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Universal Decimal Classification: Past and Present

M.P. Satija

Guru Nanak Dev University, Amritsar-143 005
E-mail: satija_mp@yahoo.com

ABSTRACT

Universal Decimal Classification (UDC) is the first internationally classified retrieval tool designed for bibliographic information and documentation. This paper discusses the history and the salient features of the UDC, and what is the future for the software.

Keywords: Universal Decimal Classification, classification, MRF, auxiliary tables, citation order, Dewey Decimal Classification

1. INTRODUCTION

The Universal Decimal Classification (UDC) is known by many names such as European Dewey, Brussels Classification, and the International Decimal Classification. Since it was based on the Dewey's System, it was called Expanded Dewey in the beginning. Nevertheless, it is the first truly international classification designed for bibliographic information and documentation work—all earlier systems were purely library classifications with the purpose of shelf arrangement. Though a retrieval tool, it is equally efficient as a library classification, and tool for organising other entities and objects. It has become a highly flexible and effective system for organising bibliographic records for all kinds of information in any medium, especially multimedia packages.

UDC is a general classification scheme for all fields of knowledge available in various languages. All branches of knowledge have a place in UDC, though traditionally it is considered stronger in science and technology subjects.

2. BRIEF HISTORY

In 1895, some system of classification was required by the then newly established International Institute of Bibliography (IIB) [it was rechristened as International Institute for Documentation in 1914; International Federation for Documentation in 1958; and International Federation of Information and Documentation (FID) in 1986. FID was closed down in 2000 due to financial failures.] Task of the IIB was to compile a universal bibliography, a *Repertoire Bibliographique Universa*l. It needed a system for arrangement of entries in this universal bibliography—a systematic list of technical literature published anywhere in any subject and language, and since antiquity. This bibliography could only be in a classified order to transcend the language barrier. By 1921, the IIB had collected 12 million references on cards. Two Belgians, founders of the IIB, Paul Otlet (1868-1944) and Nobel laureate Hernri La Fontaine (1864-1943) sought permission from Melvil Dewey (1851-1931) to use and expand Dewey Decimal Classification (DDC) for arranging items in the bibliography. They then developed an expanded and powerful classification equipped with more details, and added synthetic equipment for class-number synthesis for microdocuments. They gave dimension, depth, and flexibility to the DDC. It was credited as the first faceted classification, a harbinger of the Colon Classification (CC) in 1933 (though S R Ranganathan claimed his classification independent of the UDC). It has proved an apt classification for information analysis and retrieval, especially for highly specific subjects in documentation work.

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First edition, based on the 5th edition of DDC (1894), appeared in French between 1905-1907 under the title *Manual du Reperoire Universal*e. It comprised 33,000 classes. The 2nd edition, again in French, was published during 1923-1933 and was titled *Classification Decimal Universalle.* The 3rd German, and 4th English editions were published in 1933 and 1936, respectively. Development of the UDC has been divided into the following three historical periods by Reyward:

French Period: 1895-1933	Foundation and grammar
German Period: 1933-1952	Details and expansion
English Period: 1936-1975	Research and practice
International Period: 1990-	Technical and organisational improvement

The completed English edition, published in numerous small fascicules, took half-a-century to publish because of alleged neglect.

3. OTHER EDITIONS

Throughout its history, it has been made available in editions of varied details. Till 1990, there were full, medium, and abridged editions. Full edition comprised over 2,00,000 terms, medium had 60,000 terms (about 30 per cent of the full) and abridged had up to 20,000 terms (about 10 per cent of the full edition). In addition to the earlier available full, medium and abridged editions, abridged and pocket editions in French, English, and Spanish were published in 1998, 1999, and 2004, respectively. This format was subsequently published in other languages (like Russian and Croatian) also. Now, only standard printed version of 67,000 terms, the pocket version (also published as 'abridged') of 4100 classes and the Spanish edition of 20,000 are officially available. A new English pocket edition is underway by the British Standards Institution (BSI), while a multilingual pocket edition to be published by the UDC Consortium is also being .

A standard version of the UDC, containing 67,000 classes, is maintained by the UDC Consortium and is available in a database format. It is called the UDC Master Reference File (UDC-MRF). Currently, the main language of UDC-MRF is English, though 31,000 records are also available in German. The UDC Consortium has plans to introduce a German translation by 2010, and translation in other languages such as Spanish, French, or Russian also. UDC MRF database was created in 1993 in CDS/ISIS software. Since then, UDC database exports (in ISO 2709), and simple text exports have been distributed to the users in a file format. The UDC Consortium does not publish or distribute the UDC-MRF in printed format. The printed format as well as CD-ROM or Web editions come only as products from different publishers who are either members of the UDC Consortium or pay-publishing license.

Since 1993, there were a number of editions in various languages both printed and electronic (desktop and online) (UDC Translations: A 2004 Survey Report and Bibliography at http://dlist.sir.arizona.edu/649).

The last printed editions in English, French and Spanish containing complete UDC MRF data are:

English: UDC: Universal Decimal Classification. Standard edition. 2 volumes. London : British Standards Institution, 2005. ISBN 0 580 45469 X (Volume 1 - Systematic tables); ISBN 0 580 45470 3 (Volume 2 - Alphabetical Index).

French: Classification décimale universelle. Édition moyenne internationale en 3 volumes. Liège, Éditions du C.E.F.A.L., 2004. ISBN 2-87130-152-2.

Spanish: Clasificación Decimal Universal. Norma UNE 50001:2000 CDU (Tablas sistemáticas. 3 volúmenes), Madrid: AENOR (Asociación Española de Normalizacióny Certificación), 2000. ISBN 84-8143-255-5

UDC editions on CD-ROM are available in Czech, Spanish, Japanese, and Russian. Full content of the UDC-MRF on the web are available in the following applications:

English: UDC Online (BSI)—http://www.udconline.net/ (UDC MRF version 2005, commercial product).

Czech: Mezinárodní desetinné trídení—http://aip.nkp.cz/mdt/ (UDC MRF version 2003, free access).

Slovenian: Univerzalna Decimalna Klasifikacija: elektronska izdaja.

Apart from these, there are several abridged editions also available online. They are:

Swedish: Universella decimalklassifikationen—http://www.hb.se/bhs/udk/index.htm (Abridged edition, 6100 classes, free access).

Italian: CDU Online—http://biocfarm.unibo.it/~spinelli/cdu/ (Abridged Italian edition from 1987).

A UDC outline of around 1000 classes is available on the UDCC website http://www.udcc.org/outline/outline.htm. Online editions have many additional features over the print version and allow multiple searching by terms and numbers and have user-friendly browsing options.

In 2007, UDC data was made available in MySQL database in addition to old export formats. In 2008, new export formats in MARC21 and UNIMARC as well as some other XML and RDF/XML compliant standard formats will also be made available.

4. MAIN FEATURES

UDC is owned, managed, maintained, and distributed by an international consortium of publishers with its headquarters in The Hague. Its editorial team comprises six Associate Editors lead by an Editor-in-Chief and supported by the UDC's Advisory Board of over 20 members. Salient features of UDC are:

(i) UDC is a practical bibliographic classification, truly international in efforts and exposition of contents. It is considered as the first faceted classification and a synthetic classification which is able to specify minute subjects, aspects, formats and their varied viewpoints.

(ii) It is the first officially internationally used classification system being published in French, German and English.

(iii) Its notation is independent of any particular language or script, and its translations have appeared in about 39 languages.

(iv) It lays more emphasis on subject analysis and document specification.

(v) Its auxiliary apparatus of relations and synthesis is quite powerful. This makes the UDC a truly multidimensional scheme.

(vi) It is more suitable for microdocuments, electronic information and information retrieval in online and networked databases, and websites.

(vii) Its structure is flexible to accommodate new subjects, and change citation order for flexibility of shelf arrangement and searching.

5. ORGANISATION OF KNOWLEDGE AND LAYOUT OF THE SCHEDULES

It is a general classification covering the whole domain of knowledge. As already said, it has borrowed its basic structure from its parent, the DDC, with the exception of merging main classes 4 with 8 literatures. The main class 4 is still vacant. The main classes thus are:

0	Generalities
1	Philosophy; Psychology
2	Religion. Theology
3	Social Sciences
4	[Vacant]
5	Natural Sciences; Mathematics
6	Technology
7	The Arts
8	Language; Linguistics; Literature
9	Geography; Biography; History

Unlike the DDC there is no condition of minimum of three digits in a class number. Each of the main class has been further divided into 10 divisions:

5	Natural Sciences
51	Mathematics
52	Astronomy
—	
—	
59	Zoology

There are thus 10 x 10 =100 divisions including the vacant places. Similarly, the above 100 divisions can be divided again into 1000 sections:

53	Physics (General)
531/534	Mechanics
535	Optics
536	Heat and Thermodynamics
537	Electricity and Magnetism
538	Physical Nature and Matter: (Atomic and Nuclear Physics)

Each of the above classes can be further divided decimally.

536	Heat and Thermodynamics
536.2	Heat Conduction
536.5	Temperature

536.6	Calorimetry
536.7	Entropy

A dot has been put after the third digit. In fact a dot is put after every third digit of the same facet, e.g.

621.882	Threaded fasteners, screws, nuts and bolts, and washers.
621.882.2	Screws, bolts according to head form. Screws and bolts for various materials.
621.882.21	Screws and bolts according to head form.
621.882.215	Circular, round-head screws and bolts. Recessed, cup-head screws. Socket-head screws.

[does not exit]

The schedules 0/9 and its subdivisions are known as main tables.

6. COMMON AUXILIARY TABLES

Any number from the main table can be extended by notation from auxiliary tables, which are of two types, (i) Common auxiliaries: universally applicable to all classes; and (ii) special auxiliaries: applicable restrictively or locally.

6.1 Common Auxiliaries

More than 10,000 common auxiliaries are given in Tables 1a to 1k:

Concept	Symbol	Table
Relations, addition, coordination	+ / [] ::	1a and 1b
Languages	=0/9	1c
Forms	(0/09)	1d
Places	(1/9)	1e
Ethnic grouping and nationality	(=…)	1f
Time	" "	1g
Non-UDC numbers	* and A/Z	1h
General characteristics	-0	1k
Properties	-02	
Materials	-03	
Relations, processes, operations, etc.	-04	
Persons and personal characteristics	-05	

These auxiliaries can be added to a number of any specificity without any specific instruction.

3+5	Social Sciences and Natural Sciences
5/6	Science and Technology
2:5	Religion and Science (Relation)
[5+6](05)	*Journal of Science and Technology*
512=111	Algebra in English
02(03)	Dictionary of Library Science
02(03)=411.21	Dictionary of Library Science in Arabic Language
5 "19"	Science in 20th Century
551.5 "2007.12.25"	Weather on X-Mas of 2007
5+6 "20" (540)	21st Century Science and Technology in India
523.6#81P	Halley's Comet (Number 81P)
7 Tagore	Art works of Rabinder Nath Tagore
821.111 Shak.	Works of William Shakespeare
004.38*P4	Pentium IV Personal Computer
61-051	Medical Personnel
645.4-035.3	Wooden Furniture

Two or more auxiliaries can be added simultaneously:

Foreign relations between Pakistan and India: An Urdu text

327 (540: 549)=214.22

Hindi-Urdu journal of Indian foreign policy

327(540)(05)=214.21=214.22

Birds of India and Nepal: A textbook in Bengali

598.2 (540+541.35) (075)=214.32

Weather on X-Mas of 2007 in India: A report

551.5 "2007.12.25" (540) (047)

Critical study of the tragic plays of William Shakespeare

821.111Shak-21.09

Psychology of single parents

159.9 – 055.52 –058.832

6.2 Special Auxiliaries

The following three auxiliaries are applied to a restricted but clearly specified range of numbers. Their functions overlap. These are recognised by sidelining the numbers. These are denoted by

.0	Point naught
‘	Apostrophe
-	Hyphen

6.2.1 Zero Auxiliaries

53	Physics
53.02	General laws of phenomena
53.08	Units and constants [Physics]

It entails that the special auxiliaries .02 and .081 shown by sidelining 53 are applicable to all the subdivisions of 53 Physics, e.g.

531.02	General Laws of Mechanics
531.5.02	General Laws of Gravity
531.55.02	General Laws of External Ballistics
531.55.081	Units in External Ballistics
534.6.081	Units of Acoustic Measurement

6.2.2 Hyphen Auxiliaries

546	Inorganic Chemistry
546-31	Oxides
546.26	Carbon element
546.26-31	Carbon Oxides
546.47	Zinc
646.47-31	Zinc Oxides

6.2.3 Apostrophe Auxiliaries

81’282	Dialects
811.111’282	Dialects of English language
811.134’282(8)	Dialects of Spanish language in South America
811.134-26’282(8)	Dialects of written Spanish in South America

6.3 Citation Order

As it is clear from the above examples, two or more auxiliaries can be added to a given class number. The UDC follows the principle of inversion that is, the order of facets in the class number is reverse of their arrangement on the shelves. A broader order is: Class number +Special auxiliaries + Common auxiliaries. The common auxiliaries are to be added in the order of their decreasing specificity, i.e., more important or specific common auxiliaries are to be added first and the least specific to be added last. A mechanical formula for the citation order is that the auxiliary tables should be added in the order 1k to 1c.

Unemployed medical librarianship graduates in India in 2006: A motion picture in Hindi

026: 61-577.19 (540) “2006” (084.122)=214.21

However, no formulated order has been presented for the special auxiliaries.

The UDC being a flexible classification the order may be changed to have better sense or make some local variations. Moreover to arrange documents the shelled auxiliaries may be brought in the fore position. For example, to bring all journals in one section we could have numbers like

(05) 5	*Journal of Science*
(05) 53	*Journal of Physics*
(05) 54	*Journal of Chemistry*

Similarly,

(540) 32	*Indian Politics*
(540) 33	*Indian Economics*
(540)336.71	*Indian Banking*
(540) 34	*Indian Laws*
(540) 39	*Indian Folklore*
(540) 5	*Indian Science*

and so on to make a section of Indology.

7. NOTATION AND LAYOUT

The UDC notation is a mix of decimal numbers, punctuation signs, and symbols with permissible use of alphabets, or other non-UDC symbols. The

use of decimal notation has made it a truly international classification with many technical advantages. It is hierarchical, expressive, hospitable, mnemonic, faceted and synthetic. Layout of the abridged edition (2003) explained here is that of the pocket edition (1999).

In this edition instead of verbal signs, following symbols independent of language have been used to give notes and instructions under an entry in the schedules.

Symbol	Name	Meaning
⇒	Arrow	See Also
◊	Diamond	Examples numbers combinations
•	Square	Inclusion note (it reads Including")
|	Sideline	Special auxiliaries
#	Hash	Non-UDC extensions
A/Z	Alphabets	Alphabetical divisions

The symbols are for the convenience of presentations in this specific edition only, and not used in building UDC class number.

These tables, both main and auxiliary, consist of simple numbers and a few compound numbers– later are a compilation of two or more numbers built with linkage sign or auxiliaries. Such numbers are indicated by à sign, e.g.,

56	Paleontology
◊56:581	General Paleontology
030	General reference works, encyclopedia

It means Encyclopedia will also get the class number 030.

8. INDEX

Current terminology uses British spellings and idiom. In the index of the abridged edition there are 9500 main and 3500 subentries making a total of 13,000 entries contained in 107 pages. It gives an average of three access points per entry in the tables. Index entries culled from the electronic files are arranged in word-by-word order to conform to the BS ISO 999 Standard. Specific names are entered following AACR 2 specifications. It includes all the principal divisions, inclusion notes, common and special auxiliaries and built-in compound numbers. Collocation of terms depicts relations and qualifiers are added to homonymous words to show the context, e.g., axes (tools), 672.7; axes (plants), 581.4, or line (art), 7.013. In case of a synonym all its popular terms are indexed to avoid see-references, e.g., both *Aves* and *Birds* have been indexed. Index is tidy and easy to use.

9. MANAGEMENT, MAINTENANCE, AND REVISION

Since the 1990s the UDC has undergone sea changes in its technicalities, contents organisation, and management. It has been completely rejuvenated**.** The original FID/CCC, the committee in charge of the UDC, was replaced in 1985 by the UDC Management Board. On the recommendation of a Task Force constituted by the Board, the FID (now defunct) handed over the ownership of the UDC to the non-profit, but self-financed UDC Consortium (UDCC), which came into being on 1 January 1992. Since 2007, it consists of the publishers of the Dutch, English, French, Japanese, Russian, Spanish, and Czech editions of the UDC (ww.udcc.org). It owns markets, maintains, innovates, and keeps the UDC updated[10].

The office of the UDCC is housed in the National Library of the Netherlands at the Hague and is a managed by a Chairman. The first Editor of the UDC, since the establishment of the UDC Consortium, was Professor-Ia. C. MacIlwaine (1993-2006), and the present Chief Editor since June 2006 is Dr Maria Ines Corderio. The UDC Advisory Board consists of about 20 information professionals from all over the world. Each of the Consortium members has the right to issue UDC edition in its own language. Language versions are not mere translations. These are updated with local and cultural additions. The BSI, a member of the UDCC, is responsible for the English editions (www.bsi.org). A UDC discussion list moderated by Dr. Andrew Buxton exists at UDC-FORUM@JISCMAIL.AC.UK. <www.jiscmail.ac.uk/lists/udc-forum.html>. It is a forum to get and share UDC news and developments. UDC blog exists at http://universaldecimalclassification.blogspot.com

9.1 Revision

The UDC revision is planned and regular. The UDCC controls its development acting as an international clearing house. It seeks help from specialists in many subject fields. Normally revision proposals are published in the Extensions and Corrections to the UDC and comments and suggestions are invited from users and the members of the Advisory Board before finally being incorporated in the UCD-MRF.

With the appointment of the Editor with sole and unlimited authority over revision for the first time since September 1993, the pace of revision has become quick. Users are informed of changes and expansions in the annual publication, *UDC: Extensions and Corrections* published every year in November (the last issue is Vol. 29, 2007). This annual publication also contains articles, major revision proposals and a bibliography on the UDC. Changes to UDC are introduced annually and the new UDC version is released by UDC Consortium every January. Editions of the UDC incorporating the authorised changes are published by the members of the Consortium, each in its own language, or by any outside publisher licensed by the UDCC.

9.2 Problems

Despite its constant and enduring success, it has been criticised on certain points:

(i) Its DDC base has always been criticised.

(ii) Some notational devices, although apparently logical and satisfactory, cause problems in searching and browsing. e.g., symbols like – and 0 overlap in function and may lead to confusion.

(iii) Its auxiliaries are still developing with changes in some notational symbols.

(iv) There are certain citation order problems, as no definite standard has been prescribed.

(v) Main class 4 has still not been filled up.

(vi) Notational changes are worrisome.

10. APPLICATIONS

In terms of its applications, now it is a most diversely used tool, ranging from shelf classification, organising bibliographies, web organisation to classification of conceptual and material objects. Though the first bibliographic classification, it is equally useful for arranging documents, their surrogates and other information bearing objects such as electronic files, AVs, maps, CDs, art collections, photographs, coins, stamps, and entities like persons, places and organisations.

Today, UDC is ranked as one of the big three most widely used classification systems of the world. Technically, it is considered much superior to the other two, namely the DDC and the Library of Congress Classification (LCC). It is used in 125 countries of the world, in over 1,00,000 libraries and information centres, especially in Europe and Latin America. It is used as *de facto* standard for indexing of scientific and research literature in central and European countries. It is translated in 39 languages and is also used in over 30 national, subject, and trade bibliographies including Walford Guide. The abridged edition is equally useful for teaching.

It has been a pioneer in finding its use in computerised databases, and works extremely well with computers. While its hierarchical structure and classified order are useful for computer screen browsing, its hierarchical and synthetic notation is helpful in accurate retrieval. Online UDC allows multiple search facilities, namely, string search in natural language, Boolean searches, and browsing up and down the hierarchy. Its pioneer use in OPACs has been successful. Since 1993, it has been tested and applied in organisation of Internet resources of many subject gateways, nine of which are available in English (e.g. WAIS/WWW, NISS - National Information Services and Systems; SOSIG - Social Science Information Gateway; FVL - Finnish Virtual Library; PORT - Maritime Information Gateway; GERHARD - German Harvest Automated Retrieval and Directory etc.), and since 2000 it has been more frequently applied in national Web portals and gateways in central and eastern Europe. In subject gateways, it can be put to the following uses: Manual classification of manual collection; manual classification of large number of automatically harvested resources by using metadata; and, automatic harvesting and classification[9].

It has emerged as an excellent source for building other indexing languages, thesauri, taxonomies and special classifications with its multilingual database. It has the potential to act as a switching language between different information systems.

The UDC has emerged as knowledge organisation tool of high quality, easy applicability and international validity.

10.1 Future

As said earlier, UDC has been criticised for its DDC core and slow development. It has also been remarked that the UDC had better not been invented, yet it has not only survived but thrived in the bibliographic world where mortality rate is high. Once introduced, it not only works but performs better than many of its competitors.

For a century, despite lack of adequate finance and manpower, it has kept its head above waters. It has rejuvenated itself with constant reorganisation

since the last two decades. It is coping with updating by restructuring the knowledge using the frame work of the Bibliographic Classification (BC-2)—latter is much more up-to-date and better structured than any other general scheme. Classes of religion, languages, literature and history are now completely restructured following the principles of facet analysis. The project of restructuring of Class 61 (Medicine) on the principle of facet analysis, undertaken by Nancy Williamson, is now approaching its completion.

At the UDC Seminar (www.ulcc.org/seminar2007.htm) in June 2007 at the UDCC Headquarter, a Dutch software company Magnaview (www.magnaview.nl) presented an innovative visual application of the UDC, which makes possible to view the UDC MRF in 20 novel ways with facility to interact it visually. The software is commercially available from the company for the MRF license holders. With its well organised promotional network and keenness for innovations the UDC seems only to have assured long future.

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About the Author

Dr M.P. Satija is working as Professor and Head in the Department of Library and Information Science, Guru Nanak University, Amritsar.