py-dimensional-analysis

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This Python package addresses physical dimensional analysis. In particular, `py-dimensional-analysis` calculates from a given system of (dimensional) variables those products that yield a desired target dimension.

The following example illustrates how the variables mass, force, time and pressure must relate to each other in order to produce the dimension length*time.

```
import danalysis as da

si = da.standard_systems.SI          # predefined standard units
s = da.Solver(
    {
        'a' : si.M,                  # [a] is mass
        'b' : si.L*si.M*si.T**-2,    # [b] is force (alt. si.F)
        'c' : si.T,                  # [c] is time
        'd' : si.Pressure            # [d] is pressure
    },
    si.L*si.T                        # target dimension
)
print(s.solve())
    # Found 2 variable products of variables
    # {
    #         a:Q(M),
    #         b:Q(L*M*T**-2),
    #         c:Q(T),
    #         d:Q(L**-1*M*T**-2)
    # }, each of dimension L*T:
    #         1: [a*c**-1*d**-1] = L*T
    #         2: [b**0.5*c*d**-0.5] = L*T
```

This library is based on [Szi07], and also incorporates ideas and examples from [San19, Son01].

1.1 References

[San19] Juan G. Santiago. *A First Course in Dimensional Analysis: Simplifying Complex Phenomena Using Physical Insight.* MIT Press, 2019.

[Son01] Ain A Sonin. Dimensional analysis. Technical report, Technical report, Massachusetts Institute of Technology, 2001.

[Szi07] Thomas Szirtes. *Applied dimensional analysis and modeling.* Butterworth-Heinemann, 2007.