

# Yusuf Ekrem Keçilioğlu

BIL553\_Nesne Tab. Sis.

<https://github.com/ineventhorizon/mTSP>

## Examples

mvn clean package

```
Windows PowerShell
[INFO] Recompiling the module because of changed dependency.
[INFO] --- surefire:3.2.5:test (default-test) @ mTSP ---
[INFO] --- jar:3.4.1:jar (default-jar) @ mTSP ---
[INFO] Building jar: C:\Users\yusuf\OneDrive\Resimler\nesneÖdev\mTSP\target\mTSP.jar
[INFO] --- shade:3.6.0:shade (default) @ mTSP ---
[INFO] Including com.lexicalscope.jewelcli:jewelcli:jar:0.8.9 in the shaded jar.
[INFO] Including org.json:json:jar:20211205 in the shaded jar.
[INFO] Dependency-reduced POM written at: C:\Users\yusuf\OneDrive\Resimler\nesneÖdev\mTSP\dependency-reduced-pom.xml
[WARNING] jewelcli-0.8.9.jar, json-20211205.jar, mTSP.jar define 1 overlapping resource:
[WARNING]   - META-INF/MANIFEST.MF
[WARNING] maven-shade-plugin has detected that some files are
[WARNING] present in two or more JARs. When this happens, only one
[WARNING] single version of the file is copied to the uber jar.
[WARNING] Usually this is not harmful and you can skip these warnings,
[WARNING] otherwise try to manually exclude artifacts based on
[WARNING] mvn dependency:tree -Ddetail=true and the above output.
[WARNING] See https://maven.apache.org/plugins/maven-shade-plugin/
[INFO] Replacing original artifact with shaded artifact.
[INFO] Replacing C:\Users\yusuf\OneDrive\Resimler\nesneÖdev\mTSP\target\mTSP.jar with C:\Users\yusuf\OneDrive\Resimler\nesneÖdev\mTSP\target\mTSP-1.0-shaded.jar
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 5.384 s
[INFO] Finished at: 2025-05-10T19:27:52+03:00
[INFO] -----
PS C:\Users\yusuf\OneDrive\Resimler\nesneÖdev\mTSP> |
```

java -jar target/mTSP.jar -d 4 -s 2

```
Windows PowerShell
[INFO] -----
PS C:\Users\yusuf\OneDrive\Resimler\nesneÖdev\mTSP> java -jar target/mTSP.jar -d 4 -s 2
Depot1: 39
Route 1: 21, 33, 2, 35, 24, 17, 44, 77, 22, 62
Route 2: 10, 25, 50, 6, 8, 34, 79, 57, 20, 70

Depot2: 47
Route 1: 42, 76, 28, 74, 71, 56, 60, 78, 1, 5
Route 2: 38, 14, 36, 27, 63, 30, 59, 53, 13, 32

Depot3: 3
Route 1: 55, 72, 43, 16, 19, 80, 45, 15, 37, 4
Route 2: 18, 52, 51, 61, 46, 69, 9, 40, 64

Depot4: 49
Route 1: 41, 66, 68, 54, 31, 7, 12, 29, 11
Route 2: 67, 0, 65, 73, 58, 26, 75, 23, 48

Total cost is 51237
Depot1: 70
Route 1: 21, 33, 77, 17, 35, 24, 57
Route 2: 25, 10, 2, 44, 34, 8, 6, 79, 62, 20, 22, 50, 39

Depot2: 42
Route 1: 5, 59, 27, 28, 60, 74, 71, 1, 78, 30, 32
Route 2: 76, 38, 53, 13, 36, 56, 14, 47, 63

Depot3: 37
Route 1: 46, 72, 55, 64, 3, 4, 18, 80, 40, 15, 16, 9, 19, 69
Route 2: 51, 52, 61, 43, 45

Depot4: 49
Route 1: 73, 66, 58, 31, 41, 67, 65, 23, 68, 54, 7, 75, 29, 12, 48, 11
Route 2: 26, 0

Total cost is 27292
{
  "swapHubWithNodeInRoute": 11,
  "swapNodesInRoute": 26,
  "insertNodeBetweenRoutes": 32,
  "insertNodeInRoute": 33,
  "swapNodesBetweenRoutes": 26
}
Formatted solution saved
PS C:\Users\yusuf\OneDrive\Resimler\nesneÖdev\mTSP> |
```

java -jar target/mTSP.jar -d 5 -s 2 -v

```
PS C:\Users\yusuf\OneDrive\Resimler\nesneödev\mTSP> java -jar target/mTSP.jar -d 5 -s 2 -v
Depot1: S??RT
Route 1: B?TL?S, MARD?N, ERZ?NCAN, ?IRNAK, BATMAN, GAZ?ANTEP, KARABÜK, BOLU
Route 2: ARTV?N, ADIYAMAN, KAHRAMANARA?, AFYON, ED?RNE, ?ÇEL, S?VAS, I?DIR

Depot2: ANTALYA
Route 1: HATAY, KAYSER?, BURDUR, MU?LA, TRABZON, KOCAEL?, ERZURUM, AKSARAY
Route 2: KIRKLAREL?, BURSA, YALOVA, BAYBURT, YOZGAT, ADANA, OSMAN?YE, AYDIN

Depot3: KONYA
Route 1: DEN?ZL?, KIRIKKALE, ELAZI?, TUNCEL?, ARDAHAN, ORDU, AMASYA, TEK?RDA?
Route 2: ISPARTA, S?NOP, BARTIN, K?L?S, KIR?EH?R, D?YARBAKIR, SAKARYA, DÜZCE

Depot4: ?ANLIURFA
Route 1: KÜTAHYA, U?AK, B?LEC?K, MU?, ?STANBUL, N?DE, KARAMAN
Route 2: TOKAT, ÇANAHHKALE, BALIKES?R, ?ZM?R, HAN?SA, SAMSUN, ANKARA

Depot5: GÜMÜ?HANE
Route 1: VAN, HAKKAR?, ÇORUM, ÇANKIRI, ESK?EH?R, B?NGÖL, NEV?EH?R
Route 2: ZONGULDAK, R?ZE, G?RESUN, KARS, A?RI, MALATYA, KASTAMONU

Total cost is 51998
Depot1: ARTV?N
Route 1: B?TL?S, S??RT, BATMAN, ADIYAMAN, GAZ?ANTEP, KAHRAMANARA?, S?VAS, ERZ?NCAN
Route 2: KARABÜK, BOLU, ED?RNE, AFYON, ?ÇEL, MARD?N, ?IRNAK, I?DIR

Depot2: KAYSER?
Route 1: AKSARAY, BURDUR, BURSA, YALOVA, KOCAEL?, KIRKLAREL?, TRABZON
Route 2: BAYBURT, ERZURUM, HATAY, OSMAN?YE, ADANA, ANTALYA, MU?LA, AYDIN, YOZGAT

Depot3: ISPARTA
Route 1: AMASYA, TUNCEL?, ARDAHAN, ORDU, S?NOP, DÜZCE, BARTIN, SAKARYA, TEK?RDA?, DEN?ZL?
Route 2: KONYA, K?L?S, D?YARBAKIR, ELAZI?, KIR?EH?R, KIRIKKALE

Depot4: TOKAT
Route 1: MU?, ?ANLIURFA, N?DE, KARAMAN, KÜTAHYA, B?LEC?K, ANKARA
Route 2: ?STANBUL, ÇANAHHKALE, BALIKES?R, ?ZM?R, HAN?SA, U?AK, SAMSUN

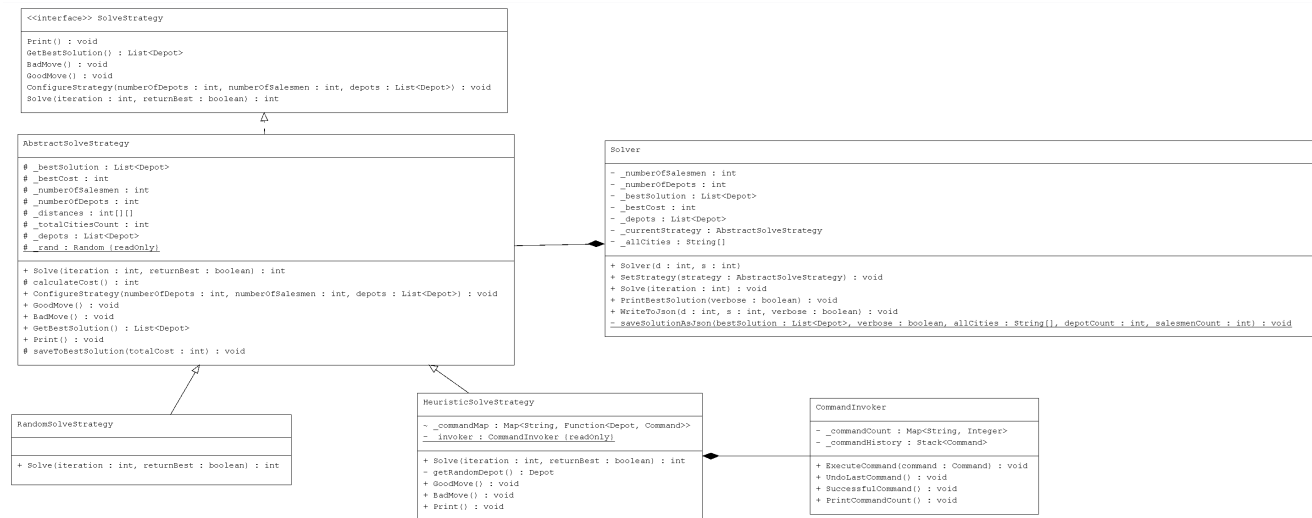
Depot5: B?NGÖL
Route 1: VAN, HAKKAR?, A?RI, GÜMÜ?HANE, G?RESUN, ÇORUM, ÇANKIRI, KASTAMONU, ZONGULDAK, ESK?EH?R, NEV?EH?R, MALATYA
Route 2: R?ZE, KARS

Total cost is 32087
{
"swapHubWithNodeInRoute": 13,
"swapNodesInRoute": 23,
"insertNodeBetweenRoutes": 26,
"insertNodeInRoute": 28,
"swapNodesBetweenRoutes": 15
}
```

# UML'S

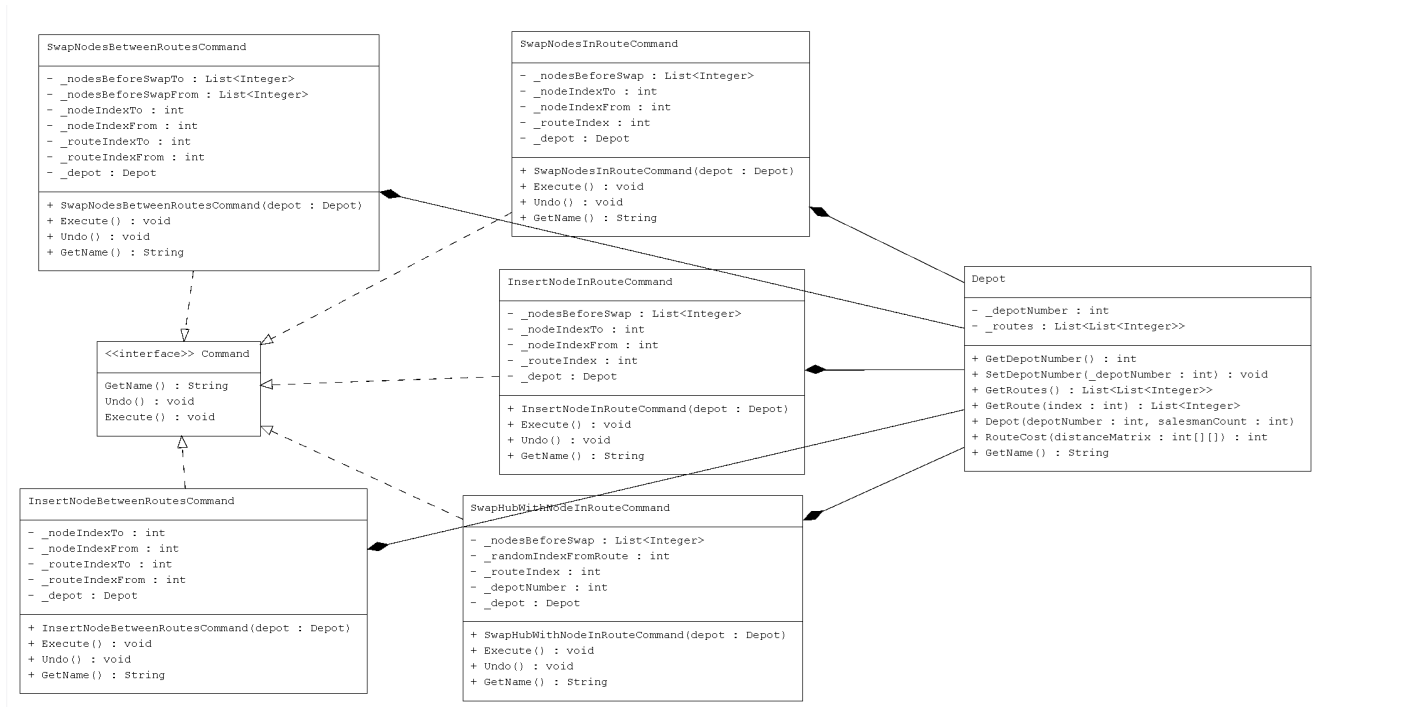
## Strategy Pattern usage

The Strategy Pattern is used to define a family of algorithms, encapsulate each one, and make them interchangeable. This allows you to choose the algorithm's behavior at runtime. In here I used strategy pattern to define different algorithms for to solve mTSP problem which are, Random Solution and Heuristic Solve algorithms. They both use different algorithms to solve mTSP problem. Also Heuristic Solve strategy uses different commands to do it's job. I've also used a design pattern there which is Command pattern.



## Command Pattern usage

The Command Pattern encapsulates a request (or an action) as an object, allowing you to parameterize methods with different commands, queue them, log them, or even undo them. In this problem I needed to undo if the move is not performing well after it's operation. Commands are invoked via a command invoker class which also count's the successfull operations that reduces the overall cost.



### Main & Others

I also defined a static class named Helper to reduce code repeats, Helper class helps to get random depots and indexes out of lists. TurkishNetwork was provided but needed to change its visibility to public because I couldn't access through other packages.

