

Real World Algorithms: A Beginners Guide

Errata to the Second Printing

Last updated 26 May 2018

This document lists the changes that should be made to *Real World Algorithms* to correct mistakes that made their way to printing, to improve infelicities that the author spotted too late, or update the material with something that the author did not know at the time of writing the book.

There are three different kinds of changes noted here. In all of them the date that they became known to the author is given at the first line of each item. The name of the person who suggested the change is also given at the end of each change.

► **Page 1, line 1** _____ 1 Jan 1

These are technical or typographical errors.

Page 1, line 1 _____ 1 Jan 1

These are changes that improve the book, even if they do not correct an error. They include small rewordings, or material that became known to the author after the book was published.

Page 1, line 1 _____ 1 Jan 1

These are minor fixes that although they do not make a big difference they do hurt the author. Some of them might strain the reader's eye to see where the improvement is exactly.

- Page 20, line -1 _____ 14 Feb 2018

we cannot execute line 7 more than n times. \leadsto we cannot execute line 7 more than $n - 1$ times; note that the last day is pushed, but not popped. (K. Marinakos)

- Page 32, line -2 _____ 16 Feb 2018

2.5×10^{25} , or 7 septillion $\leadsto 2.5 \times 10^{19}$, or 25 quintillion (K. Marinakos)

- Page 32, line 8 _____ 16 Feb 2018

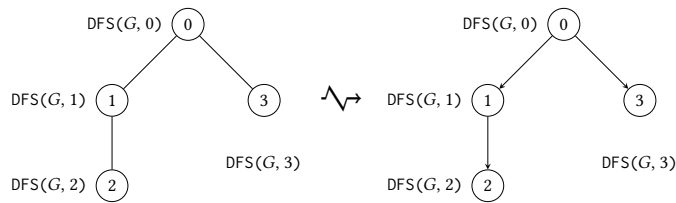
In an adjacency matrix, vertices are represented by row and column indices, and vertices are represented by the contents of the matrix. \leadsto In an adjacency matrix, the vertices are represented by row and column indices, and the edges are represented by the contents of the matrix. (K. Marinakos)

- Page 39, line -5 _____ 16 Feb 2018

Similarly, if $|E|$ is the number of edges in the graph, \leadsto Similarly, if $|E|$ is the number of edges in the graph, counting undirected edges twice, (K. Marinakos)

- Page 44, figure 2.21 _____ 17 Feb 2018

Add arrows so that the graph is directed:



(K. Marinakos)

- Page 49, algorithm 2.3, line 7 _____ 16 Feb 2018

$c \leftarrow \text{Pop}(s)$ $\leadsto c \leftarrow \text{Pop}(S)$ (K. Marinakos)

- Page 50, lines 2-4 _____ 16 Feb 2018

Line 2 is executed $|V|$ times, once per each vertex. Then $\text{DFS}(G, \text{node})$ is called exactly once per edge, in line 4, that is, $|E|$ times. \leadsto Line 4 is executed $|V|$ times, once per each vertex. The condition in line 3 is called exactly once for each edge of every adjacency list, that is, $|E|$ times.

- Page 54, line 5 _____ 16 Feb 2018

we only node \leadsto we only note (K. Marinakos)

- Page 49, line 4 _____ 17 Feb 2018
the same as algorithm 2.4 \leadsto the same as algorithm 2.3 (K. Marinakos)
- Page 55, figure 2.28a _____ 17 Feb 2018
rename nodes 7 and 8 to 6 and 7 respectively (K. Marinakos)
- Page 61, line 7 _____ 26 Feb 2018
with number in different number systems \leadsto with numbers in different number systems (K. Marinakos)
- Page 61, lines 17–18 _____ 26 Feb 2018
The binary number 1010 has value 14 \leadsto The binary number 1110 has value 14 (K. Marinakos)
- Page 65, line 10 _____ 26 May 2018
in 32 bits \leadsto in 33 bits (M. Chatzidavid)
- Page 69, line –13 _____ 26 Feb 2018
Each element of the priority tree \leadsto Each element of the priority queue (K. Marinakos)
- Page 72, line –2 _____ 26 Feb 2018
larger than its parent \leadsto lighter than its parent (K. Marinakos)
- Page 73, line –1 _____ 26 Feb 2018
larger than its children \leadsto smaller than its children (K. Marinakos)
- Page 161, line 14 _____ 26 Mar 2018
Beecause \leadsto Because (K. Marinakos)
- Page 173, figure 7.4 _____ 19 Mar 2018
was astonished whenever it shone in her face. Close by
was astonished whenever it shone in her face. Close by the
 \leadsto
was astonished whenever it shone in her face. Close by
was astonished whenever it shone in her face. Close by the
- Page 180, line –17 to –16 _____ 19 Mar 2018
then the number of nodes cannot be more than the number of edges \leadsto then
the number of nodes minus the source cannot be more than the number of
edges

- Page 192, figure 8.3 (c)–(h) _____ 26 May 2018
 $1/R_1 \wedge \rightarrow 1/D$ (I. Lazaridou)
- Page 192, figure 8.3 (h) _____ 21 Mar 2018
 $\underline{5/R_2} \wedge \rightarrow \underline{5/R_3}$ (M. E. Kostopoulou)
- Page 194 line -4 _____ 26 Mar 2018
 exactly one $\wedge \rightarrow$ exactly once (K. Marinakos)
- Page 196 line -7 _____ 26 Mar 2018
 $(2, 1) \wedge \rightarrow (2, 2)$ (K. Marinakos)
- Page 196 line -1 _____ 26 Mar 2018
 eighth $\wedge \rightarrow$ seventh (K. Marinakos)
- Page 198 line 12 _____ 26 Mar 2018
 they story short $\wedge \rightarrow$ the story short (K. Marinakos)
- Page 231 lines 8–9 _____ 18 Apr 2018
 A beats B by 60 to 40, B beats C by 60 to 40, and C beats A by 60 to 40 $\wedge \rightarrow$ A beats B by 60 to 30, B beats C by 60 to 30, and C beats A by 60 to 30 (K. Marinakos)
- Page 232 line 1 _____ 18 Apr 2018
 $i = 1, 2, \dots, n \wedge \rightarrow i = 1, 2, \dots, n$
- Page 232 line -11 _____ 18 Apr 2018
 This requires $\Theta(|B|^2)$ time. $\wedge \rightarrow$ This requires $\Theta(|C|^2)$ time. (K. Marinakos)
- Page 233 line 2 _____ 18 Apr 2018
 runs in $O(|C|^2 + |B|^2)$ time. $\wedge \rightarrow$ runs in $O(|C|^2 + |B||C|^2)$ time (K. Marinakos)
- Page 241, algorithm 10.3, Input _____ 18 Apr 2018
 S , an array of size $n \times n$ with the strongest paths between nodes; $s[i, j]$ is the strongest path between nodes i and j
 $\wedge \rightarrow$
 S , an array of size $n \times n$ with the strengths of the strongest paths between nodes; $s[i, j]$ is the strength of the strongest path between nodes i and j
- Page 241, algorithm 10.3, Output _____ 18 Apr 2018
 $wins$, a list of size n ; item i of $wins$ is a list containing m integer items j_1, j_2, \dots, j_m for which $S[i, j_k] > S[j_k, i]$
 $\wedge \rightarrow$
 $wins$, an array of size n ; item i of $wins$ is a list containing m integer items j_1, j_2, \dots, j_m for which $S[i, j_k] > S[j_k, i]$

- Page 241, algorithm 10.3, line 1 _____ 18 Apr 2018

$wins \leftarrow \text{CreateList}()$

\rightsquigarrow

$wins \leftarrow \text{CreateArray}(n)$

- Page 241, algorithm 10.3, line 4 _____ 18 Apr 2018

$\text{InsertInList}(wins, \text{NULL}, list)$

\rightsquigarrow

$wins[i] \leftarrow list$

- Page 241, lines 3–4 _____ 18 Apr 2018

a list $wins$ such that item i of the list $wins$ \rightsquigarrow an array $wins$ such that item i of the array $wins$ (K. Marinakos)

- Page 241 line –7 _____ 18 Apr 2018

$O(|C|^2 + |B|^2)$ time $\rightsquigarrow O(|C|^2 + |B||C|^2)$ time (K. Marinakos)

Page 341, line 2 _____ 20 May 2018

$$v_4 = 3,276,858 + \text{Ordinal}("O") = +3,276,858 + 14 = 3,276,872$$

\rightsquigarrow

$$v_4 = 3,276,858 + \text{Ordinal}("O") = 3,276,858 + 14 = 3,276,872$$

Page 443, algorithm 15.4, line 6 _____ 20 May 2018

$rt[\text{Ord}(p[i])] \leftarrow m - i - 1$

\rightsquigarrow

$rt[\text{Ordinal}(p[i])] \leftarrow m - i - 1$

Page 443, line –4 _____ 20 May 2018

The function $\text{Ord}(c)$ \rightsquigarrow The function $\text{Ordinal}(c)$

Page 445, algorithm 15.5, line 13 _____ 20 May 2018

$i \leftarrow i + rt[\text{Ord}(c)]$

\rightsquigarrow

$i \leftarrow i + rt[\text{Ordinal}(c)]$

- Page 446, line –4 to –3 _____ 20 May 2018

The time to create table rt is $O(m)$ \rightsquigarrow The time to create rt is $O(m + s)$

- Page 446, line –2 _____ 20 May 2018

longer than m \rightsquigarrow longer than $m + s$

Page 456, line 10 _____ 20 May 2018

But a whole lot more of them. $\wedge \rightarrow$ But a whole lot more of them before it starts repeating itself.

► Page 463, line -4, _____ 20 May 2018

from a *scr* $\wedge \rightarrow$ from a source *src*

► Page 463, lines -3, -1 _____ 20 May 2018

scr $\wedge \rightarrow$ *src*

► Page 464, algorithm 16.5 signature, input, output, lines 1, 3, 5 ____ 20 May 2018

scr $\wedge \rightarrow$ *src*

► Page 464, line 1 _____ 20 May 2018

creating *s* $\wedge \rightarrow$ creating *S*

► Page 464, lines 2, 4, -6 _____ 20 May 2018

scr $\wedge \rightarrow$ *src*

► Page 464, line -6 _____ 20 May 2018

we return *s* $\wedge \rightarrow$ we return *S*

► Page 478, figure 16.7, line 2 _____ 23 May 2018

F F T T T T T T T T T T T T F F T T T T T T T T T T T T T T

$\wedge \rightarrow$

F F T

► Page 484, algorithm 16.10, output _____ 23 May 2018

with probability $(1/4)^t$ $\wedge \rightarrow$ with error probability $(1/4)^t$