**Inequality in the World**

* Description: For this test we wanted to look at how inequality in the world and the actor’s relative wealth affect the schedules being generated by our simulation. As a measurement of a world state’s wealth inequality, we used the mean log deviation(MLD) of each country’s state quality. This is normalized so that an MLD of 0 represents completely equal state qualities and 1 represents only a single country having any resources at all. To measure the actor’s relative quality(ARQ) we used the proportion of the actor’s state quality to the average state quality. An ARQ of 1 represents the actor having average wealth while ARQ > 1 means the actor is wealthy and ARQ < 1 means the actor is poor. We ran 9 simulations in which the world was equal, slightly unequal or extremely unequal and the actor was poor, average or rich.
* Test 1
  + Description: The MLD is ~0 and the ARQ is ~0.5 representing nearly equal world in which the actor is poor.
  + Parameters:
    - initial\_state\_filename = “./input\_files/countries\_threshold.xlsx”
    - initial\_resources\_filename = “./input\_files/MLD0\_ARQ0.5.xlsx”
    - output\_schedule\_filename = “./output\_files/MLD0\_ARQ0.5.txt”
    - depth = 5
    - solution\_limit = 100
  + Output:

Number of solutions: 1

Best solution EU: 340946

MLD: 0.032380

ARQ: 0.521300

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 340946')

Number of solutions: 5

Best solution EU: 601028

MLD: 0.034980

ARQ: 0.506232

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 340946')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 450223')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 534566')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 598923')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 601028')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 601028')

Number of solutions: 10

Best solution EU: 601028

MLD: 0.034980

ARQ: 0.506232

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 340946')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 450223')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 534566')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 598923')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 601028')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 601028')

Number of solutions: 50

Best solution EU: 601028

MLD: 0.034980

ARQ: 0.506232

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 340946')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 450223')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 534566')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 598923')

('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalElements', 100), 'EU: 601028')

('TRANSFER', 'MyCountry', 'Brobdingnag', ('timber', 1050.0), 'EU: 601028')

Number of solutions: 100

Best solution EU: 601028

MLD: 0.034980

ARQ: 0.506232

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 340946')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 450223')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 534566')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 598923')

('TRANSFER', 'Carpania', 'MyCountry', ('metalElements', 100), 'EU: 601028')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 1050.0), 'EU: 601028')

Number of solutions: 100

Best solution EU: 601028

MLD: 0.034980

ARQ: 0.506232

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 340946')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 450223')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 534566')

('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalElements', 100), 'EU: 549995')

('TRANSFER', 'MyCountry', 'Brobdingnag', ('timber', 1050.0), 'EU: 549995')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 601028')

* Test 2
  + Description: The MLD is 0 and the ARQ is 1 representing completely equal world.
  + Parameters:
    - initial\_state\_filename = “./input\_files/countries\_threshold.xlsx”
    - initial\_resources\_filename = “./input\_files/MLD0\_ARQ1.xlsx”
    - output\_schedule\_filename = “./output\_files/MLD0\_ARQ1.txt”
    - depth = 5
    - solution\_limit = 100
  + Output:

Number of solutions: 1

Best solution EU: 538562

MLD: 0.000013

ARQ: 0.988428

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

Number of solutions: 5

Best solution EU: 1209508

MLD: 0.000182

ARQ: 0.958599

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1209508')

Number of solutions: 10

Best solution EU: 1209508

MLD: 0.000182

ARQ: 0.958599

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1209508')

Number of solutions: 50

Best solution EU: 1209508

MLD: 0.000182

ARQ: 0.958599

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Atlantis', ('food', 1166.6666666666667), 'EU: 1209508')

Number of solutions: 100

Best solution EU: 1209508

MLD: 0.000178

ARQ: 0.958599

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Brobdingnag', ('electronics', 48.83720930232558), 'EU: 1209508')

Number of solutions: 100

Best solution EU: 1209508

MLD: 0.000178

ARQ: 0.958599

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Dinotopia', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Dinotopia', ('food', 1166.6666666666667), 'EU: 1209508')

* Test 3
  + Description: The MLD is ~0 and the ARQ is ~2 representing nearly equal world in which the actor is wealthy.
  + Parameters:
    - initial\_state\_filename = “./input\_files/countries\_threshold.xlsx”
    - initial\_resources\_filename = “./input\_files/MLD0\_ARQ2.xlsx”
    - output\_schedule\_filename = “./output\_files/MLD0\_ARQ2.txt”
    - depth = 5
    - solution\_limit = 100
  + Output:

Number of solutions: 1

Best solution EU: 504965

MLD: 0.068229

ARQ: 1.982283

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 504965')

Number of solutions: 5

Best solution EU: 717283

MLD: 0.066172

ARQ: 1.965504

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 504965')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 597752')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 667164')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 717283')

Number of solutions: 10

Best solution EU: 717283

MLD: 0.066172

ARQ: 1.965504

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 504965')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 597752')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 667164')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 717283')

Number of solutions: 50

Best solution EU: 717283

MLD: 0.066172

ARQ: 1.965504

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 504965')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 597752')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 667164')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 717283')

Number of solutions: 100

Best solution EU: 717283

MLD: 0.066172

ARQ: 1.965504

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 504965')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 597752')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 667164')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 717283')

Number of solutions: 100

Best solution EU: 717283

MLD: 0.066172

ARQ: 1.965504

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 504965')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 597752')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 667164')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 717283')

* Test 4
  + Description: The MLD is ~0.25 and the ARQ is ~0.5 representing a sizeable but not extremely unequal world in which the actor is average.
  + Parameters:
    - initial\_state\_filename = “./input\_files/countries\_threshold.xlsx”
    - initial\_resources\_filename = “./input\_files/MLD0.25\_ARQ0.5.xlsx”
    - output\_schedule\_filename = “./output\_files/MLD0.25\_ARQ0.5.txt”
    - depth = 5
    - solution\_limit = 100
  + Output:

Number of solutions: 1

Best solution EU: 473761

MLD: 0.280556

ARQ: 0.470321

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 473761')

Number of solutions: 5

Best solution EU: 852770

MLD: 0.283243

ARQ: 0.457449

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 473761')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 852770')

Number of solutions: 10

Best solution EU: 852770

MLD: 0.283243

ARQ: 0.457449

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 473761')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 852770')

Number of solutions: 50

Best solution EU: 852770

MLD: 0.283243

ARQ: 0.457449

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 473761')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 852770')

Number of solutions: 100

Best solution EU: 852770

MLD: 0.283243

ARQ: 0.457449

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 473761')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 852770')

Number of solutions: 100

Best solution EU: 852770

MLD: 0.283243

ARQ: 0.457449

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 473761')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 852770')

* Test 5
  + Description: The MLD is ~0.25 and the ARQ is ~1 representing a sizeable but not extremely unequal world in which the actor is average.
  + Parameters:
    - initial\_state\_filename = “./input\_files/countries\_threshold.xlsx”
    - initial\_resources\_filename = “./input\_files/MLD0.25\_ARQ1.xlsx”
    - output\_schedule\_filename = “./output\_files/MLD0.25\_ARQ1.txt”
    - depth = 5
    - solution\_limit = 100
  + Output:

Number of solutions: 1

Best solution EU: 494767

MLD: 0.254733

ARQ: 1.048162

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494767')

Number of solutions: 5

Best solution EU: 951983

MLD: 0.254890

ARQ: 1.062958

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494767')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890358')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 951983')

Number of solutions: 10

Best solution EU: 951983

MLD: 0.254890

ARQ: 1.062958

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494767')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890358')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 951983')

Number of solutions: 50

Best solution EU: 951983

MLD: 0.254890

ARQ: 1.062958

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494767')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890358')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 951983')

Number of solutions: 100

Best solution EU: 951983

MLD: 0.254890

ARQ: 1.062958

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494767')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890358')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 951983')

Number of solutions: 100

Best solution EU: 951983

MLD: 0.254890

ARQ: 1.062958

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494767')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890358')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 951983')

* Test 6
  + The MLD is ~0.25 and the ARQ is ~2 representing a sizeable but not extremely unequal world in which the actor is average.
  + Parameters:
    - initial\_state\_filename = “./input\_files/countries\_threshold.xlsx”
    - initial\_resources\_filename = “./input\_files/MLD0.25\_ARQ2.xlsx”
    - output\_schedule\_filename = “./output\_files/MLD0.25\_ARQ2.txt”
    - depth = 5
    - solution\_limit = 100
  + Output:

Number of solutions: 1

Best solution EU: 193432

MLD: 0.249820

ARQ: 2.013956

Best Path:

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 193432')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 193432')

Number of solutions: 5

Best solution EU: 495180

MLD: 0.245029

ARQ: 1.994176

Best Path:

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 193432')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 193432')

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 348179')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 348179')

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 470044')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 470044')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 495180')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 495180')

Number of solutions: 10

Best solution EU: 495180

MLD: 0.246124

ARQ: 1.995386

Best Path:

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 193432')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 193432')

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 348179')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 348179')

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 470044')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 470044')

('TRANSFER', 'Carpania', 'MyCountry', ('metalAlloys', 100), 'EU: 495180')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 1100.0), 'EU: 495180')

Number of solutions: 50

Best solution EU: 495180

MLD: 0.246375

ARQ: 1.994054

Best Path:

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 193432')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 193432')

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 348179')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 348179')

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 470044')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 470044')

('TRANSFER', 'Erewhon', 'MyCountry', ('metalAlloys', 100), 'EU: 495180')

('TRANSFER', 'MyCountry', 'Erewhon', ('timber', 1100.0), 'EU: 495180')

Number of solutions: 100

Best solution EU: 495180

MLD: 0.246280

ARQ: 1.994420

Best Path:

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 193432')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 193432')

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 348179')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 348179')

('TRANSFER', 'Dinotopia', 'MyCountry', ('electronics', 100), 'EU: 470044')

('TRANSFER', 'MyCountry', 'Dinotopia', ('timber', 2150.0), 'EU: 470044')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 495180')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 495180')

Number of solutions: 100

Best solution EU: 495180

MLD: 0.247882

ARQ: 1.996965

Best Path:

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 193432')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 193432')

('TRANSFER', 'Carpania', 'MyCountry', ('electronics', 100), 'EU: 348179')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 2150.0), 'EU: 348179')

('TRANSFER', 'Dinotopia', 'MyCountry', ('electronics', 100), 'EU: 470044')

('TRANSFER', 'MyCountry', 'Dinotopia', ('timber', 2150.0), 'EU: 470044')

('TRANSFER', 'Carpania', 'MyCountry', ('metalAlloys', 100), 'EU: 495180')

('TRANSFER', 'MyCountry', 'Carpania', ('timber', 1100.0), 'EU: 495180')

* Test 7
  + Description: The MLD is ~0.5 and the ARQ is ~0.5 representing an extremely unequal world in which the actor is poor.
  + Parameters:
    - initial\_state\_filename = “./input\_files/countries\_threshold.xlsx”
    - initial\_resources\_filename = “./input\_files/MLD0.5\_ARQ0.5.xlsx”
    - output\_schedule\_filename = “./output\_files/MLD0.5\_ARQ0.5.txt”
    - depth = 5
    - solution\_limit = 100
  + Output:

Number of solutions: 1

Best solution EU: 494729

MLD: 0.488814

ARQ: 0.492414

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494729')

Number of solutions: 5

Best solution EU: 952264

MLD: 0.485746

ARQ: 0.509341

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494729')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890363')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 952264')

Number of solutions: 10

Best solution EU: 952264

MLD: 0.485746

ARQ: 0.509341

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494729')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890363')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 952264')

Number of solutions: 50

Best solution EU: 952264

MLD: 0.485746

ARQ: 0.509341

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494729')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890363')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 952264')

Number of solutions: 100

Best solution EU: 952264

MLD: 0.485746

ARQ: 0.509341

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494729')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890363')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 952264')

Number of solutions: 100

Best solution EU: 952264

MLD: 0.485746

ARQ: 0.509341

Best Path:

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 494729')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 890363')

('TRANSFORM', 'MyCountry', (('population', 192), ('metalElements', 128), ('metalAlloys', 128)), (('population', 192), ('electronics', 128), ('electronicsWaste', 128)), 'EU: 952264')

* Test 8
  + Description: The MLD is ~0.5 and the ARQ is ~1 representing an extremely unequal world in which the actor is average.
  + Parameters:
    - initial\_state\_filename = “./input\_files/countries\_threshold.xlsx”
    - initial\_resources\_filename = “./input\_files/MLD0.5\_ARQ1.xlsx”
    - output\_schedule\_filename = “./output\_files/MLD0.5\_ARQ1.txt”
    - depth = 5
    - solution\_limit = 100
  + Output:

Number of solutions: 1

Best solution EU: 538562

MLD: 0.495631

ARQ: 0.993148

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

Number of solutions: 5

Best solution EU: 1209508

MLD: 0.495293

ARQ: 0.963196

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1209508')

Number of solutions: 10

Best solution EU: 1209508

MLD: 0.495293

ARQ: 0.963196

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1209508')

Number of solutions: 50

Best solution EU: 1209508

MLD: 0.495293

ARQ: 0.963196

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Atlantis', ('food', 1166.6666666666667), 'EU: 1209508')

Number of solutions: 100

Best solution EU: 1209508

MLD: 0.495520

ARQ: 0.963985

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Dinotopia', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Dinotopia', ('electronics', 48.83720930232558), 'EU: 1209508')

Number of solutions: 100

Best solution EU: 1209508

MLD: 0.495520

ARQ: 0.963985

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Dinotopia', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Dinotopia', ('electronics', 48.83720930232558), 'EU: 1206122')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1209508')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1209508')

* Test 9
  + The MLD is ~0.5 and the ARQ is ~2 representing an extremely unequal world in which the actor is wealthy.
  + Parameters:
    - initial\_state\_filename = “./input\_files/countries\_threshold.xlsx”
    - initial\_resources\_filename = “./input\_files/MLD0.5\_ARQ2.xlsx”
    - output\_schedule\_filename = “./output\_files/MLD0.5\_ARQ2.txt”
    - depth = 5
    - solution\_limit = 100
  + Output:

Number of solutions: 1

Best solution EU: 193418

MLD: 0.480669

ARQ: 2.015587

Best Path:

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 193418')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 193418')

Number of solutions: 5

Best solution EU: 565900

MLD: 0.462950

ARQ: 1.991896

Best Path:

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 193418')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 193418')

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 348154')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 348154')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 441763')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 513177')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 565900')

Number of solutions: 10

Best solution EU: 565900

MLD: 0.462950

ARQ: 1.991896

Best Path:

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 193418')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 193418')

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 348154')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 348154')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 441763')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 513177')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 565900')

Number of solutions: 50

Best solution EU: 565900

MLD: 0.462950

ARQ: 1.991896

Best Path:

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 193418')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 193418')

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 348154')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 348154')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 441763')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 513177')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 565900')

Number of solutions: 100

Best solution EU: 565900

MLD: 0.462950

ARQ: 1.991896

Best Path:

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 193418')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 193418')

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 348154')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 348154')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 441763')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 513177')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 565900')

Number of solutions: 100

Best solution EU: 565900

MLD: 0.462950

ARQ: 1.991896

Best Path:

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 193418')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 193418')

('TRANSFER', 'Atlantis', 'MyCountry', ('electronics', 100), 'EU: 348154')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 2150.0), 'EU: 348154')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 441763')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 513177')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 565900')

* Results and analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test | Initial MLD | Final MLD | Initial ARQ | Final ARQ | Expected Utility |
| 1 | 0.030936 | 0.034980 | 0.530062 | 0.506232 | 601028 |
| 2 | 0 | 0.000178 | 1 | 0.958599 | 1209508 |
| 3 | 0.070406 | 0.066172 | 1.999822 | 1.965504 | 707283 |
| 4 | 0.278010 | 0.284217 | 0.483133 | 0.452939 | 852770 |
| 5 | 0.254643 | 0.254890 | 1.037349 | 1.062958 | 952983 |
| 6 | 0.251509 | 0.247882 | 2.021784 | 1.996965 | 495180 |
| 7 | 0.491184 | 0.485746 | 0.480049 | 0.509341 | 952264 |
| 8 | 0.495629 | 0.495520 | 1.004765 | 0.963985 | 1209508 |
| 9 | 0.498422 | 0.462950 | 2.024543 | 1.991896 | 565900 |

From this we see that the simulation finds schedules with the most expected utility when the actor has average wealth and the least when it is wealthy. The low gains when the actor is wealthy can be explained by the logistic nature of our state quality function. There is a diminished reward when the state quality is high. When the ARQ is low, the utility of the schedules is low because the actor does less transfers due to small resource quantities not meeting the utility threshold.

When the actor is poor, it does better in a less equal world. This way there are other poor countries to trade with. When the actor is wealthy, it does worse in a less equal world because there are less viable trade partners. The inequality in the world and actor’s relative quality generally decrease throughout a schedule even when the actor is already the wealthiest country. This means that the trading strategy is mostly non-exploitive as other countries are able to improve as well.