

Software Disclosure & Abstract Form

This software was developed in the course of or under prime contract No. DE-AC02-05CH11231 between the U.S. Department of Energy and the University of California. This Disclosure is prepared for the Office of the Assistant General Counsel for Patents, U.S. Department of Energy.

Summary of Software Disclosure

Title of Software Program

SOCEMO: Surrogate Optimization of Computationally Expensive Multi-Objective Problems

Short Name or Acronym:

SOCEMO

Version No.:

17.05

Software Disclosure category

Please select the one category that best describes the invention.

Primary Technology Class

Advanced Computation: Other

Description Abstract

SOCEMO is an optimization algorithm for solving computationally expensive, black-box, multi-objective optimization problems. SOCEMO uses various surrogate models to approximate the computationally expensive objective functions. Hence, derivative information, which is generally unavailable for black-box simulation objective functions, is not needed. SOCEMO aims at solving problems that have continuous variables whose upper and lower bounds are known. Other constraints, such as computationally expensive black-box constraints or computationally cheap equality or inequality constraints cannot be handled by this version, but extensions of the algorithm to these problem classes are underway. This code manual describes the MATLAB code and how you can use SOCEMO to solve your multi-objective optimization problems.

Primary Contact

Organization

Name

Email

LBNL/CRD

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Features, Advantages, and Interested Parties

Describe possible uses for the software, including commercial and non-commercial uses:

SOCOMO is intended for solving computationally expensive black-box multi-objective optimization problems with continuous variables. These problem types arise in many application and science areas where several criteria have to be optimized simultaneously. If evaluating your criteria is extremely time consuming (e.g., some hours per evaluation), SOCOMO is an appropriate solver for you.

List any companies that are or would be interested in the software:

Funding

Type of funding - Check the applicable box(es) below & provide the requested information for the funding source(s) for this software:

Office of Advanced Scientific Research (OASCR)

Other Funding Source

A.DOE

DOE Program Manager	Address	Telephone	Email
Steven Lee	U.S. Department of Energy, SC-21, Germantown Building, 1000 Independence Ave., SW Washington, DC 20585-1290	301-903-5800	steven.lee@science.doe.gov

If no DOE Program Manager, please explain.

B. Non DOE, including Strategic Partnership Project

Funding Type	Project ID and Activity Code	BNR Code	Grant or Agreement Number	Sponsor Name	Address	Telephone	Email
Alvarez Fellowship	102646.001	KJ0401000	None	DOE-ASCR	U.S. Department of Energy, SC-21, Germantown Building, 1000 Independence Ave., SW Washington, DC 20585-1290	301-903-5800	steven.lee@science.doe.gov



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C. Other Describe:

Do you reasonably expect future or continuing funding? Yes

Source:

DOE-ASCR

Do you intend to distribute this code outside of LBNL or UC? Yes

If yes, when and how do you intend to distribute? *An IPO licensing associate will contact you regarding distribution.*

When: as soon as possible; How: bitbucket and my LBNL website

Software History

A. History: Is the Software a later version, or a derivative of an earlier LBNL software version? No

If yes, please identify the version and describe:

B. Third Party Related and/or Auxiliary Software:

- Does the software *include* third party software? No
- Does the software *require* the use of third party software (e.g. scripts)? Yes
- Is the software a *derivative* work of third party software? No

It is important that you identify in the table below:

- the name and version of the original third-party software
- how the third-party software is used
- if the third-party software is modified or unmodified
- name(s) of the developer(s)/licensor of the third-party software
- third-party software license type
- third-party software repository link
- If Yes, please fill out details in the table below.

Name of Original Software	Version	How used, e.g., Dynamic/Static library, tool	Modified or Unmodified?	Name of Developer/Licensor	License Type e.g., BSD, GPL, MIT	Repository Link.
MATLAB	2012(a) or later	computing environment for running the codes	unmodified	Mathworks		https://www.mathworks.com/



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- C. Was any portion of the software written by a subcontractor or non-LBNL employee** (including developers listed on this form who were not employed at LBNL at the time the code was written)?

No

If Yes

- Please supply the name(s) and contact information in the below table.
- Please attach the actual Subcontract Agreement (the "contract") to this form.

Subcontractor Name and email

Export Control

Review of software for export control restrictions is a DOE requirement managed by IPO. Where possible, please provide the information requested below.

- A. Prior Export Control Review?** – Has the software or the project/contract funding the software's development (e.g. WFO, CRADA, etc.) been through export control review previously? No

If yes, please provide the prior export classification determination and indicate the author of the determination.

- B. General field of research of the software author(s) (for example, compact high density batteries)**

optimization algorithm development

- C. Does the software have a potential "dual-purpose" application in any of the following areas?**

Please indicate the best answer for each area:

- Military/Defense/National Security No
- Nuclear Proliferation (e.g. enrichment technology) No
- Chemical or Biological Warfare (e.g. toxins, infectious agents) No
- Missile Technology
- Communications Intercepting Technology No
- Aircraft No
- Encryption No
- Spacecraft or Satellites No
- Sensors or Lasers No
- Navigation or Avionics No
- Submersible Vessels, UAVs or Drones No
- Directed Energy or other Weapons No
- Marine No

Please provide additional information here to explain any of your answers above:

- D. Background Intellectual Property?** - Does the software include any of the following:

- Non-OSS code No

If "Yes", please list all non-OSS code and export classifications if known:



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2. Proprietary Information (e.g. libraries, data sets, sponsor data) No
If "Yes", please provide details and owners of the proprietary information:



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**UNITED STATES DEPARTMENT OF ENERGY
ANNOUNCEMENT OF COMPUTER SOFTWARE
(ESTSC - The Energy Science and Technology Software Center)**
<http://www.osti.gov/estsc/> Form DOE AN 241.4

<p>PART II: STI PRODUCT MEDIA/FORMAT and LOCATION/TRANSMISSION</p>	<p>E. References: List citations of pertinent (including technical) publications by author, title, report number, barcode, or order number (if available) and date. References are to be broken down into two groupings: 1) reference documents provided with the submittal package and 2) additional background reference materials generally available.</p> <p>2) Juliane Mu00fcller, "SOCEMO: Surrogate Optimization of Computationally Expensive Multi-Objective Problems", INFORMS Journal on Computing, forthcoming publication</p>
<p>A. Hardware Requirements PC MAC Supercomputer Unix Workstation</p> <p>B. Software Requirements 1. OPERATING SYSTEM/VERSION: 2. COMPILER/VERSION: 3. LIMITATIONS/RESTRICTIONS/TIMING REQUIREMENT ESTIMATE: 4. OTHER SPECIAL REQUIREMENTS: needs MATLAB license on user's end 5. RELATED/AUXILIARY SOFTWARE: 6. TYPE(S) OF FILES: Source Code Sample Problem Input Data User Guide Sample Problem Output Data Programmer Documentation</p>	
<p>C. Media Type Information 1. Type Electronic QUANTITY: 27 files CAPACITY: 2. FORMAT: PC MAC 3. LOCATION/TRANSMISSION: URL: FTP FILENAME:</p>	



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D. Documentation Type Information 1. TYPE: USER MANUAL 2. FORMAT: ELECTRONIC 3. LOCATION/TRANSMISSION: URL: FTP FILENAME:	
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BUSINESS REVIEW AND COPYRIGHT REGISTRATION INFORMATION

Developer(s) Information

Developers – Please list the main developer who will be the main point of contact for IPO first, if multiple developers.

Developers & electronic signatures

Contributor:

Division/Employer	Name	Email	Signature	Date
CRD	Juliane Mueller	julianemueller@lbl.gov		05/18/2017

