Politechnika Poznańska

Informatyka rok I semestr 2

L10, Piątek 0:00 - 0:00

Algorytmy i Struktury Danych

Prowadzący: Dominik Piotr Witczak

Sprawozdanie nr 1

Algorytmy Sortowania

Autor:

Dominik Fischer 164176
Oliwer Miller

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POLITECHNIKA POZNAŃSKA

Wprowadzenie

Tutaj piszemy wprowadzenie

Selection Sort

Tutaj opis algorytmu

Terminal

```
def selection_sort(data):
    n=len(data)
    for j in range(n-1):
        min = j
        for i in range(j+1, n):
            if data[i] < data[min]:
                min = i
        data[j], data[min] = data[min], data[j]
    return data
```

Insertion Sort

Tutaj opis algorytmu

Terminal

```
def insertion_sort (data):
    for i in range(1, len(data)):
        key = data[i]
        j = i - 1
        while j >= 0 and data[j] > key:
            data[j + 1] = data[j]
            j -= 1
        data[j + 1] = key
    return data
```

shell Sort With Sadgewick Gaps

Tutaj opis algorytmu

Terminal

```
def sedgewick_gaps(n):
   gaps = []
   k = 0
   while True:
      if k % 2 == 0:
         gap = 9 * (2 ** k) - 9 * (2 ** (k // 2)) + 1
      else:
         gap = 4 ** k + 3 * 2 ** (k - 1) + 1

      if gap >= n:
         break
      gaps.append(gap)
      k += 1

   return gaps[::-1]

def shell_sort(data):
   n = len(data)
   gaps = sedgewick_gaps(n)

   for gap in gaps:
      for i in range(gap, n):
         temp = data[i]
         j = i
         while j >= gap and data[j - gap] > temp:
            data[j] = data[j - gap]
            j -= gap
         data[j] = temp
   return data
```

Heap Sort

Tutaj opis algorytmu

Terminal

```
def heap(data,n,i):
   largest=i
   left = 2*i+1
   right = 2*i+2

   if left<n and data[left]>data[largest]:
      largest = left
   if right<n and data[right]>data[largest]:
      largest=right
   if largest !=i:
      data[i], data[largest]=data[largest],
          data[i]
      heap(data, n, largest)

def heap_sort(data):
   n = len(data)

   for i in range(n // 2 - 1, -1, -1):
      heap(data, n, i)

   for i in range(n - 1, 0, -1):
      data[i], data[0] = data[0], data[i]
      heap(data, i, 0)

   return data
```

Quick Sort Left Pivot

Tutaj opis algorytmu

Terminal

```
def partition(A, p, r):
    pivot = A[p]
    i = p+1
    j = r

    while True:
        while i <= j and A[i] <= pivot:
            i += 1
        while i <= j and A[j] > pivot:
            j -= 1
        if i <= j:
            A[i], A[j] = A[j], A[i]
        else:
            break

    A[p], A[j] = A[j], A[p]
    return j

def quick_sort_left_pivot(A, p, r):
    if p < r:
        q = partition(A, p, r)
        quick_sort_left_pivot(A, p, q-1)
        quick_sort_left_pivot(A, q+1, r)
    return A
```

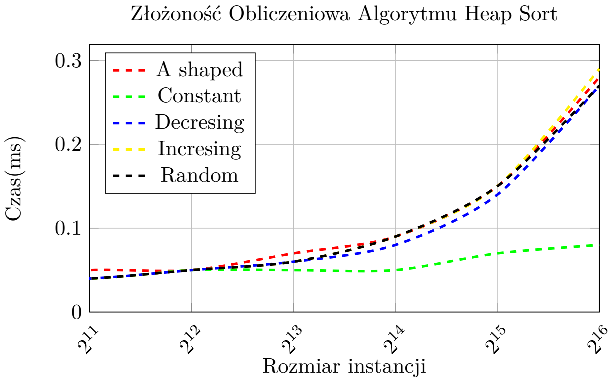
Quick Sort Random Pivot

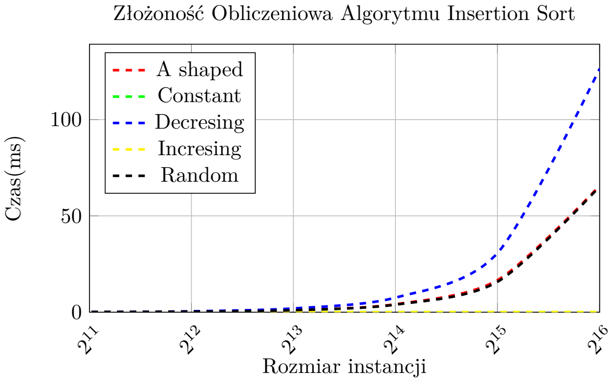
Tutaj opis algorytmu

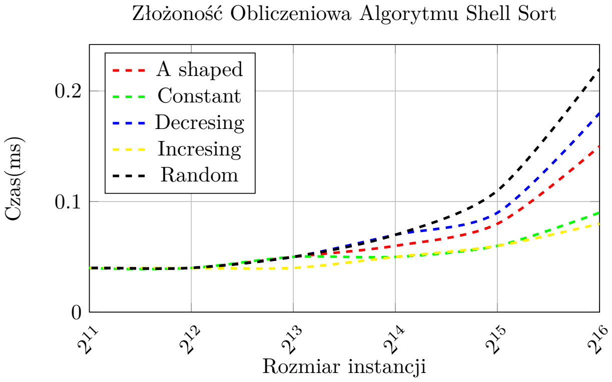
Terminal

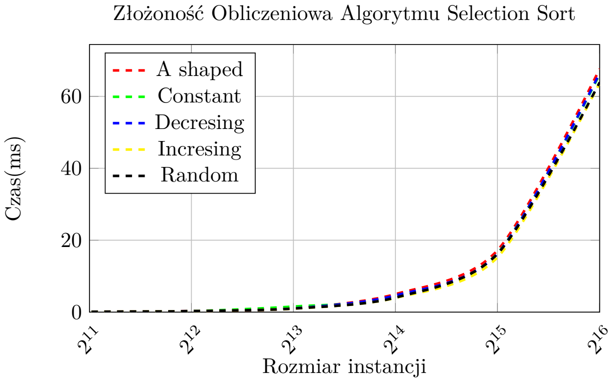
```
def quick_sort_random_pivot(data):
   if len(data) <= 1:
      return data

   pivot_index = random.randint(0, len(data)
        - 1)
   pivot = data[pivot_index]

   left = []
   middle = []
   right = []

   for i, x in enumerate(data):
      if i == pivot_index:
         middle.append(x)
      elif x < pivot:
         left.append(x)
      elif x > pivot:
         right.append(x)

   return quick_sort_random_pivot(left) +
       middle + quick_sort_random_pivot(
       right)
```

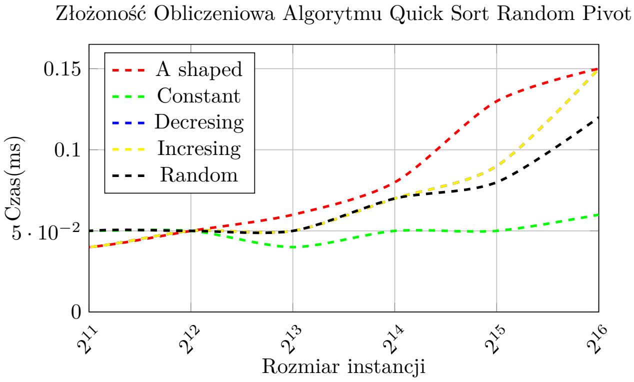
Porównanie czasów wykonania

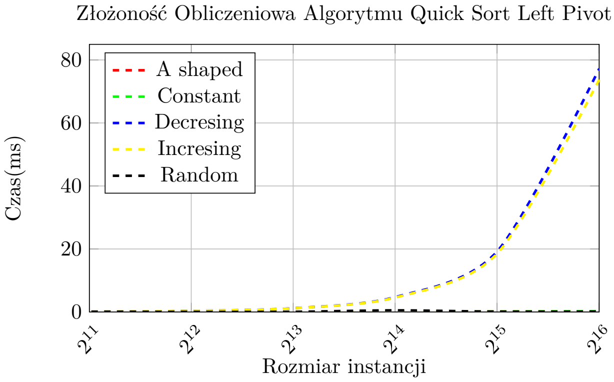






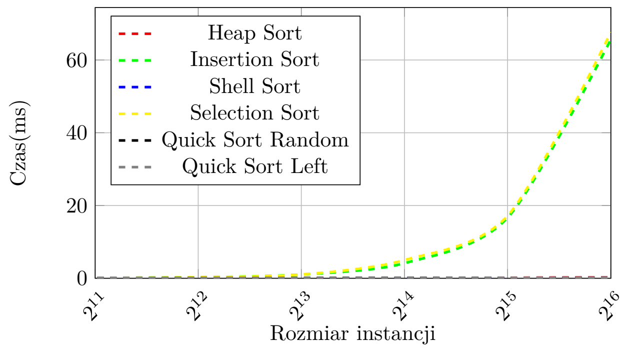




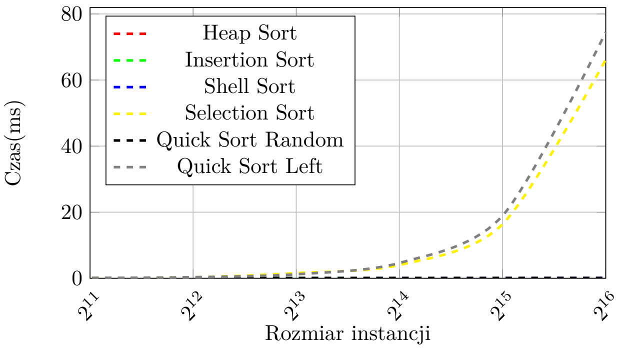


Porównanie czasów wykonania poszczególnych algorytmów względem danych

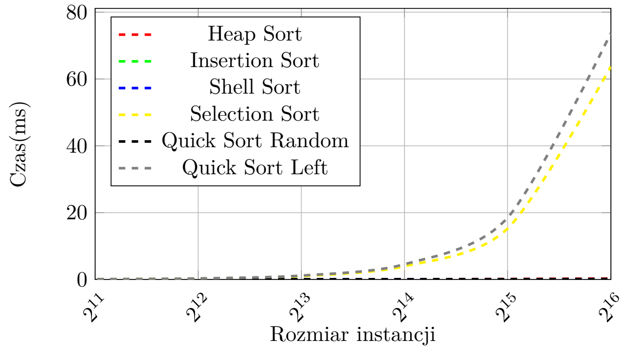
A shaped



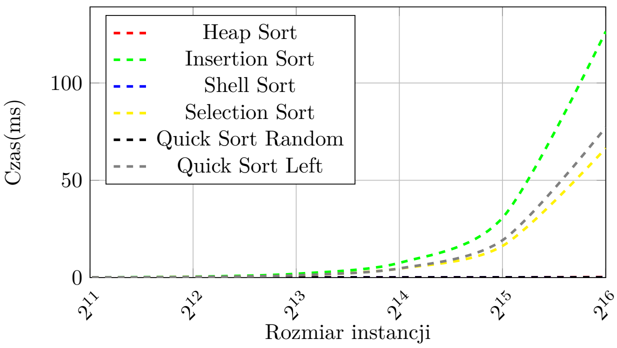
Constant



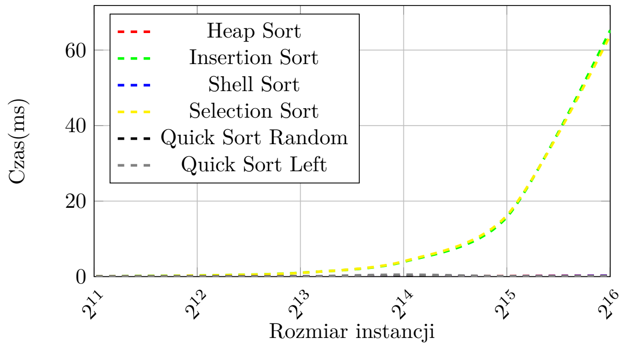
Increasing



Decresing



Random



Wnioski

Tutaj dajemy wnioski