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VisualDOC/VisualScript 6.0
New Features List

New Features in VisualDOC 6.0

VisualDOC 6.0 includes improvements in robustness, new updates to the underlying optimization engine, a number of new features, and resolution of several known issues. Some of the more prominent enhancements include:

1. **Python replaces Perl as the VisualScript engine**
   VisualDOC 6.0 replaces the Perl VisualScript engine used in previous versions with Python. This switch provides more flexibility for VisualScript operations and also allowed us to extend the synthetic function capabilities in VisualDOC. In most cases, the user will not notice the difference. The exception is existing scripts exported from VisualScript. in these cases, the exported Perl script files will not work with in VisualDOC 6.0. To fix the problem, simply re-export the script from VisualScript to obtain the corresponding Python script.

2. **Easy-to-use-multiprocessor capability**
   If the user wants to run analyses in parallel on a multi-processor or multi-core computer, VisualDOC provides an easy to use functionality to setup and run the problem directly from the GUI. The user simply needs to specify the number of processors to use, and VisualDOC will take care of the rest.

3. **Start optimization from multiple points capability**
   It is now possible for the user to automatically start gradient based optimization from several starting points. The user simply specify the points to start from and VisualDOC will perform all optimization runs and keeps track of the individual as well as the best overall results.

4. **Optimization with combinatorial variables**
   Sometimes it is desirable to make sure that during an optimization run, some input parameters remain constant and to perform optimizations for different combinations of these constant parameters. VisualDOC now provides an option to perform such a parametric optimization study. The input parameters that remain constant during each optimization run (but automatically change their values from one optimization run to another) are referred to as combinatorial input parameters in VisualDOC. VisualDOC keeps track of the individual as well as the best overall results.

5. **Extended synthetic function capabilities**
   The synthetic function capabilities are expanded to include:

   - Specifying array arguments as input parameters to synthetic functions
   - Creating synthetic functions that consists of multi-line equations or Python programs

6. **Mean-value approximate probabilistic optimization for DGO**
   When using gradient-based optimization to do probabilistic design, it is now possible to use the mean-value approximation approach. Previous versions only allowed the use of Monte-Carlo and Latin Hypercube direct simulation for probabilistic optimization

in DGO, while the mean-value approximation approach was only available for response surface approximate and non-gradient based optimization.

7. **User-defined design variable scaling**
It is now possible to specify individual scale factors for design variables in VisualDOC.

8. **Optimal Latin Hypercube DOE**
A new design of experiments, the Optimal Latin Hypercube design, is now available. The Optimal Latin Hypercube design arranges the design points as evenly as possible throughout the design space, while satisfying the Latin Hypercube conditions.

9. **User-defined initial population for GA and PSO**
It is now possible to specify what points should be used as the initial population when doing non-gradient based optimization, using the GA or PSO algorithms.