Teaching Linear Algebra with APL

Who am I?

Asher Harvey-Smith

University of Warwick

Summer intern @ Dyalog

Asher HE/HIM 05/08/2022 12:06

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7 months later...

Hello!

My name is Asher Harvey-Smith and I'm a 2nd year Computer Science student at the University of Warwick. I'm emailing to ask if Dyalog offers any kind of internships over the summer period. If so, I would love to apply!

What I got up to

INTERPRETER

Learning the internals

⎕NPUT and ⎕NGET matrix forms

⎕NS reference left argument

TOOLS

Tools group week

Fixing multiline cells in
Jupyter kernel and TryAPL

Educational resources for linear
algebra in APL

https://asherbhs.github.io/linear.ipynb

Arithmetic
↓
Vectors
↓
Linear combinations
↓
Matrices
↓
Inner products
↓
2×2 matrix inverse
↓
Monadic ⌸
↓
Dyadic ⌸

Outcomes

Pacing - people learn simple things fast

Exercises

Motivation in-context

Lecture + workshop at once

Limited to finite, computable objects

Don't take my word for it!

'The pacing was good and the background of linear algebra definitely helped. Being taught about a language in the context it was designed for makes it easier to understand why things are as they are, and how to best use the features of the language.'

'I think the content of the session was structured very well, and enjoyed building up my arsenal of APL tools over the course of the session. The pacing could have been slightly faster, but the time was taken to make sure everything was explained well, so it wasn't really a problem. I think it was beneficial to frame certain sections in the context of linear algebra, because it gave an additional reason to care about APL by providing real world scenarios where the language excels.'

Don't take my word for it!

'I don't mind the unicode, partly because they were introduced gradually and in context during the session which made each one easier to remember, and also because they tend to be well chosen: the analogy between box-division for matrices and traditional division for example.'

'I think it helps to produce clean, concise code. Naturally it takes a bit of getting used to, but a mapping quickly forms in your brain. In the session, the tradeoff between reading and writing symbols was workable. It was also fun to explore symbols on my own, as the APL environment gives a description of each one when you hover over it.'

Don't take my word for it!

'The exercises were helpful and well designed to get us thinking in the APL way. The way the final exercise of inverting the matrix was built up to, using all the tools we had accumulated throughout the session, was a satisfying and eye opening way to end the session. It could maybe have done with more exercises when we got into the more complex things.'

'epic'

Domain → APL

'Stage 1'

Show that APL is a useful tool

Already going well!

One day see APL established in academia

APL → Domain

'Stage 2'

Using APL to broaden domain knowledge

Needs APL to be reasonably established

Code used in teaching can be used in real research