

Lca Algebraic - New features

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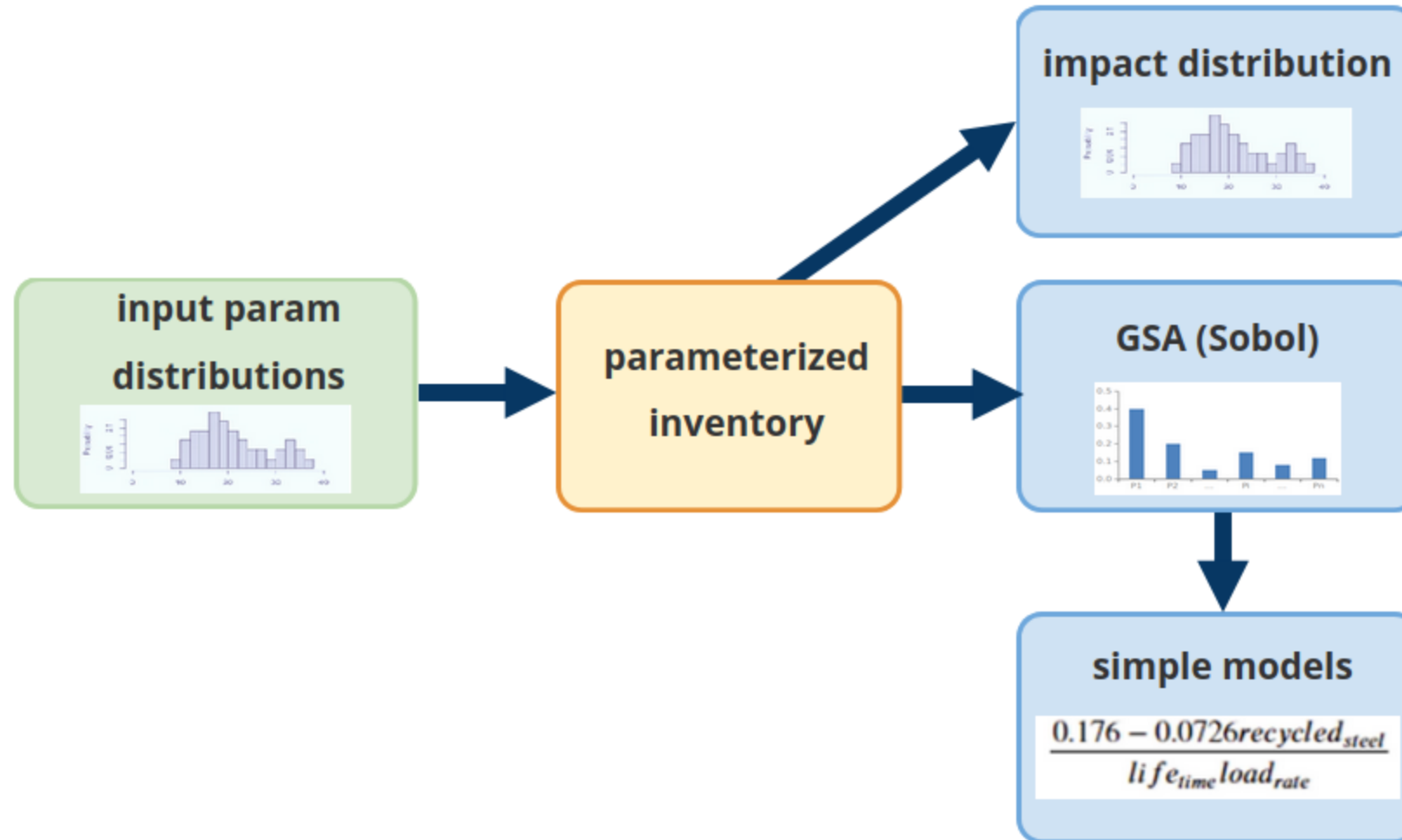
Summary

- 💡 Introduction to *LCA Algebraic*
- 🌐 Automatic creation of web apps
- 🔺 Automatic check of physical units : 🍏 + 🍌 = ?

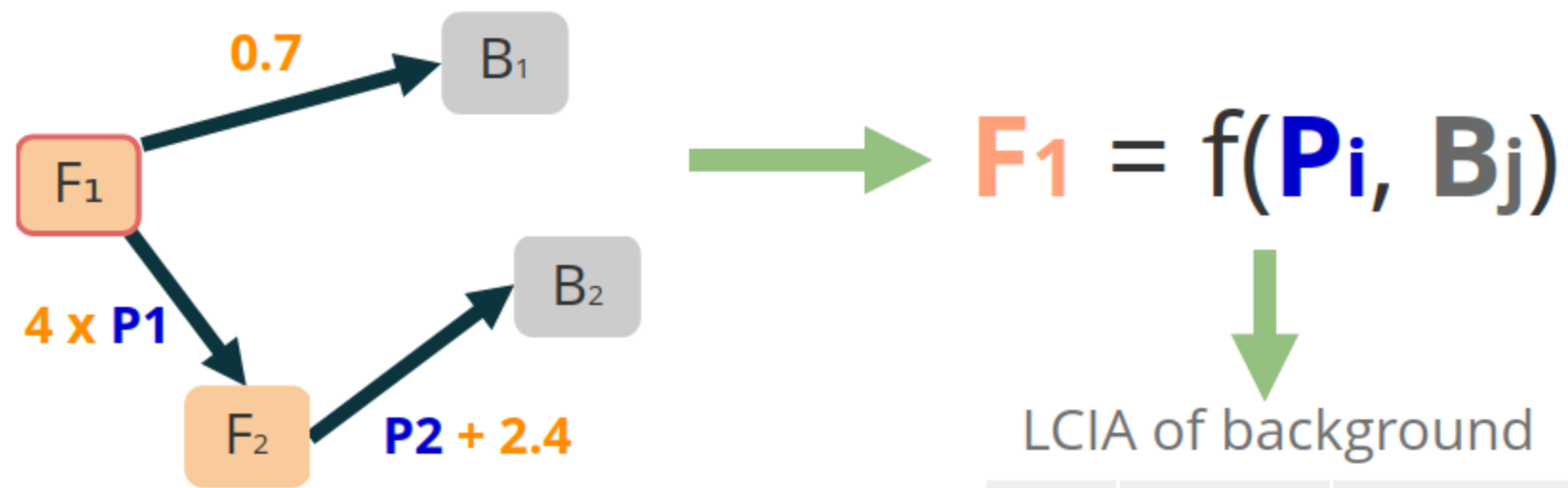
Introduction to *LCA Algebraic*

- A Python library to build **parametric inventories** with **symbolic calculus**
- Based on **Brightway** and **Sympy**
- Features :
 - Write formulas as **regular Python expressions**
 - Generate **Fast Monte Carlo** analysis and **Global Sensitivity Analysis** (Sobol indices)
 - Identifies key parameters
 - Generate **simplified models**
 - Helpers above **Brightway** : compact & readable inventories

Lca Algebraic - Overview



Lca Algebraic - Implementation



LCIA of background

	Climate	Resources
B ₁	0.01	0.02
B ₂	3.2	4.3

Arrows from the Climate and Resources columns of the table point to the following functions:

$$f_{\text{climate}}(P_i) \quad f_{\text{resources}}(P_i)$$

F_i

foreground activities

B_j

background activities

$\rightarrow$

exchanges

```

import lca_algebraic as agb

elec_conso = agb.newFloatParam('elec_conso', default=0.5, min=0.2, max=2, unit="kWh")
mass_alu = agb.newFloatParam('mass_alu', default=3, min=2, max=5, unit="ton")

us_elec_act = agb.findTechAct("market group for electricity, medium voltage", 'US')
aluminium_act = agb.findTechAct("aluminium alloy production, AlMg3", loc="RER")

inventory = agb.newActivity(db_name=USER_DB,
    name="full_inventory", unit="unit",
    exchanges= {
        us_elec_act: elec_conso + 10,
        aluminium_act: mass_alu * 1000})

climate= ('EF v3.0', 'climate change', 'global warming potential (GWP100)')

agb.compute_impacts(
    inventory,
    methods=[climate],
    functional_unit=some_parametric_expression,

    # Params
    elec_conso = 1.3,
    mass_alu = 4)

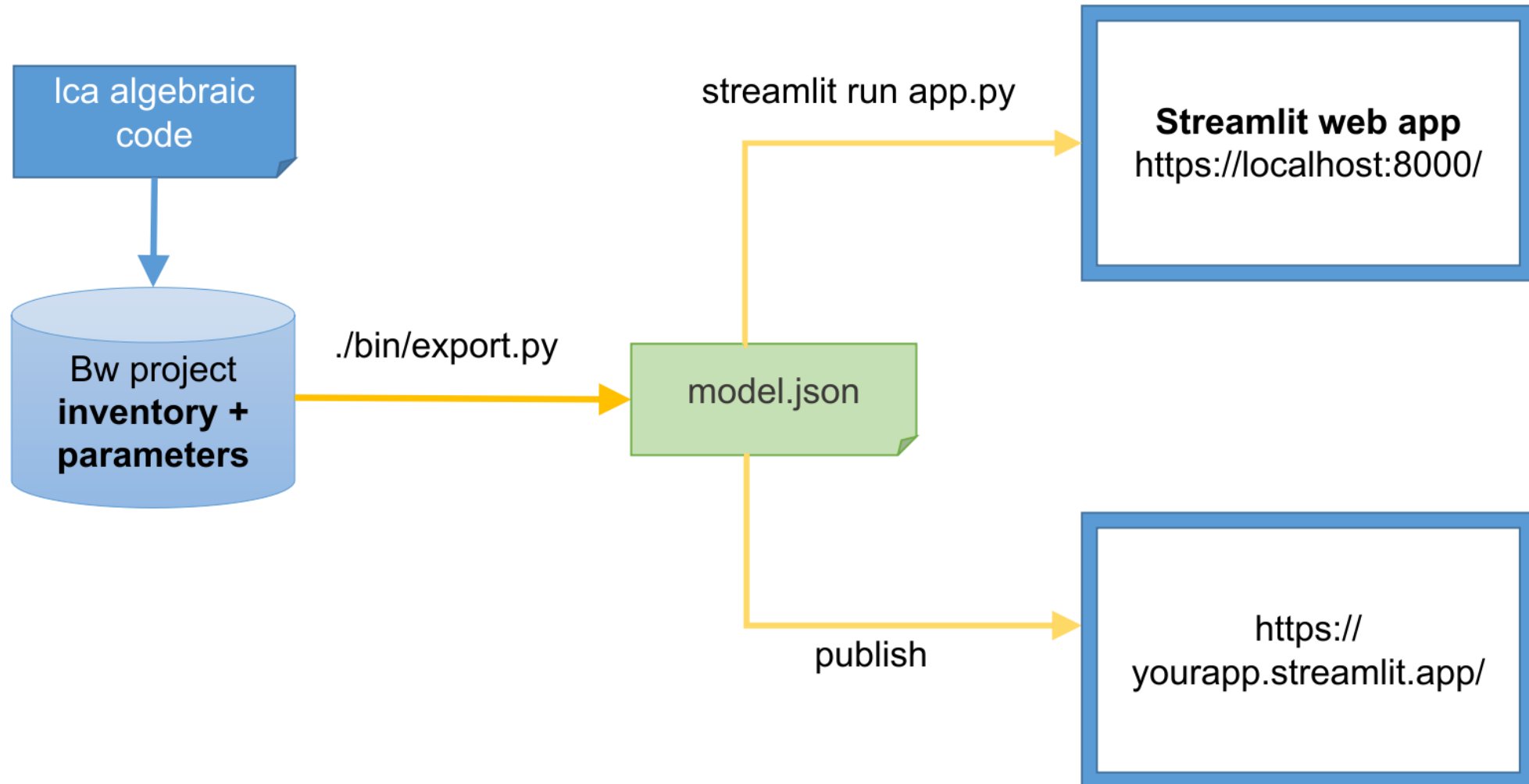
```

New features

- **v1.2 :**
 -  Creation of web apps
 -  Support for **physical units**
- **v1.3 :**
 -  Loops in foreground inventory
 -  Compatibility with **Brightway 2.5** (separate package [lca_algebraic-bw25](#)) :
 to CEA

Automatic creation of web apps

- Create your parametric inventory with **lca_algebraic**
- Clone this [separate project](#)
- Edit `settings.yaml`
- Run `./bin/export.py`  exports formulas in `data/model.json`
- Run `streamlit run ./app.py`  Runs the app locally
- Publish on [Streamlit community cloud](#)



Demo

Parasol web app

Licenses

- Technically : **no BG database** left in the app.
- Check your **license of Ecoinvent** is compatible with public parametric apps

Automatic check of physical units

 +  = ?

- Frequent **source of errors**
- Since **v1.2** : Integration with **Pint**  (Python library for physical units)
- **Optional** : not activated by default
-  Live check of **physical homogeneity** of expressions

Basic usage

- `newFloatParam()` creates a *Pint Quantity* (**magnitude & units**)
- `|` **assigns** or **transforms** units of any expression
- `newActivity(...)` & `updateExchange(...)` :
Checks **amount units == activity units**

 [Full doc](#)

```
from lca_algebraic import Settings
from lca_algebraic import unit_registry as u # Short alias to units
Settings.units_enabled = True

# Creates a Quantity `mass kg`
mass = agb.newFloatParam("mass", default=10, unit="kg")

# Assign unit
CONSTANT_MASS = 10 | u.kg
CONSTANT_DURATION = 10 | u.second

print(mass + CONSTANT_MASS) # <10 + mass, kg>
print(mass + CONSTANT_DURATION) # Will fail
```

Demo for Units

[Go to Notebook](#)

The End

Thanks