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Smoothing Data Using Moving Average in C++

Laboratory work #2

KULUBECİOGLU MEHMET

Kyiv– 2023

Step-by-Step Explanation of the Code:

1. Including Libraries:

```
#include <iostream>
#include <vector>
#include <omp.h>
```

- The `#include` directives include the `iostream` and `vector` libraries in our code.
- The `using namespace std;` line allows us to use all identifiers (functions, variables, etc.) in the `std` namespace directly.

2. Declaring Variables:

```
int main() {
    const int N = 16000;
    vector<double> a(N);
    vector<double> b(N);
```

- The `const int N = 16000;` line defines a constant integer variable named `N` and sets its value to 16,000.
- The `vector<double> a(N);` line creates a vector (array) named `a` that can store `double` type data and has `N` elements.
- The `vector<double> b(N);` line creates a vector (array) named `b` that can store `double` type data and has `N` elements.

3. Populating the Array:

```
    for (int i = 0; i < N; i++) {
        a[i] = i;
    }
```

- The `for` loop iterates through all `i` values from 0 to `N-1` (inclusive).
- In each loop iteration, the value of `i` is assigned to the `i`th element of the `a` array.

4. Calculating Average Values:

```
#pragma omp parallel for
    for (int i = 1; i < N - 1; i++) {
        b[i] = (a[i - 1] + a[i] + a[i + 1]) / 3.0;
    }
```

- The `for` loop iterates through all `i` values from 1 to `N-2` (inclusive).
- In each loop iteration, the average of the `a[i-1]`, `a[i]` and `a[i+1]` values is assigned to the `i`th element of the `b` array.

5. Printing the Results:

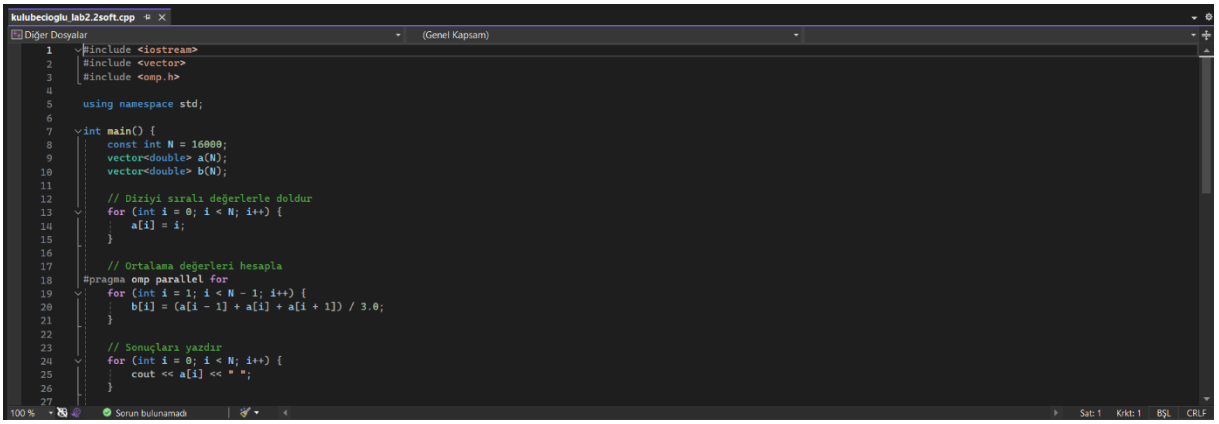
```
22      for (int i = 0; i < N; i++) {
23          cout << a[i] << " ";
24      }
25
26      cout << endl;
27
28      for (int i = 0; i < N; i++) {
29          cout << b[i] << " ";
30      }
31
32      cout << endl;
```

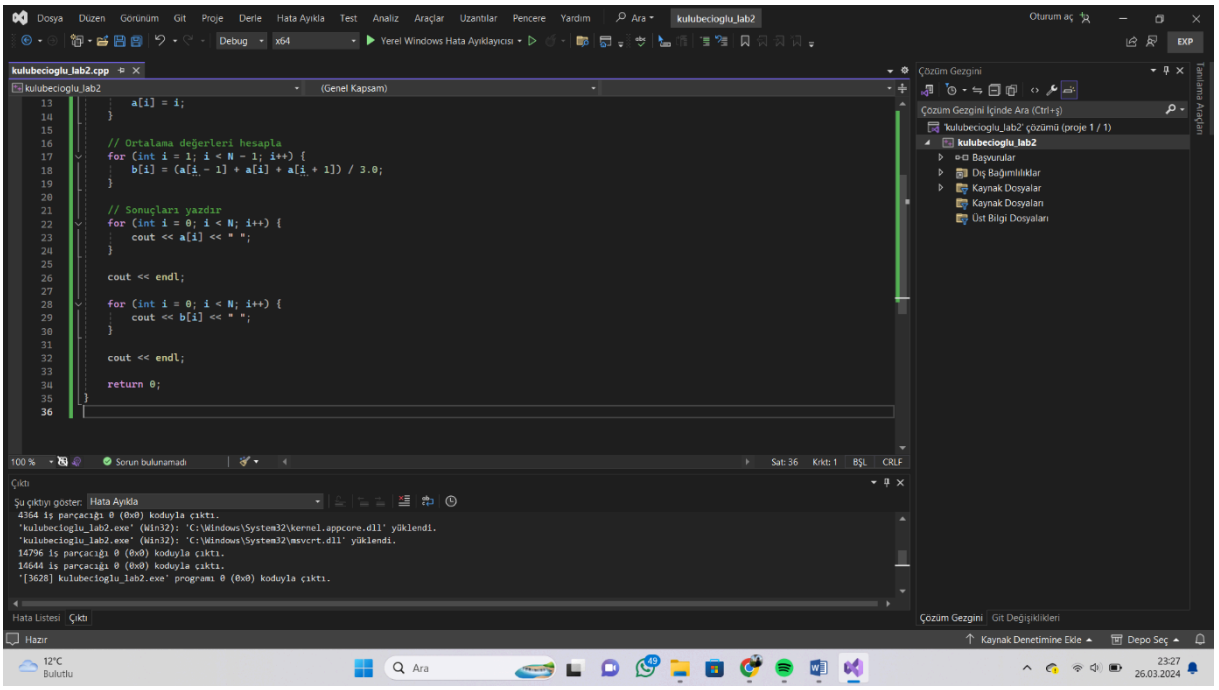
- The first `for` loop prints all elements of the `a` array to the screen in sequence using the `cout` object.
- The second `for` loop prints all elements of the `b` array to the screen in sequence using the `cout` object.

Short Code Snippets and Explanations:

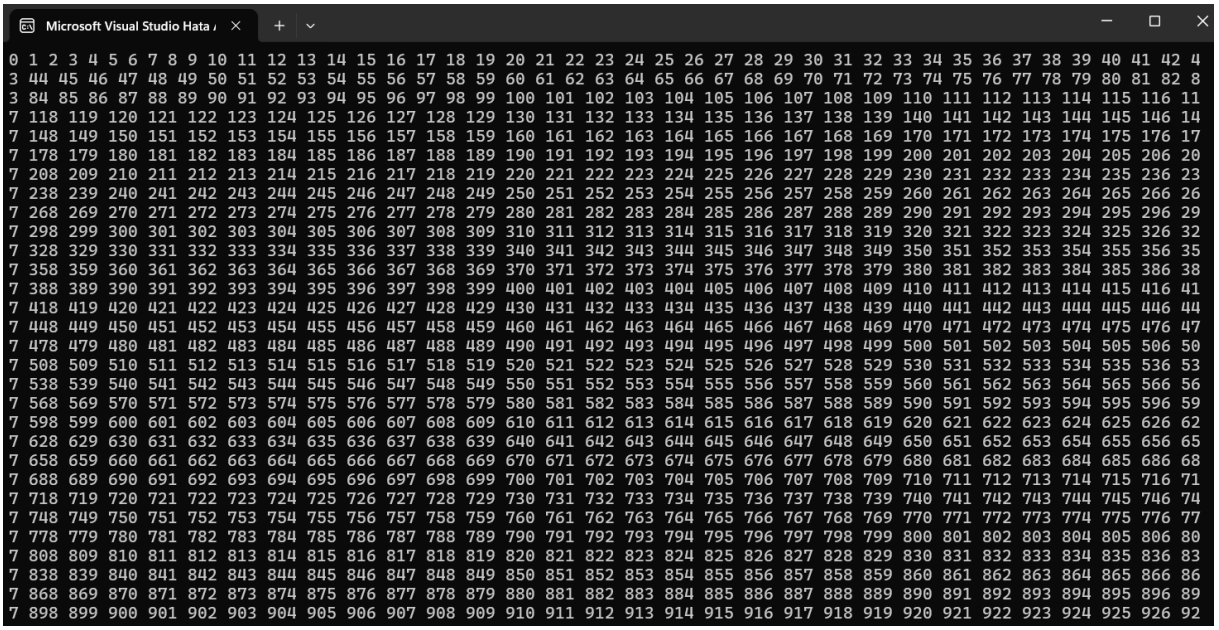
- `#include <iostream>`: Includes the necessary library for input and output operations.
- `#include <vector>`: Includes the necessary library to use the vector (array) data structure.
- `vector<double> a(N);`: Creates a vector (array) named `a` that can store `double` type data and has `N` elements.
- `for (int i = 0; i < N; i++) { a[i] = i; }`: Populates all elements of the `a` array with values from 0 to N-1 in sequence.
- `b[i] = (a[i - 1] + a[i] + a[i + 1]) / 3.0;`: Assigns the average of the `a[i-1]`, `a[i]` and `a[i+1]` values to the `i`th element of the `b` array.
- `cout << a[i] << " ";`: Prints the `i`th element of the `a` array to the screen.

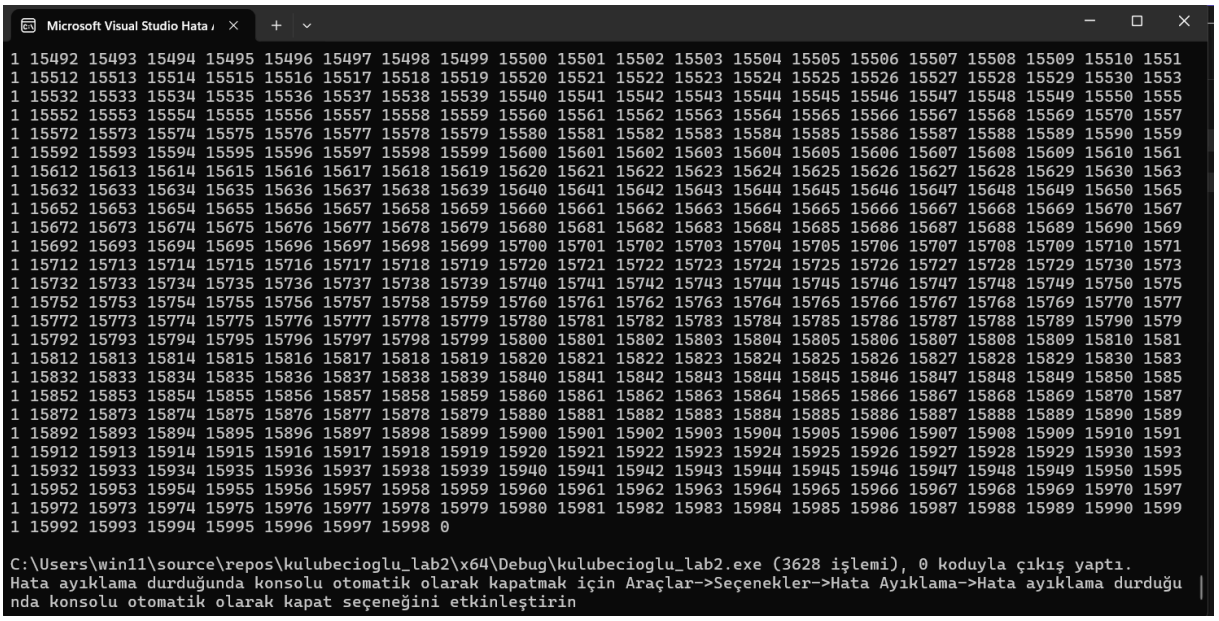
MY FULL CODES:


kulubecioglu_lab2.2soft.cpp
Diğer Dosyalar
(Genel Kapsam)
#include <iostream>
#include <vector>
#include <omp.h>
using namespace std;
int main() {
const int N = 16000;
vector<double> a(N);
vector<double> b(N);
// Diziyi sıralı değerlerle doldur
for (int i = 0; i < N; i++) {
a[i] = i;
}
// Ortalama değerleri hesapla
#pragma omp parallel for
for (int i = 1; i < N - 1; i++) {
b[i] = (a[i - 1] + a[i] + a[i + 1]) / 3.0;
}
// Sonuçları yazdır
for (int i = 0; i < N; i++) {
cout << a[i] << " ";
}
Sorun bulunamadı
Sat: 1
Krkt: 1
BŞL
CRLF


Dosya Düzen Görünüm Git Proje Derle Hata Ayıkla Test Analiz Araçlar Uzantılar Pencere Yardım
kulubecioglu_lab2
Debug
x64
Yerel Windows Hata Ayıklayıcısı
kulubecioglu_lab2.cpp
kulubecioglu_lab2
(Genel Kapsam)
a[i] = i;
// Ortalama değerleri hesapla
b[i] = (a[i - 1] + a[i] + a[i + 1]) / 3.0;
// Sonuçları yazdır
cout << a[i] << " ";
cout << endl;
return 0;
Sorun bulunamadı
Sat: 36
Krkt: 1
BŞL
CRLF
Çıktı
Şu çıktıyı göster: Hata Ayıkla
4364 iş parçacığı 0 (0x0) koduyla çıktı.
'kulubecioglu_lab2.exe' (Win32): 'C:\Windows\System32\kernel.appcore.dll' yüklendi.
'kulubecioglu_lab2.exe' (Win32): 'C:\Windows\System32\msvcrt.dll' yüklendi.
14796 iş parçacığı 0 (0x0) koduyla çıktı.
14644 iş parçacığı 0 (0x0) koduyla çıktı.
'[3628] kulubecioglu_lab2.exe' programı 0 (0x0) koduyla çıktı.
Hata Listesi
Çıktı
Çözüm Gezgini
Çözüm Gezgini İçinde Ara (Ctrl+ş)
'kulubecioglu_lab2' çözümü (proje 1 / 1)
kulubecioglu_lab2
Başvurular
Dış Bağımlılıklar
Kaynak Dosyalar
Kaynak Dosyaları
Üst Bilgi Dosyaları
Çözüm Gezgini
Git Değişiklikleri
Hazır
Kaynak Denetimine Ekle
Depo Seç
12°C
Bulutlu
Ara
23:27
26.03.2024

MY OUTPUT:


Microsoft Visual Studio Hata
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 4
3 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 8
3 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 11
7 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 14
7 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 17
7 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 20
7 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 23
7 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 26
7 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 29
7 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 32
7 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 35
7 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 38
7 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 41
7 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 44
7 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 47
7 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 50
7 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 53
7 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 56
7 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 59
7 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 62
7 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 65
7 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 68
7 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 71
7 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 74
7 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 77
7 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 80
7 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 83
7 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 86
7 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 89
7 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 92


Microsoft Visual Studio Hata
1 15492 15493 15494 15495 15496 15497 15498 15499 15500 15501 15502 15503 15504 15505 15506 15507 15508 15509 15510 1551
1 15512 15513 15514 15515 15516 15517 15518 15519 15520 15521 15522 15523 15524 15525 15526 15527 15528 15529 15530 1553
1 15532 15533 15534 15535 15536 15537 15538 15539 15540 15541 15542 15543 15544 15545 15546 15547 15548 15549 15550 1555
1 15552 15553 15554 15555 15556 15557 15558 15559 15560 15561 15562 15563 15564 15565 15566 15567 15568 15569 15570 1557
1 15572 15573 15574 15575 15576 15577 15578 15579 15580 15581 15582 15583 15584 15585 15586 15587 15588 15589 15590 1559
1 15592 15593 15594 15595 15596 15597 15598 15599 15600 15601 15602 15603 15604 15605 15606 15607 15608 15609 15610 1561
1 15612 15613 15614 15615 15616 15617 15618 15619 15620 15621 15622 15623 15624 15625 15626 15627 15628 15629 15630 1563
1 15632 15633 15634 15635 15636 15637 15638 15639 15640 15641 15642 15643 15644 15645 15646 15647 15648 15649 15650 1565
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1 15672 15673 15674 15675 15676 15677 15678 15679 15680 15681 15682 15683 15684 15685 15686 15687 15688 15689 15690 1569
1 15692 15693 15694 15695 15696 15697 15698 15699 15700 15701 15702 15703 15704 15705 15706 15707 15708 15709 15710 1571
1 15712 15713 15714 15715 15716 15717 15718 15719 15720 15721 15722 15723 15724 15725 15726 15727 15728 15729 15730 1573
1 15732 15733 15734 15735 15736 15737 15738 15739 15740 15741 15742 15743 15744 15745 15746 15747 15748 15749 15750 1575
1 15752 15753 15754 15755 15756 15757 15758 15759 15760 15761 15762 15763 15764 15765 15766 15767 15768 15769 15770 1577
1 15772 15773 15774 15775 15776 15777 15778 15779 15780 15781 15782 15783 15784 15785 15786 15787 15788 15789 15790 1579
1 15792 15793 15794 15795 15796 15797 15798 15799 15800 15801 15802 15803 15804 15805 15806 15807 15808 15809 15810 1581
1 15812 15813 15814 15815 15816 15817 15818 15819 15820 15821 15822 15823 15824 15825 15826 15827 15828 15829 15830 1583
1 15832 15833 15834 15835 15836 15837 15838 15839 15840 15841 15842 15843 15844 15845 15846 15847 15848 15849 15850 1585
1 15852 15853 15854 15855 15856 15857 15858 15859 15860 15861 15862 15863 15864 15865 15866 15867 15868 15869 15870 1587
1 15872 15873 15874 15875 15876 15877 15878 15879 15880 15881 15882 15883 15884 15885 15886 15887 15888 15889 15890 1589
1 15892 15893 15894 15895 15896 15897 15898 15899 15900 15901 15902 15903 15904 15905 15906 15907 15908 15909 15910 1591
1 15912 15913 15914 15915 15916 15917 15918 15919 15920 15921 15922 15923 15924 15925 15926 15927 15928 15929 15930 1593
1 15932 15933 15934 15935 15936 15937 15938 15939 15940 15941 15942 15943 15944 15945 15946 15947 15948 15949 15950 1595
1 15952 15953 15954 15955 15956 15957 15958 15959 15960 15961 15962 15963 15964 15965 15966 15967 15968 15969 15970 1597
1 15972 15973 15974 15975 15976 15977 15978 15979 15980 15981 15982 15983 15984 15985 15986 15987 15988 15989 15990 1599
1 15992 15993 15994 15995 15996 15997 15998 0
C:\Users\win11\source\repos\kulubecioglu_lab2\x64\Debug\kulubecioglu_lab2.exe (3628 işlemi), 0 koduyla çıkış yaptı.
Hata ayıklama durduğunda konsolu otomatik olarak kapatmak için Araçlar->Seçenekler->Hata Ayıklama->Hata ayıklama durduğu
nda konsolu otomatik olarak kapat seçeneğini etkinleştirin