A List of Symbols

a	length of interval A	page 72
A	set of all index entries	page 18
a_j	name of jth attribute	page 18
A_j	set of extensions of attribute a_j	page 18
b	blocksize	page 16
B	set of distinct blocksizes	page 95
B_{dir}	maximum fanout of directory node	page 24
b_{dir}	minimum fanout of directory node	page 24
B_{equal}	expected number of bitmap vectors which are read for an equality encoded bitmap index for processing a range query	page 31
b_j	number of bitmap vectors in j's dimension	page 30
b_{ji}	the ith bitmap vector on the jth attribute	page 30
B_{leaf}	maximum fanout of leaf node	page 24
b_{leaf}	minimum fanout of leaf node	page 24
B_{range}	expected number of bitmap vectors which are read for a range encoded bitmap index for processing a range query	page 33

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$Border(q)$	number of blocks that have to be accessed when an R_a^*-tree is used: $Inter(q) - Contain(q)$	page 46
bw	bandwith	page 94
BW	set of distinct bandwidths	page 94
c	cardinality of data space	page 92
C	set of distinct cardinalities of data space	page 95
c_j	cardinality of data space in jth dimension	page 18
$Contain(q)$	number of leaf nodes contained in query box q	page 46
cp	child pointer	page 23
d	number of dimensions	page 18
D	set of distinct number of dimensions	page 95
$d_a(x)$	density function of position of interval A	page 73
$d_b(y)$	density function of position of interval B	page 73
d_f	fractal dimension	page 69
$data_{entry}$	entry of a data node	page 48
dir_{entry}	entry of a directory node	page 47
DW	data warehouse	page 7
e	configuration vector $(d, t, c, qs, qd, b, sf, bw, t_l)$	page 94
E	set of all configurations: $\{(d, t, c, qs, qd, b, sf, bw, t_l) \mid (d, t, c, qs, qd, b, sf, bw, t_l) \in D \times N_t \times C \times Q_s \times Q_d \times B \times SF \times BW \times T_l, (qd \leq d) \wedge (c \leq t)\}$	page 95

$f(u,v)$	additional space when switching from fanout of u to fanout of v	page 53
$f(x,y)$	characteristic function to decide if two intervals intersect	page 73
$g(x,y)$	characteristic function to decide if one intervals is contained in the other	page 74
G	input set for creation of classification tree	page 99
h	height of tree	page 52
$h_1(a,b)$	PISA model: probability that A intersects B	page 73
$h_2(a,b)$	PISA model: probability that A contains B	page 74
i	index	
I	multi dimensional interval	page 18
$Inter(q)$	number of leafs intersecting query box q	page 46
j	index on the number of dimensions	
k	number of classes of the user defined density function	page 75
K	upper bound for additional space	page 53
l_{ik}	lower border of block i in dimension k	page 36
m	total number of bitmap vectors that are stored by an bitmap index in all dimensions	page 97
m_j	number of bitmap vectors that are stored by an bitmap index in the jth dimension	page 30
M	boxes for fractal dimension model	page 69
M_f	boxes filled for fractal dimension model	page 69

n	number of leaf nodes	page 36
N	set $\{1, \cdots, n\}$	page 69
n_i	number of nodes on level i n_0: number of leaf nodes n_1: number of inner nodes on level 1 n_h: number of root nodes ($n_h = 1$)	
n_u	number of leaf nodes of structure with fanout u	page 53
n_v	number of leaf nodes of structure with fanout v	page 53
N_t	set with distinct number of tuples	page 95
O	$O_1 \times \cdots \times O_d = \{0, \cdots, c_1 - 1\} \times \cdots \times \{0, \cdots, c_d - 1\}$	page 18
O_j	$\{0, \cdots, c_j - 1\}$	page 18
OP	set of operations	page 7
P	set of d-dimensional points (tuples)	page 36
p_i	SUM model: probability that rectangle i intersects query box q	page 66
q	vector with size of query box $q = (q_1, \cdots, q_d)$ (length in each dimension)	page 19
q_j	length of query box in jth dimension	page 19
qd	query box dimensions	page 92
Q_d	set with distinct query box dimensions	page 95
qs	query box size	page 92
Q_s	set of distinct query box sizes	page 95

R	Relation $R(a_1, \cdots, a_n, s)$	page 10
r_{ij}	size of leaf node i in dimension j	page 66
r	average length of rectangle in SUM model and PISA model (1-case)	page 75
r'	average length of rectangle in FRACTAL model	page 70
$\overline{r}$	average length of rectangle in GRID model	page 65
s_{dir}	size of a directory entry	page 46
s_{min}	select the index of the structure with the minimum value	page 99
s	number of index structures which are compared	page 95
s_0	number of slice for approximation of PISA model	page 124
S	data space $[0, 1)^d$	page 64
sf	scale factor	page 93
SF	set with distinct scale factors	page 95
t	number of tuples	page 36
T	$\{1, \cdots, t\}$	page 36
tid	tuple identifier	page 18
t_r	time for random block access to secondary memory	page 17
t_s	time for sequential block access to secondary memory	page 17

$t_i : E \rightarrow \mathbb{R}^+$	expected time for processing a range queries with index structure i	page 95
	$t_1 : E \rightarrow \mathbb{R}^+$ R-tree without aggregated data	page 96
	$t_2 : E \rightarrow \mathbb{R}^+$ R-tree with aggregated data	page 96
	$t_3 : E \rightarrow \mathbb{R}^+$ equality encoded bitmap index	page 98
	$t_4 : E \rightarrow \mathbb{R}^+$ range encoded bitmap index	page 98
TDB	target database	page 7
u_l	user defined density function for distribution of sizes of rectangles	page 75
u_{ik}	upper border of block i in dimension k	page 36
v	blocks per bitmap vector	page 97
x	leftmost point of interval A	page 72
y	leftmost point of interval B	page 72
Y_e	percentage error of modeled values for R^*/R^*_a-tree	page 81

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