MPSGE.jl

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Outline

- **Summary**

- Julia

- Demo

- Architecture

- Roadmap

- Summary

Summary

- Long term vision: completely open-source version of MPSGE on Julia

- At the moment: very rudimentary prototype

- I think it is complete enough that I'm optimistic it can be done

- Warning: nothing is stable!

Team

- Eli Lazarus and myself

- Both Tom and the group at NREL (Max, Jon and Caroline) have helped us tremendously

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Julia

- Created at MIT
- Language for scientific computing
- Open source
- As simple as Python or R
- As fast as C or Fortran
- As powerful as Lisp
- Released in 2012, 1.0 in 2018
- Long past the point of "will this stay?"

Why We Created Julia

14 February 2012 | **Jeff Bezanson Stefan Karpinski Viral B. Shah Alan Edelman**

Jeff Bezanson Stefan Karpinski Viral B. Shah Alan Edelman

In short, because we are greedy.

Julia

- General purpose scientific computing
- So, excellent for:
  - All things math
  - All things data
  - Plotting
  - Distributed computing
- Fully integrated into "modern" scientific software stack:
  - Jupyter
  - VS Code
  - GitHub
  - Binder

Julia

- Excellent optimization packages
- Excellent support for domain specific languages

Julia

- I have been active in the Julia community since version 0.2
- All my research is using Julia, including a new SCC platform called Mimi.jl
- I also wrote and maintain a lot of general purpose Julia software:
  - The Julia VS Code extension
  - A family of data science packages called Queryverse
  - A plotting package called VegaLite.jl
  - A lot of random stuff

Outline

- Summary
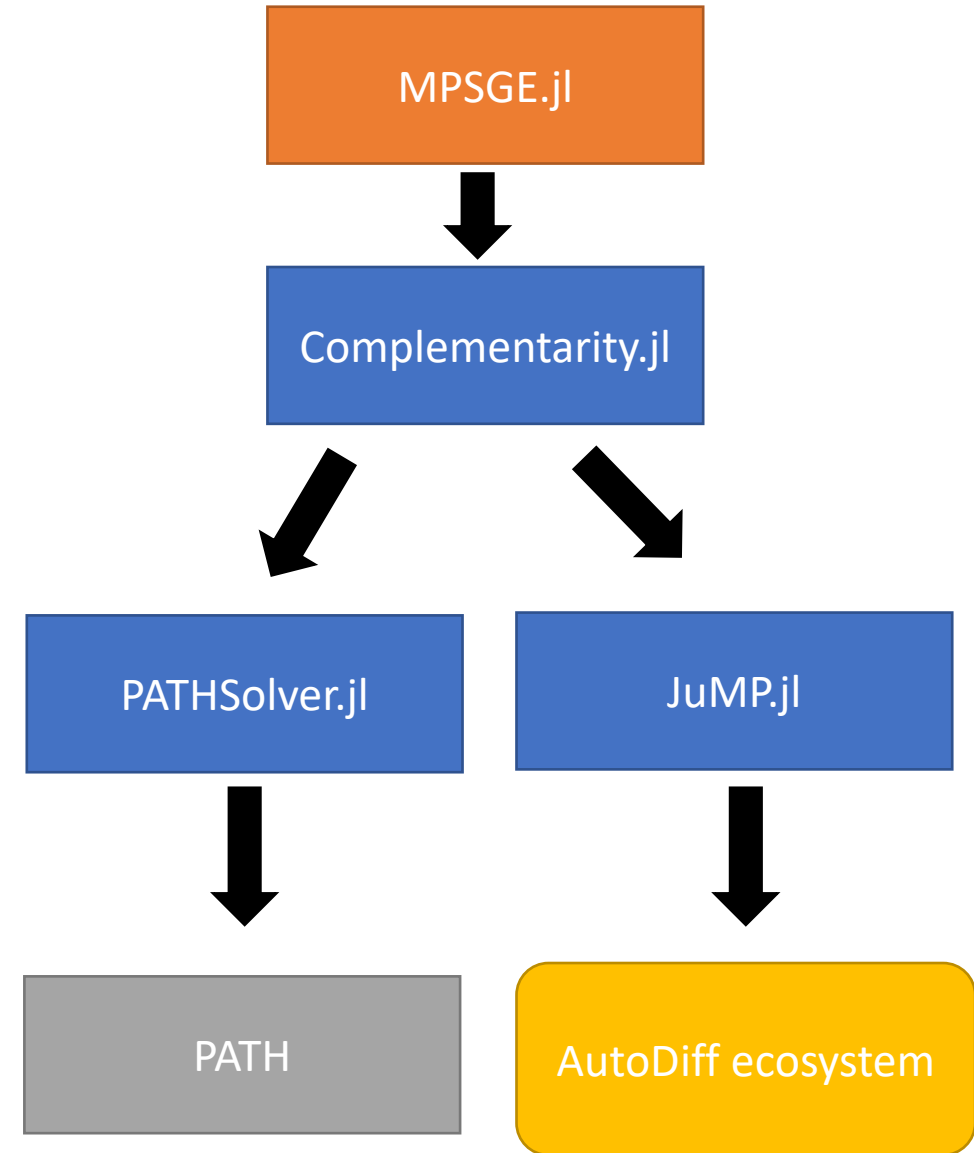- Julia
- **Demo**
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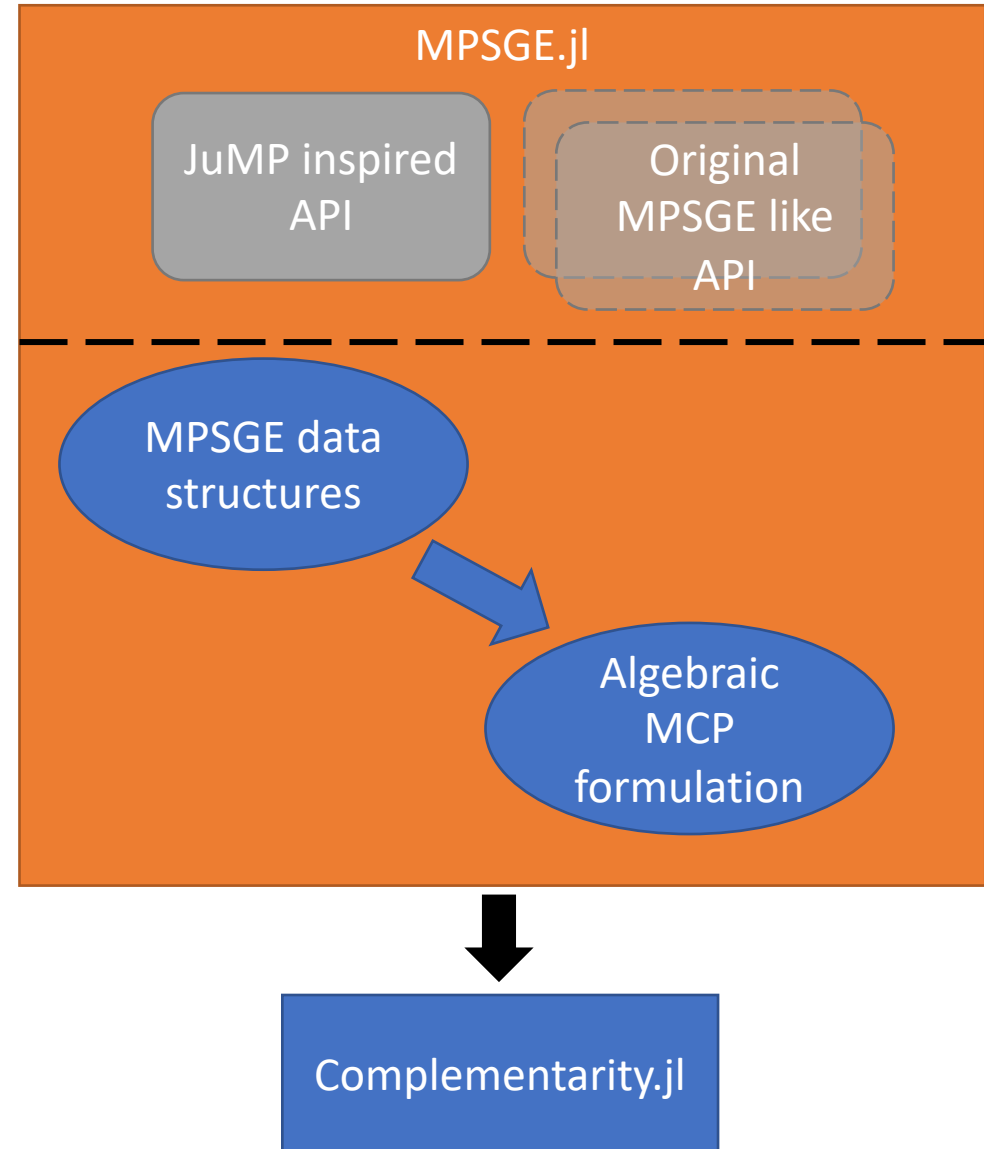- Summary

Demo

You can run the demo yourself at

https://bit.ly/3sJ3kkv

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Architecture

Inside MPSGE.jl

MPSGE.jl

JuMP inspired API

Original MPSGE like API

MPSGE data structures

Algebraic MCP formulation

Complementarity.jl

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Roadmap

- At the moment, no funding…

- A LOT of things are missing!

- Set notation
- Anything more complex than 2x2 example
- Taxes, elasticities etc.
- Integration with data sources (NREL)

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Summary

- I am confident now that this can be done
- I think this could bring MPSGE to entirely new audiences
- It would bring MPSGE into a modern computational environment
- It might make it easier for others to contribute to MPSGE itself

Thank you!

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https://www.david-anthoff.com/

https://github.com/anthofflab/MPSGE.jl

https://github.com/davidanthoff/talk-2021-04-mpsge