

IS 587: Mining the Web

Course Description

This course covers the history, origins, and motivation of the web, resources available on the web and methods for accessing them, and human factors/usability. During the course, we will cover three generations of the web: Web 1.0 – Primitive Web, Web 2.0 – Social Web, and Web 3.0 – Semantic Web.

Aspects of all three versions of the web are available today. The primitive web is today's World Wide Web – simple anonymous access to html content using browsers, hypertext linking and full-text search. The Social Web adds collaboration and some knowledge of who is using and participating. The Semantic Web adds a new level of intelligence and meaning through the introduction of machine-level problem solving, question-answering, smarter contextualized search systems. For each of these versions of the web, we will consider its basic architecture, the functionality it supports, the kind of content it can handle and the user experience issues. Finally, we will look at globalization and localization issues for all three versions.

Teaching and Learning Philosophy

The reason that I teach in graduate information science programs is to share with new professionals what I learn each day on the job. I have had the good fortune to have had some very interesting positions during my career, and have learned a lot over the past three decades. As a practicing information professional and strong advocate of knowledge management, I will share 'real world experiences' to complement the course content.

Your learning experience is my goal in teaching. To this end, the following teaching methods are used:

- Lectures and lecture notes are prepared prior to the start of class and are available to all students as a baseline;
- Session topics are identified for each session to help you focus on the learning objectives
- Key Takeaways are used as a feedback mechanism to let the instructor know what you got out of each session;
- In class discussion is strongly encouraged because I believe you have much to contribute to the course, too;
- The assignments provide an opportunity for you to synthesize what you have learned and to do some critical, creative thinking;

In over ten years of teaching in various disciplines, one lesson holds true – students learn as much from each other as they do from the instructor. This course – though conducted entirely online – is designed to create a learning environment in which you can learn from me and from one another. Critical to your success in the course is your willingness to think critically about the issues, and to share the knowledge you bring to or develop throughout the course. The course also provides the starting rather than the end point in your understanding of the economics of information.

Professional and Academic Standards and Behavior

Cheating and Plagiarism

When you write for this class or when you use information in your assignments, remember that the sources you use should be credited. Plagiarism involves using someone else's words without giving credit. Plagiarism is a violation of scholarly and professional ethics as well as University policy. Further information about this is available in Hill Toics, the UTK Student Handbook.

Class Attendance

Attendance of class sessions is expected because class discussions are an important part of mastering the content of the course. If you must miss a session, let the instructor know ahead of time. Because the course sessions are recorded, you are expected to listen to the recording for any session you must miss.

Course Calendar

Session	Date	Topic	Assignments
1	Aug. 21, 2008	History and Future Evolution of Web	
2	Aug. 28, 2008	Introduction to Usability and Human Factors	
3	Sept. 4, 2008	Web 1.0 Search Engines and MetaSearch Engines.	Literature Search & Summary
4	Sept. 11, 2008	Web 1.0 Search Experience and Metrics	Query Set 1
5	Sept. 18, 2008	Web 1.0 Directories, Reference Sources and News	Query Set 2
6	Sept.25, 2008	Web 1.0 Audio, Video, Image Resources	Query Set 3
	Oct. 2, 2008	Fall Break – No Class	
7	Oct. 9, 2008	Web 2.0 Architecture and Functionality	
8	Oct. 16, 2008	Web 2.0 Social Networking	
9	Oct. 23, 2008	Web 2.0 Collaboration	Project #1
10	Oct. 30, 2008	Web 2.0 Recommender Engines	
11	Nov. 6, 2008	Web 2.0 Mashups	Project #2
12	Nov. 13, 2008	Web 3.0 Semantic Web	Project #3
	Nov. 20, 2008	Thanksgiving – No Class	
13	Nov. 27, 2008	Special Topic: Globalization and Localization Challenges	
14	Dec. 4, 2008	Course Review and Wrapup	

Assignments and Grading

Six instructional methods will be used in the course, including:

- Literature Search and Summary (1)
- Query Sets (3)
- Team Projects (3)
- Team Project Presentations
- Online discussions of targeted questions among students (20%)
- Key Takeaways

Literature Search and Summary

To set a context for our exploration of the web, students will conduct a literature search to find four articles which discuss the latest developments and cutting edge applications for the web. Full description of this assignment is found in the Blackboard session folder

Question Sets

Sets of questions for which you will try to find answers, using your knowledge of web resources. Each assignment contains 4 to 6 questions. Full description of the assignments are found in the Blackboard session folders.

Team Projects

Project 1: Evaluation and Characterization of Collaboration or Social Networking

Project 2: Usability Evaluation of Mashup Sites

Project 3: Evaluation and Reverse Engineering of a Recommender Engine

Team projects are collaborative efforts. Each project has a set of instructions. The instructions can be found with the assignment descriptions in the individual folders in Blackboard.

Team Project Presentations

Teams should prepare a short presentation of their project to share with the class. Presentations

In Class Discussion and Participation (5%)

Each week students will find “Points to Ponder” interspersed within the lecture. In class discussions serve two goals: (1) provide an opportunity for students to learn from one another, and (2) help us to build a virtual learning community which we would have if we were in a physical classroom setting. Contributions to discussions are graded as credit/no credit.

Key Takeaway (5%)

Key takeaways are designed to help me track whether I’m being effective in teaching the concepts each week. Teaching in a virtual space is a challenge because I cannot see how students are reacting to lectures or assignments. They are one or two sentences that describe the key idea or issue you took away from a session. There is no right or wrong idea. Key takeaways should be submitted within 24 hours after a session so they are fresh in your mind.

Grading Scheme

Grades will be assigned according to the following scale:

A	93-100%	Excellent performance
B+	86-92%	Very good performance
B	80-85%	Good performance
C+	75-84%	Marginal performance
C	70-74%	Below graduate level performance

Session 1. History and Future Evolution of Web

Session Topics

- History of the Internet
- History of the Web
- Web 1.0 – Primitive Web (ecosystem)
- Web 2.0 – Social Web (participation)
- Web 3.0 – Semantic Web (understanding)
- Web as a source of information
- Revisiting definition of information

Learning Objective: Understand the role and function of today's web and how it is changing

Read This

Vinton Cerf, Barry Leiner, David Clark, Robert Kahn, Leonard Kleinrock, Daniel Lynch, Jon Postel, Larry Roberts, and Stephen Wolff, [A Brief History of the Internet, Version 3.32](http://www.isoc.org/internet/history/brief.shtml), Dec. 10, 2003. <http://www.isoc.org/internet/history/brief.shtml>

Janna Quitney Anderson and Lee Rainie, Future of the Internet II, Pew Internet and American Life Project, September 24, 2006

Do This

- Complete the Cerf reading
- Scan the Pew survey
- Submit Key Takeaway #1

Session 2. Introduction to Usability and Human Factors

Session Topics

- Definition of usability engineering
- Usability engineering life cycle
- Usability methods and metrics
- How people use the web
- Information foraging and berry picking
- Search interfaces and results display
- Navigation and layout

Learning Objective: Learn how to judge the usability of any web accessible resource

Read This

Bates, Marcia J. The Design of Browsing and Berrypicking Techniques for the Online Search Interface. 1989 <http://www.gseis.ucla.edu/faculty/bates/berrypicking.html>

Meet the MasterMinds: Common Sense Web Design with Steve Krug. Management Consulting News, 2008 (this is an interview with Krug) http://www.managementconsultingnews.com/interviews/krug_interview.php

Jarod Spool , Five Usability Challenges of Web Based Applications, Dec. 4, 2007 http://www.uie.com/articles/usability_challenges_of_web_apps/

Jakob Nielsen and Hoa Loranger, Prioritizing Web Usability, New Riders, 2006

- Chapter 2: The Web User Experience, pp. 21-56
- Chapter 5: Search, pp. 137-170
- Chapter 5: Navigation and Information Architecture, pp. 171-212

U.S. Department of Health and Human Services Usability.gov (browse through this to get a sense of coverage and approach) <http://www.usability.gov>

Do This

- Submit your key takeaways
- Literature Search and Summary

Literature Search and Summary Assignment

Conduct a literature search using appropriate databases and web search engines (authoritative sources only). Find four articles discussing the latest development and cutting edge applications for the Web in the last three years. The articles should be informative rather than sketchy. Each article should provide you with new information that is not totally learned in the other articles:

- Read each article
- Provide the full citation for each article with a brief description of the developments identified
- Identify the applications discussed in the four articles that may be suitable for use by libraries. Justify your point of view.

- Provide a list of references with full citations at the end of the assignment using a standard style manual.

Session 3. Web 1.0: Search Engine Architecture and Functionality

Session Topics

- Search architectures
- Macro-architectures
- Micro-architectures

Learning Objective: Learn how to determine which parts a search system has and how to leverage them

Read This

Sergey Brin and Lawrence Page, "The Anatomy of a Large-Scale Hypertextual Web Search Engine," Stanford University, 1997

George Chang, Marcus Healey, James McHugh and Jason Wang, Mining the World Wide Web: An Information Search Approach. Kluwer Academic Publishers, 2001.

- Chapter 1: Keyword-Based Search Engines, pp. 3-18
- Chapter 2: Query-Based Search Systems, pp. 19-34
- Chapter 4: Multimedia Search Engines, pp. 51-66

Do This

- Submit your key takeaway

Session 4. Search Experience and Strategies

Session Topics

- Search experience today
- Search experience tomorrow
- Basic web search strategies
- Measuring search results
- Search failures
- Basic visible web search engines
- Metasearch engines

Learning Objective: Learn basic search strategies and how to evaluate results

Read This

Randolph Hock, The Extreme Searcher's Internet Handbook: A Guide for the Serious Searcher, Thomas Hogan Publisher, 2004.

- Chapter 4: Search Engines, pp.64-114

Alan Schlein, Find it online: the complete guide to online research. 4th edition. Fact on Demand Press, 2004.

- Chapter 4: General Search Tools – Search Engines and More, pp.

Do This

- Submit your key takeaway
- Begin working on Query Set 1 – due to instructor before 12 midnight, October 1

Query Set Assignment #1

Use the web to find answers to the following questions:

1. Does glucosamine really help with knee pain?
2. I am trying to find an online collection of Appalachian children's literature
3. I need to find background information about the Sony Corporation, preferably the company based in the U.S., but the Japanese location will also be fine if you can find it.
4. What is the top selling brand of baby diapers, and why does it sell more than any other brand?
5. What was the story behind the Iran-Contra affair, and who was involved in it?

For each question in the set, provide the following information:

1. Question
2. Description of your search strategies (how you formulated the search)
3. Answer to the question – synthesized from all of the results you reviewed rather than simple printouts of resources
4. Search engine or resources used
5. Explanation of how the resources contributed to answering the questions

Session 5. Web 1.0 Directories, Reference Sources and News

Session Topics

- Specialized directories
- Reference sources
- News resources
- Search techniques

Read This

Randolph Hock, The Extreme Searcher's Internet Handbook: A Guide for the Serious Searcher, Thomas Hogan Publisher, 2004.

- Chapter 3: Specialized Directories, pp. 47-60
- Chapter 5: Groups and Mailing Lists pp. 115-132
- Chapter 6: Internet Reference Shelf, pp. 133-162
- Chapter 8: News Resources, pp. 181-198

Learning Objective: Begin to build your repertoire of search tools

Do This

- Submit your key takeaway
- Query Set 2 – due to instructor by 12 midnight, October 8, 2008

Query Set Assignment #2

Use the web to find answers to the following questions:

1. Someone with the name “king-something or something-king” wrote a review of “The Passion of the Christ” that was not well received by the Jewish community. Can you help me find it?
2. I'm writing a persuasive speech on “Why college students need to work” and I need to find statistics on the number of college students who work part or full time, and I need to find articles talking about why they need to work. I don't want articles that talk about them wanting to work for spending money.
3. I need sources to aid me in formulating an argument for internet filtering in public libraries for a class debate.
4. Can you help me find articles on whether sign language (American Sign Language) is considered a formal language?

For each question in the set, provide the following information:

6. Question
7. Description of your search strategies (how you formulated the search)
8. Answer to the question – synthesized from all of the results you reviewed rather than simple printouts of resources
9. Search engine or resources used
10. Explanation of how the resources contributed to answering the questions

Session 6. Web 1.0 Audio, Video, Image Resources

Session Topics

- Search challenges – audio, video and images
- Audio formats
- Sources of audio information
- Video formats
- Sources of video information
- Image formats
- Sources of image information

Learning Objective: Continue to build your repertoire of search tools

Read This

Randolph Hock, [The Extreme Searcher's Internet Handbook: A Guide for the Serious Searcher](#), Thomas Hogan Publisher, 2004.

- Chapter 7: Sights and Sounds – Finding Images, Audio and Video, pp. 163-180

Do This

- Submit your key takeaway
- Query Set 3 – due to the instructor by 12 midnight, October 15, 2007

Query Set Assignment #3

Use the web to find answers to the following questions:

1. Where can I find information about whether or not a company that only does business online is reputable – TungstenWorld?
2. What could be the case of pain felt in the top of the foot during physical activity such as running?
3. How are diamonds evaluated for quality? What are the criteria?
4. What is the wealthiest zip code in Knoxville?
5. Who were the members of the Tennessee Supreme Court in 1895
6. Did it rain in Knoxville, TN, on August 3rd or 4th, 2007?

For each question in the set, provide the following information:

11. Question
12. Description of your search strategies (how you formulated the search)
13. Answer to the question – synthesized from all of the results you reviewed rather than simple printouts of resources
14. Search engine or resources used
15. Explanation of how the resources contributed to answering the questions

Session 7. Web 2.0 Architecture and Functionality

Session Topics

- What do we mean by social?
- Web 2.0 architecture
- Web 2.0 functionality
- Blogs
- Wikis
- Mashups
- Podcasts
- Folksonomies
- Second Life
- What you can find in a social space
- How you look for information in a social space

Learning Objective: Gain understanding of the information value of Web 2.0

Read This

Brynn M. Evans and Ed H. Chi, "Towards a Model of Understanding Social Search,"
Workshop on Collaborative Information Retrieval, June 2008, Pittsburgh PA

Frank Hopfgartner, David Vallet, Martin Halvey and Joemon Jose, "Collaborative Search
Trails for Video Search," Workshop on Collaborative Information Retrieval, June 2008,
Pittsburgh PA

Chirag Shah, "Toward Collaborative Information Seeking (CIS)," Workshop on Collaborative
Information Retrieval, June 2008, Pittsburgh PA

Niemann, Brand. Executive Spotlight with Brand Niemann.
ExecutivBiz <http://www.executivebiz.com/newsletter-executives-detail.php?who=bniemann>

What is Social Media? An eBook from iCrossing. www.icrossing.co.uk/ebooks 2007

Blog search engine <http://www.blogsearchengine.com/>

Do This

- Submit your key takeaway

Session 8. Social Networking

Session Topics

- Knowledge discovery
- Knowledge creation
- Invisible colleges and social networks
- Looking for people who know
- Advisory services
- Information value of social networks

Read This

Meredith G. Farkas *Social Software in Libraries: Building Collaboration, Communication, and Community Online*, Information Today, 2007

- Chapter 6: Online Communities, pp. 85-108
- Chapter 7: Social Networking, pp. 109-124
- Chapter 8: Social Networking and Collaborative Filtering, pp. 125-148
- Chapter 9: Tools for Online Synchronous Reference, pp. 149-167

Dana Boyd and Nicole Ellison, « Social Network Sites – Definition, History and Scholarship, » <http://jcmc.indiana.edu/vol13/issue1/boyd.ellison.html>

(watch the quick video)

Social Networking in Plain English http://www.youtube.com/watch?v=6a_KF7TYKVC

Do This

- Submit your key takeaway

Session 9 Web 2.0 Collaboration Contexts

Session Topics

- Collaboration
- Participation
- Wikis
- Information seeking in collaborative contexts
- Collaborative information seeking

Read This

Don Tapscott and Anthony D. Williams, Wikinomics: [How Mass Collaboration Changes Everything](#), Penguin Books, 2008.

- Chapter 1: Wikinomics, pp. 7-33
- Chapter 7: Platforms for Participation, pp. 183-212
- Chapter 9: The Wiki Workplace, pp. 239-267
- Chapter 10: Collaborative Minds, pp. 268-287

Pickens, Jeremy, Gene Golovchinsky and Meredith Ringel Morris, "Report on the 1st Collaborative Information Retrieval Workshop: D-Lib Magazine, July/August, 2008 <http://www.dlib.org/dlib/july08/pickens/07pickens.html>

Do This

- Submit your key takeaway
- Team Project #1: Evaluation of Social Networking

Team Project #1

The goal of this project is to evaluate social networking spaces against a set of requirements and group needs. You should:

- select three of the social networking tools below for your evaluation
- compile your own evaluation criteria, drawing from the requirements list provided for this exercise, but also prioritizing and supplementing these criteria based on how a group might want to use each of these spaces
- develop a grid of the criteria you compiled along with a scale ranging from 1-5 (1=low; 5 = high) to use for assessing how well the website meets each of the criteria.

Project deliverable should include:

- url and name of the social networking or collaboration space
- brief description of the space
- rationale for selecting the space
- grid listing the criteria on which the social networking space was evaluated with your rating scale
- operational definition for each of the evaluation criteria
- overall assessment of the functionality along with recommendations for improving it
- list of sources used for evaluating the space

Session 10. Web 2.0 Recommender Engines

Session Topics

- Recommender Engines defined
- Using recommender engines to find information
- Recommender engine architectures
- Recommender engine rules
- Recommender engine examples
- Recommender engine evaluation

Read This

C. Hayes, P. Massa, P. Avesani, and P. Cunningham. “An On-Line Evaluation Framework for Recommender Systems,” Research Paper TCD-CS02002-19, Trinity College, Dublin, 2002
<https://www.cs.tcd.ie/publications/tech-reports/reports.02/TCD-CS-2002-19.pdf>

Alex Iskold, “Rethinking Recommender Engines”, February 25, 2008 ReadWriteWeb
http://www.readwriteweb.com/archives/rethinking_recommendation_engines.php

Monnich, Michael and Marcus Spiering, “Adding Value to the Library Catalog by Implementing a Recommendation System”, D-Lib Magazine, May/June 2008 Vol. 14, No. 56.

Richard MacManus, 10 Recommended Recommender Engines. February 25, 2008. ReadWriteWeb.
http://www.readwriteweb.com/archives/10_recommendation_engines.php

Do This

- Submit your key takeaway
- Team Project #2

Team Project #2

The goal of this project is to evaluate a recommender engine against a set of requirements and group needs. You should:

- Select three recommender engines from the list below – or you may recommend another others;
- Each member of the group should interact with the recommender engine for a week to formulate their own views of performance;
- Compile the group’s evaluation criteria based on your expectations for the engine, and leveraging some of the criteria provided in the attached file,
- Develop a grid of the criteria you compiled along with a scale ranging from 1-5 (1=low; 5 = high) to use for assessing how well the website meets each of the criteria.

Project deliverable should include:

- url and name of the recommender engine
- brief description of the engine, including a description of rules it uses, the type of user participation and feedback, its elasticity, etc.
- rationale for selecting the engine
- grid listing the criteria on which the engine was evaluated with your rating scale
- operational definition for each of the evaluation criteria

- overall assessment of the functionality along with recommendations for improving it
- list of sources used for evaluating the recommender engine

Music Recommender Engines

- Pandora (www.pandora.com)
- Last.fm (www.last.fm)
- myStrands (www.mystrands.com)
- MatchMine (www.matchmine.com)
- SeeqPod (www.seeqpod.com)
- MeeMix (www.meemix.com)
- TheFilter (www.thefilter.com)

Web Content Recommender Engines

- FeedEachOther (www.feedeachother.com)
- StumbleUpon (www.stumbleupon.com)

Film Recommender Engines

- [Criticker](http://www.criticker.com) (www.criticker.com)
- MovieProfiler (www.movieprofiler.com)

Restaurant Recommender Engine

- [Foodio54](http://www.foodio54.com) ([www.foodio54](http://www.foodio54.com))

Book Recommender Engines

- Amazon (www.amazon.com)
- Barnes & Noble (www.barnesandnoble.com)
- Borders (www.borders.com)
- Suggestica (www.suggestica.com)
- Inside a Dog (www.insideadog.com.au)
- MySpace Books (www.myspacetoolbox.com/myspace-book-lists.php)
- Books We Like (www.bookswelike.net)
- OCLC's FictionFinder (www.oclc.org/research/projects/frbr/fictionfinder.htm)
- All Consuming (www.allconsuming.net)
- LibraryThing (www.librarything.com)
- Next Favorite (www.nextfavorite.com)
- StoryCode (www.storycode.com)
- AlexLit (www.alexlit.com)
- WhichBook.net (www.whichbooks.net)
- AllReaders.com (www.allreaders.com)
- Reader's Robot (www.tnrplib.bc.ca/rr.html)
- gnooks (www.gnooks.com)
- Shelfari (www.shelfari.com)
- Bookrabbit (www.bookrabbit.com)

Session 11. Web 2.0 Mashups

Session Topics

- Goal of mashups
- Mashup architectures
- Mashup design principles
- Mashup usability issues
- Searching for mashups
- Searching in mashups
- Creating knowledge in mashups

Read This

Jesse Feiler, How to Do Everything with Web 2.0 Mashups.

- Chapter 1: Welcome to the world of mashups, pp. 3-14
- Chapter 2: Understanding the Mashup World, pp. 15-23
- Chapter 3: Know the Web 2.0 Mashup Rules and Design Principles, pp. 25-34

Do This

- Submit your key takeaway
- Start working with your group on team project #3

Team Project #3

The goal of this project is to evaluate mashup implementations against a set of requirements and group needs. You should:

- Select three of the mashup sites below for your evaluation
- Compile your own evaluation criteria based on the intended purpose and use of the mashup, leveraging some of the criteria provided in the attached file,
- Develop a grid of the criteria you compiled along with a scale ranging from 1-5 (1=low; 5 = high) to use for assessing how well the website meets each of the criteria.

Project deliverable should include:

- url and name of the mashup
- brief description of the mashup, including its intended audience and purpose
- rationale for selecting the mashup
- grid listing the criteria on which the mashup was evaluated with your rating scale
- operational definition for each of the evaluation criteria
- overall assessment of the functionality along with recommendations for improving it
- list of sources used for evaluating the mashup

Session 12. Web 3.0 Semantic Web Architecture and Functionality

Session Topics

- Semantics and meaning
- Semantic ‘Layer Cake’
- Metadata and ontologies
- Who will search the semantic web?
 - M2M – Machine to Machine Level
 - Problem solving agents
- How will we search the semantic web?
- Current examples of semantic web
- Future examples of semantic web

Read This

Nigel Shadbolt and Wendy Hall, “The Semantic Web Revisited”, IEEE Intelligent Systems, 2006 http://eprints.ecs.soton.ac.uk/12614/1/Semantic_Web_Revisited.pdf

Michael Uschold, Where are the semantics in the semantic web? Autonomous Agents Conference in Montreal, June 2001. <http://www.starlab.vub.ac.be/WhereAreSemantics-AI-Mag-FinalSubmittedVersion2.pdf>

Other Recommended Reading

Dieter Fensel, James Hendler, Henry Lieberman and Wolfgang Wahlster, Spinning the Semantic Web: Bringing the World Wide Web to its full Potential, MIT Press, 2003

- Foreword by Tim Berners-Lee, pp. xi-xxiii
- Introduction, pp. 1-25

Thomas B. Passin, Explorer’s Guide to the Semantic Web, Manning Press, 2004.

- Chapter1: The Semantic Web, pp.1-18
- Chapter5: Searching, pp. 06-126

Do This

- Submit your key takeaway
- Team Project #3 – Evaluation and Characterization of Mashups – due to the instructor by 12 midnight, December 1, 2008

Team Project #3

The goal of this project is to evaluate mashup implementations against a set of requirements and group needs. You should:

- Select three of the mashup sites below for your evaluation
- Compile your own evaluation criteria based on the intended purpose and use of the mashup, leveraging some of the criteria provided in the attached file,
- Develop a grid of the criteria you compiled along with a scale ranging from 1-5 (1=low; 5 = high) to use for assessing how well the website meets each of the criteria.

Project deliverable should include:

- url and name of the mashup

- brief description of the mashup, including its intended audience and purpose
 - rationale for selecting the mashup
 - grid listing the criteria on which the mashup was evaluated with your rating scale
 - operational definition for each of the evaluation criteria
 - overall assessment of the functionality along with recommendations for improving it
- list of sources used for evaluating the mashup

Session 13. Special Topic: Globalization and Localization Challenges

Session Topics

- User Interface Considerations
- Language Considerations
- Culture and Conventions
- Input and Output Interfaces
- Character Sets for Encoding
- Asian Ideographic Scripts
- Bi-Directional Scripts
- Cursive Arabic Script

Read This

IBM. Globalize Your On Demand Business. Globalization Guidelines.
<http://www-306.ibm.com/software/globalization/guidelines/index.jsp>

Hoffman, Maxwell. **Creating a New Language for Nutrition: McDonald's Universal Icons for 109 Countries (see attached pdf)**

Other Recommended Reading

Unicode Consortium. Common Locale Data Repository (CLDR)
<http://www.unicode.org/cldr/>

IBM Arabic/French keyboard 462. (see attached PDF file)

Do This