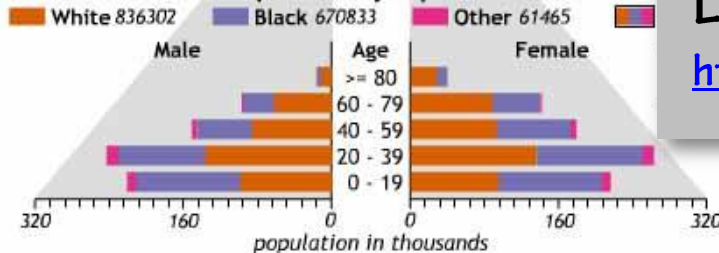


Pennsylvania Population 1994



County	Rate	Lower CI	Upper CI	Count	Population
Adams	60.4	55.3	65.9	518	801,717
Allegheny	61.4	60.1	62.7	9,390	11,676,746
Armstrong	58.9	53.8	64.4	506	656,638
Beaver	56.4	53.3	59.7	1,247	1,654,797
Bedford	52.3	46.3	58.8	287	446,092
Berks	60.1	57.6	62.6	2,287	3,306,811
Blair	47.4	43.7	51.7	1,012	1,471,282

Philadelphia county Population 1994



Live Demo:

<http://www.geovista.psu.edu/grants/CDC/index.html>

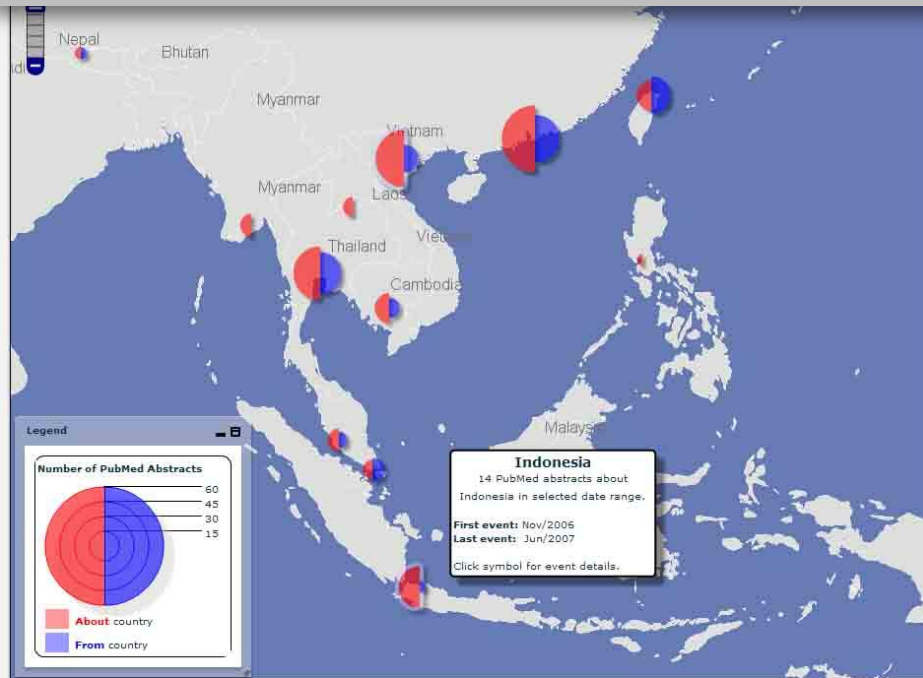
Centre	52.1	47.6	56.9	502	1,214,956
Chester	56.2	53.8	58.7	2,015	3,797,562
Clarion	64.5	57	72.8	273	376,923

Health GeoJunction

disease: avian influenza incidence & mortalities

source: PubMed

design inspiration: HealthMap.org & GISAID Epi Flu database



Geographic Hierarchy

influenza influenza virus influenza vaccinated
influenza viruses chick embryo antiviral agent poultry disease virus replicated
h5n1 virus cell line base sequence world health h5n1 influenza human influenza
viral protein united states species specific influenza pandemic pandemic influenza
bird flu hong kong avian flu virus strain middle aged risk factor virus infect
monoclonal antibodies hemagglutination test reassortant viruses neutralization test
viral vaccination international cooperation wild bird influenza outbreak public health sialic acid
risk assessment virus disease gene segment immune sera mdck cell avian species

Tags: One Two Yahoo MeSH Sort: Descending Count 974

Set term frequency threshold: 0

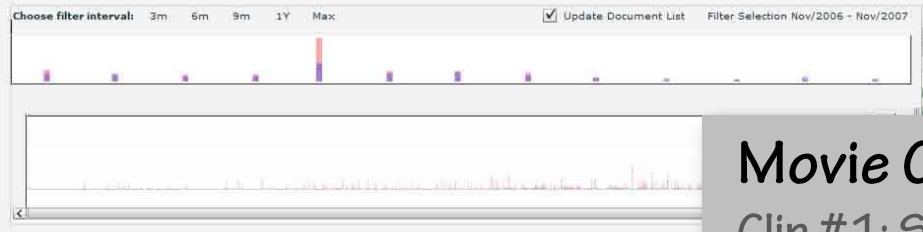
Apply Filters: Place Tag Time

Filtered PubMed abstract set published between Nov/2006 - Nov/2007 about Indonesia

avian influenza disease outbreak h5n1 virus influenza vaccinated h5n1 influenza antiviral agent
base sequence develop countries h5n1 vaccine international cooperation virus infect

Tags: One Two Yahoo MeSH Sort: Descending Count Rank Change: +100 5

Set term frequency threshold: 0



Movie Clips:
Clip #1: Split Proportional Symbols & Temporal Filtering
Clip #2: Tag Cloud Filtering
Clip #3: the Abstract List View

Clip #1: Split Proportional Symbols & Temporal Filtering

The screenshot displays the Health Geo3action interface, which is used for analyzing and visualizing geographic data. The main components are:

- Map:** A map of Southeast Asia with proportional symbols (split into red and blue) indicating the number of published abstracts in various countries. A legend titled "Number of Publied Abstracts" shows a scale from 15 to 45.
- Tag Cloud:** A cloud of tags related to "Avian Flu" (3550 abstracts). The most prominent tags include "disease outbreak", "avian influenza", "influenza virus", "influenza vac", "influenza viruses", "chick embryo", "antiviral agent", "poultry disease", "virus r", "h5n1 virus", "cell line", "base sequence", "world health", and "h5n1 influenza".
- Filters:** Options to select tags (One, Two, Yahoo, MeSH) and sort by "Descending Count". A "Set term frequency threshold" slider is set to 0.
- Filtered Abstract Set:** A list of abstracts published between Feb/2007 and Nov/2007 (550 abstracts). The top tags include "disease outbreak", "avian influenza", "influenza vaccinated", "antiviral agent", "wo", "influenza virus", "united states", "h5n1 virus", "influenza pandemic", "h5n1 influenza", and "bird flu".
- Timeline:** A horizontal bar chart showing the distribution of abstracts over time. The filter interval is set to "2m" (2 months).
- Abstract List:** A table of abstracts with columns for "Publied Abstract List", "Annotations", and "Document Details". The table shows a list of abstracts with their titles and publication dates (Nov 2007).

An interactive timeline is provided to filter the document set.

Clip #2: Tag Cloud Filtering

The screenshot displays the Health GeoJunction interface, which is used for analyzing geographic data and filtering search results. It is divided into several main sections:

- Map Section:** Shows a map of Southeast Asia with pie charts overlaid on various countries, representing the distribution of PubMed abstracts. A legend indicates that red represents 'About country' and blue represents 'From country'. A scale for the number of PubMed abstracts is provided, ranging from 15 to 45.
- Tag Cloud Section:** Displays a tag cloud for 'Avian Flu' with 3550 related PubMed abstracts. The most prominent tags include 'disease outbreak', 'avian influenza', 'influenza virus', and 'influenza vaccine'. A text box explains: 'Tag cloud derived from PubMed dataset offers a variety of tools for searching and filtering entities.' Below the tag cloud are controls for 'Tag' (One, Two, Yahoo, MeSH), 'Sort' (Descending Count), and 'Set term frequency threshold' (0).
- Filtered Results Section:** Shows a filtered PubMed abstract set published between Feb/2007 and Nov/2007 (558 articles). The tag cloud for this filtered set includes terms like 'disease outbreak', 'avian influenza', 'influenza vaccinated', 'antiviral agent', 'influenza virus', 'united states', 'h5n1 virus', 'influenza pandemic', and 'h5n1 influenza bird flu'. Similar controls for 'Tag', 'Sort', and 'Set term frequency threshold' are present.
- PubMed Abstract List Section:** Provides a list of abstracts with columns for 'More like this', 'Place(s)', 'Abstract', 'Date', and 'Title'. The list shows articles from Nov 2007, such as 'Biological evaluation of anti-influenza viral activity of semi-synth...', 'Attachment of infectious influenza A viruses of various subtypes...', 'Immunization of animals with a Newcastle disease virus-vector...', 'Effective small interfering RNAs targeting matrix and nucleocapsid...', 'Characterization of low-pathogenicity H5N1 avian influenza virus...', 'Social considerations for the allocation of pre-pandemic influenza...', and 'Fundamental role of PCR for detection of avian influenza virus...'. Each entry includes a 'More like this' link and an 'Abstract' link.

Clip #3: the Abstract List View

The screenshot displays the Health Geo3 interface. On the left, a map of Southeast Asia shows pie charts representing the number of published abstracts by country. A legend indicates that red represents 'About country' and blue represents 'From country'. A circular gauge shows the number of published abstracts, ranging from 15 to 45. Below the map, a bar chart shows the distribution of abstracts over time, with a filter selection for Feb/2007 - Nov/2007. The right side of the interface features a tag cloud of terms related to 'Avian Flu', including 'disease outbreak', 'avian influenza', 'influenza virus', 'influenza vac', 'influenza viruses', 'chick embryo', 'antiviral agent', 'poultry disease', 'virus n', 'h5n1 virus', 'cell line', 'base sequence', 'world health', and 'h5n1 influenza'. Below the tag cloud, there are controls for tags (One, Two, Yahoo, MeSH), sort order (Descending Count), and a set term frequency threshold. A filtered abstract set is shown for the period Feb/2007 - Nov/2007, with a tag cloud of terms like 'disease outbreak', 'avian influenza', 'influenza vaccinated', 'antiviral agent', 'wo', 'influenza virus', 'united states', 'h5n1 virus', 'influenza pandemic', 'h5n1 influenza', and 'bird flu'. A text box states: 'The abstract view shows details about each article, and allows users to quickly view abstracts or conduct a search for similar articles.' At the bottom, a table of published abstracts is visible, with columns for 'More like this', 'Place(s)', 'Abstract', 'Date', and 'Title'. The table lists several articles from November 2007, including 'Biological evaluation of anti-influenza viral activity of semi-synth', 'Attachment of infectious influenza A viruses of various subtypes', 'Immunization of primates with a Newcastle disease virus-vector', 'Effective small interfering RNAs targeting matrix and nucleocapsid', 'Characterization of low-pathogenicity H5N1 avian influenza virus', 'Spatial considerations for the allocation of pre-pandemic influen', and 'Rapid multiplexed real-time PCR for detection of avian influenza virus'.

G-EX Portal

design inspiration: YouTube, del.icio.us, Facebook

welcome to the ***G-EX Portal*** the geovisual explication portal

[login](#) [upload artifact](#) [about](#)



Movie Clips:

Clip #1: the Search Module

Clip #2: User Profiles & the Learn Module

Clip #3: Integration with other GeoVISTA tools

Clip #1: the Search Module

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Clip #2: User Profiles & the Learn Module

welcome to the ***G-EX Portal*** the geovisual explication portal

[login](#) [upload artifact](#) [about](#)



Clip #3: Integration with other GeoVISTA tools



Questions?

Further reading:

Bhowmick et al. (2008) Distributed usability evaluation of the Pennsylvania Cancer Atlas. *International Journal of Health Geographics* 7: 35.

Stryker et al. (2008) Health GeoJunction: Geovisualization of news and scientific publications to support situation awareness. In: *Proceedings of the Geospatial Visual Analytics Workshop, GIScience 2008*. Park City, UT: September 23.

Robinson et al. (2007) The G-EX Portal: Web-based Dissemination of Geovisual Analytic Results. In: *Proceedings of the ICA Commission on Visualization and Virtual Environments*. Helsinki, Finland: August 2-3.