

# Terms and Acronyms in Network Analysis

Acronym/ Term	Definition	Explanation	Web Resources
ACE	Agent-based Computational Economics	ACE is the computational study of economic processes modeled as dynamic systems of interacting agents.	
ACO	Ant Colony Optimization	ACO, introduced by Marco Dorigo in 1992 in his PhD thesis, is a probabilistic technique for solving computational problems which can be reduced to finding good paths through graphs. They are inspired by the behaviour of ants in finding paths from the colony to food.	<a href="http://www.aco-metaheuristic.org/">http://www.aco-metaheuristic.org/</a>
AS	Autonomous System network	Term used for large national networks – the backbone of Internet.	
ATM	Asynchronous Transfer Mode	A high bandwidth, low-delay, connection-oriented, packet-like switching and multiplexing technique. ATM allocates bandwidth on demand, making it suitable for high-speed connections of voice, data and video services. Access speeds are up to 622 Mb/s and backbone networks currently operate at speeds as high as 2.5 Gb/s. Standardised by ITU-T.	<a href="http://www.itu.int">http://www.itu.int</a>
BGP	Border Gateway Protocol	The core routing protocol of the Internet. It works by maintaining a table of IP networks or 'prefixes' which designate network reachability between autonomous systems (AS). It is described as a path vector protocol. BGP does not use technical metrics, but makes routing decisions based on network policies or rules. The current version of BGP, BGP version 4, is specified in IETF RFC 1771.	<a href="http://www.ietf.org/rfc/rfc1771.txt">http://www.ietf.org/rfc/rfc1771.txt</a>
BISON	Biology-Inspired techniques for Self-Organization in dynamic Networks	European research project in the 5th Framework Programme IST running from 2003 to 2005. The aim of BISON was to explore the use of ideas derived from complex adaptive systems (CAS) to enable the construction of robust and self-organizing information systems for deployment in highly dynamic network environments.	<a href="http://cordis.europa.eu">http://cordis.europa.eu</a>
CC	Connected Component	In an undirected graph, a <i>connected component</i> or <i>component</i> is a maximal connected subgraph. [Source: Wikipedia]	
CE	Cross Entropy	In information theory, the cross entropy between two probability distributions measures the average number of bits needed to identify an event from a set of possibilities, if a coding scheme is used based on a given probability distribution $q$ , rather than the "true" distribution $p$ .	
CEAS	Cross-Entropy Ant System	CEAS is a distributed version of Reuven Rubinstein's popular cross entropy method for optimization. CE-ants have been shown to find near-optimal solutions to NP-complete path-finding problems of large scale.	
CPLEX		Optimization Software Package from ILOG which can be used to solve linear and quadratic problems.	<a href="http://www.ilog.com/products/cplex/">http://www.ilog.com/products/cplex/</a>
DAG	Directed Acyclic Graph	A DAG is a directed graph with no directed cycles; that is, for any vertex $v$ , there is no nonempty directed path that starts and ends on $v$ . [Source: Wikipedia]	
DELIS	Dynamically Evolving, Large-scale Information Systems	European research project in the 6th Framework Programme IST running from 2004 to 2008 with the objective to develop methods, techniques and tools to cope with challenges imposed by the size and dynamics of today's and especially future information systems, in an interdisciplinary effort of Computer Science, Physics, Biology, and Economy.	<a href="http://delis.upb.de">http://delis.upb.de</a> , <a href="http://cordis.europa.eu">http://cordis.europa.eu</a>
DFG	Deutschen Forschungsgemeinschaft (German Research Foundation)	The central, self-governing research funding organisation that promotes research at universities and other publicly financed research institutions in Germany. The DFG serves all branches of science and the humanities by funding research projects and facilitating cooperation among researchers.	<a href="http://www.dfg.de">http://www.dfg.de</a>

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HITS		HITS is a link analysis algorithm that rates Web pages, developed by Jon Kleinberg. It determines two values for a page: its authority, which estimates the value of the content of the page, and its hub value, which estimates the value of its links to other pages. US patent 6 112 202.	<a href="http://www2002.org/CDROM/refereed/643/node1.html">http://www2002.org/CDROM/refereed/643/node1.html</a>
ICT	<b>Information and Communication Technology</b>	The technology required for information processing. In particular the use of electronic computers and computer software to convert, store, protect, process, transmit, and retrieve information from anywhere, anytime.	
IM	<b>Instant Messaging</b>	An instant messaging service is reached by the use of an instant messenger client. Instant messaging differs from e-mail in that conversations happen in real-time. Also, most services convey an "online status" between users, such as if a contact is actively using the computer. Generally, both parties in the conversation see each line of text right after it is typed (line-by-line), thus making it more like a telephone conversation than exchanging letters. Instant messaging applications may also include the ability to post an away message, the equivalent of the message on a telephone answering machine. Popular instant messaging services on the public Internet include Jabber, AOL Instant Messenger, Yahoo! Messenger, .NET Messenger Service and ICQ. These services owe many ideas to an older (and still popular) online chat medium known as Internet Relay Chat (IRC).	
IS-IS	<b>Intermediate System to Intermediate System</b>	Protocol for routing in an Internet domain, based on Dijkstra's algorithm, standardised as ISO10589. Specified in IETF RFC 1195.	<a href="http://www.ietf.org/rfc/rfc1195.txt">http://www.ietf.org/rfc/rfc1195.txt</a>
ISP	<b>Internet Service Provider</b>	A vendor who provides access for customers to the Internet and the World Wide Web. The ISP also typically provides a core group of internet utilities and services like e-mail and news group readers.	
IU	<b>Induced Underlay network</b>		
LA	<b>Link Analysis</b>	The analysis of networks through graph theory. The networks may be social, transportation, electrical, biological, Internet networks, etc. Analysis includes descriptions of structure, such as small-world networks, social circles or scale-free networks, optimisation, such as Critical Path Analysis and PERT (Program Evaluation & Review Technique), and properties such as flow assignment.	
MATLAB	<b>MATrix LABORatory</b>	MATLAB is a numerical computing environment and programming language. (Not to be confused with Matlab Upazila in Chandpur District, Bangladesh.)	<a href="http://www.mathworks.com/">http://www.mathworks.com/</a>
MMS	<b>Multimedia Message Service</b>	MMS is a communications technology developed by 3GPP (Third Partnership Project) that allows users to exchange multimedia communications between capable mobile phones and other devices. An extension to the Short Message Service (SMS) protocol, MMS defines a way to send and receive, almost instantaneously, wireless messages that include images, audio, and video clips in addition to text.	<a href="http://www.3gpp.org">http://www.3gpp.org</a>
MODAGENT	<b>Modelling System for Agent-based Computational Economics</b>	Agent-based Computational Economics is the computational study of economic processes modeled as dynamic systems of interacting agents.	
MPLS	<b>Multi Protocol Label Switching</b>	An IETF standard intended for Internet application. MPLS has been developed to speed up the transmission of IP based communications over ATM networks. The system works by adding a much smaller "label" to a stream of IP data-grams allowing "MPLS" enabled ATM switches to examine and switch the packet much faster. It is specified in IETF RFC 4368.	<a href="http://www.ietf.org/rfc/rfc4368.txt">http://www.ietf.org/rfc/rfc4368.txt</a>
NDD	<b>Node Degree Distribution</b>	In graph theory, degree distribution gives the probability distribution of degrees in a network. Its use originates from the study of random graph by Paul Erdős and Alfréd Rényi, and it has become an important concept which describes the topology of complex networks.	
NO	<b>Network Operator</b>	A network operator, also known as carriage service provider (CSP), wireless service provider, wireless carrier, mobile phone operator, or cellular company, is a telephone company that provides services for mobile phone subscribers.	

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NOK	Norwegian Kroner		
OSPF	Open Shortest-Path First	A link-state, hierarchical Interior Gateway Protocol (IGP) routing protocol. The shortest path tree is calculated using cost as its routing metric. A link state database is constructed of the network topology which is identical on all routers in the area.	
P2P	Peer-To-Peer	A computer network that does not rely on dedicated servers for communication but instead mostly uses direct connections between clients (peers). A pure peer-to-peer network does not have the notion of clients or servers, only equal peer nodes that simultaneously function as both "clients" and "servers" to the other nodes on the network.	
POTS	Plain Old Telephone Service	A very general term used to describe an ordinary voice telephone service. See also PSTN.	
PSTN	Public Service Telephone Network	Common notation for the conventional analog telephone network.	
QAP	Quadratic Assignment Problem	QAP is one of fundamental combinatorial optimization problems in the branch of optimization or operations research in mathematics, from the category of the facilities location problems.	
QoS	Quality of Service	The "degree of conformance of the service delivered to a user by a provider, with an agreement between them". The agreement is related to the provision/delivery of this service. Defined by EURESCOM project P806 in 1999 and adopted by ITU-T in recommendation E.860.	<a href="http://www.itu.int">http://www.itu.int</a> , <a href="http://www.eurescom.de">http://www.eurescom.de</a>
SALSA	Stochastic Approach for Link-Structure Analysis	This is a link analysis algorithm that examines random walks on two different Markov chains which are derived from the link structure of the WWW. An approach for finding hubs and authorities in a network. First described by R. Lempel and S. Moran in 2001.	
SBPP	Shared Backup Path Protection		
SCC	Strongly Connected Component	A directed graph is called <i>strongly connected</i> if for every pair of vertices $u$ and $v$ there is a path from $u$ to $v$ and a path from $v$ to $u$ . The SCC of a directed graph are its maximal strongly connected subgraphs. C18	
SDH	Synchronous Digital Hierarchy	SDH (Synchronous Digital Hierarchy) is a standard technology for synchronous data transmission on optical media. It is the international equivalent of North American SONET (Synchronous Optical Network). Both technologies provide faster and less expensive network interconnection than traditional PDH (Plesiochronous Digital Hierarchy) equipment. It is a method of transmitting digital information where the data is packed in containers that are synchronized in time enabling relatively simple modulation and demodulation at the transmitting and receiving ends. The technique is used to carry high capacity information over long distances. SDH uses the following Synchronous Transport Modules (STM) and rates: STM-1 (155 megabits per second), STM-4 (622 Mb/s), STM-16 (2.5 Gb/s), and STM-64 (10 Gb/s). SDH is specified by ITU-T G.707.	<a href="http://www.itu.int">www.itu.int</a>
SMS	Short Message Service	A means by which short messages can be sent to and from digital cellular phones, pagers and other handheld devices. Alphanumeric messages of up to 160 characters can be supported.	
SNA	Social Network Analysis	SNA is the mapping and measuring of relationships and flows between people, groups, organizations, animals, computers or other information/knowledge processing entities. The nodes in the network are the people and groups while the links show relationships or flows between the nodes. SNA provides both a visual and a mathematical analysis of human relationships. [Source: orgnet.com]	
SQG	Stochastic programming software environment	Software for solving stochastic programming problems with stochastic gradient methods.	

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T-RANK		This is a link analysis algorithm giving a single score to each web page. US patent no. 7 281 005.	
TTL	Time-To-Live	A limit on the period of time or number of iterations or transmissions in computer and computer network technology that a unit of data (e.g. a packet) can experience before it should be discarded. In IPv4, time to live is an 8-bit field in the Internet Protocol (IP) header. It is the 9th octet of 20. The time to live value can be thought of as an upper bound on the time that an IP datagram can exist in an internet system. The TTL field is set by the sender of the datagram, and reduced by every host on the route to its destination. If the TTL field reaches zero before the datagram arrives at its destination, then the datagram is discarded and an ICMP (Internet Control Message Protocol) error datagram is sent back to the sender.	
UN	Underlay Network		
VC	Virtual Connection, Virtual Circuit	A connection oriented communication service that is delivered by means of packet mode communication. After a virtual connection is established between two nodes or application processes, a bit stream or byte stream may be delivered between the nodes. A virtual circuit protocol hides the division into segments, packets or frames from higher level protocols.	
VNO	Virtual Network Operator	A VNO is a company that provides mobile phone services but does not have its own frequency allocation of the radio spectrum, nor does it have all of the infrastructure required to provide mobile telephone service.	
VoIP	Voice over Internet Protocol	Voice over Internet Protocol is the routing of voice conversations over the Internet or any other IP-based network. The voice data flows over a general-purpose packet-switched network, instead of traditional dedicated, circuit-switched voice transmission lines. Several standards exist to support VoIP, like H.323 from ITU-T and SIP (IETF RFC 3261).	<a href="http://www.itu.int">http://www.itu.int</a> , <a href="http://www.ietf.org">http://www.ietf.org</a>
WS-graph	Watts-Strogatz-graph	The Watts and Strogatz model is a random graph generation model that produces graphs with small-world properties, including short average path lengths and high clustering. It was proposed by Duncan J. Watts and Steven Strogatz in their joint 1998 <i>Nature</i> paper. The model also became known as the (Watts) beta model after Watts used $\beta$ to formulate it in his popular science book <i>Six Degrees</i> .	
WWW	World Wide Web	An international, virtual network based information service composed of Internet host computers that provide on-line information. A hypertext-based, distributed information system/service created by researchers at CERN in Geneva, Switzerland in 1991. Users may create, edit or browse hypertext documents. The clients and servers are freely available.	<a href="http://www.w3c.org">http://www.w3c.org</a>
XPRESS	Optimization Software Package	Optimization Software Package. A Linear Programming (LP) and Mixed Integer Programming (MIP) solver from Dash. XPRESS can also be used to solve Quadratic Program (QP) and Mixed Integer Quadratic Program (MIQP) problems.	<a href="http://www.dashoptimization.com/">http://www.dashoptimization.com/</a>