Algorithm Analysis and Design (CS1.301)

Project Report
Functional Implementation of Algorithms

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Project

The project consists of an implementation of all the algorithms covered in class in Haskell (a functional programming language). In addition to the code, the code has also been benchmarked to find the running time and relative efficiency of different methods.

The project is hosted on GitHub and can be found **here**.

Repo Structure

Each different type of algorithm has a separate subdirectory, which in turn contains subdirectories for each algorithm. These subdirectories have the source code file, the object file, the graphs of the running times, and READMEs, which contain an explanation and analysis of the code (and comparison of different methods where applicable). The analysis includes a theoretical view of the code and the actual measured running time.

The code (bash script) used for benchmarking has also been included.

```
AAD-Project_2020114001
    DP
        AllPairs
            Comp.png
            Length.png
            Path.png
            README.md
            allpairs
            allpairs.hs
        ChainMat
            Comp.png
            Cost.png
            Order.png
```

```
    README.md
    chainmat
    chainmat.hs
EditDist
    Align.png
    AlignOpt.png
    Comp.png
    Dist.png
    README.md
    editdist
    editdist.hs
IndepSet
    CompMem.png
    CompNoMem.png
    CompSet.png
    CompSize.png
    MemSet.png
    MemSize.png
    NoMemSet.png
    NoMemSize.png
    README.md
    indep
    indep.hs
Knapsack
    CompComb.png
    CompCombRep.png
    CompVal.png
    NoRepComb.png
    NoRepVal.png
    README.md
    RepCombEff.png
    RepCombIneff.png
    RepVal.png
    knapsack
    knapsack.hs
LIS
    LIS
    LIS.hs
    LIS.png
    README.md
ReliablePath
    Comp.png
    Length.png
    Path.png
    README.md
    relpath
```

```
        relpath.hs
    ShortestPath
        Comp100.png
        Comp25.png
        Comp50.png
        CompDist.png
        CompPath.png
        Dist100.png
        Dist25.png
        Dist50.png
        Path100.png
        Path25.png
        Path50.png
        README.md
        shortest
        shortest.hs
DivAndConq
    Matmult
        Comp.png
        CompLog.png
        Naïve.png
        README.md
        Stras.png
        matmult
        matmult.hs
    Mergesort
        Comp.png
        Iter.png
        README.md
        Rec.png
        mergesort
        mergesort.hs
        mg
    Orderstat
        OStat.png
        README.md
        orderstat
        orderstat.hs
    Polymult
        FFT.png
        Naïve.png
        README.md
        polymult
        polymult.hs
Greedy
    ActSel
```

```
        ActSel.png
        README.md
        actsel
        actsel.hs
    Huffman
        Comp.png
        HuffConst.png
        HuffLog.png
        README.md
        huffman
        huffman.hs
    Kruskal
        Comp100.png
        Comp100Log.png
        Comp50.png
        Comp50Log.png
        CompComp.png
        CompDisjIns.png
        CompDisjInsLog.png
        CompDisjMerg.png
        CompDisjMergLog.png
        CompIter.png
        CompIterLog.png
        DisjIns100.png
        DisjIns50.png
        DisjMerg100.png
        DisjMerg50.png
        Iter100.png
        Iter50.png
        README.md
        kruskal
        kruskal.hs
    Setcover
        README.md
        setcover
        setcover.hs
NumTheo
    EuclidGCD
        Comp.png
        Euc.png
        EucExt.png
        README.md
        euclid
        euclid.hs
    RabinMiller
        README.md
```

```
        Rabin.png
        rabin
        rabin.hs
Prelims
    Fibonacci
        CompAll.png
        CompEff.png
        CompMat.png
        Memoised.png
        NaïveMat.png
        NaïveRec.png
        NaïveRecLog.png
        OptMat.png
        README.md
        StrasMat.png
        fibonacci
        fibonacci.hs
    Multiplication
        CompAll.png
        CompAllLog.png
        CompInt.png
        CompIntLog.png
        CompList.png
        CompListLog.png
        HaskNat.png
        HaskNatL.png
        Kar.png
        KarL.png
        README.md
        SchoolAlg.png
        SchoolAlgL.png
        multiplication
        multiplication.hs
README.md
bench.sh
```