How I learned to stop worrying and love the ρ

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Nice to meet you

Hi

About me

About me


Self
Lua
Microsoft
ASP.net
λ
Java
CF
ERLANG
C#
php
BASH
PROGRAMMING REPUBLIC OF
PERL

About the contest

- Introductory APL
- Three months
- Five challenges
  - Airline routes
  - Noisy patterns
  - Images
  - DNA bind sites
  - Keywords

About the talk

But I like the keyboard I've got

Why I entered

- $$$
- Real problems with a real amount of time to do them
- Chance to expand my horizons

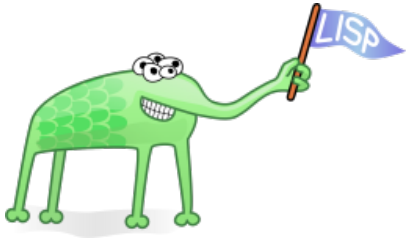
APL vs…

fmap lines . readFile Function applications

APL vs…

fmap lines . readFile

Function applications



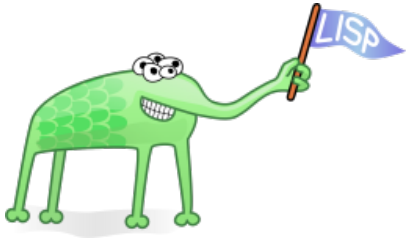
'(1 2 3 4)

Lists

APL vs…

fmap lines . readFile

Function applications



'(1 2 3 4)

Lists

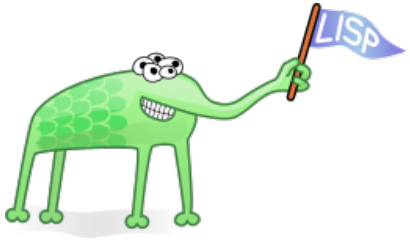
C

1 2 3 4;

APL vs…

fmap lines . readFile

Function applications



'(1 2 3 4)

Lists

C

1 2 3 4;

error: expected ‘;’ before numeric constant

APL vs…

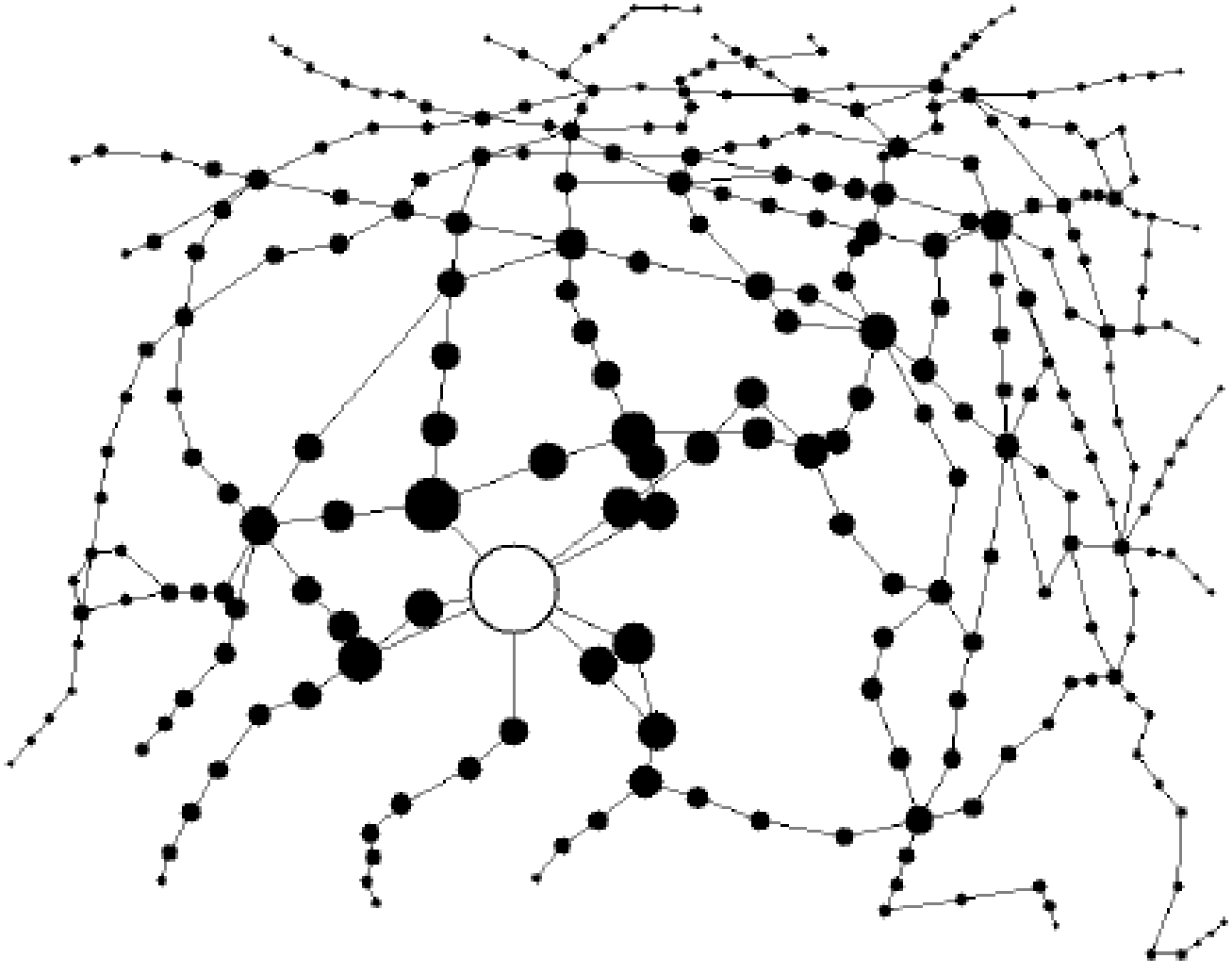
```
2 2⍴1 2 3 4
```

Airline routes

Given a set of airports and routes

- Compute an adjacency matrix
- Find all possible trips
- Remove longest redundant routes

A what matrix?

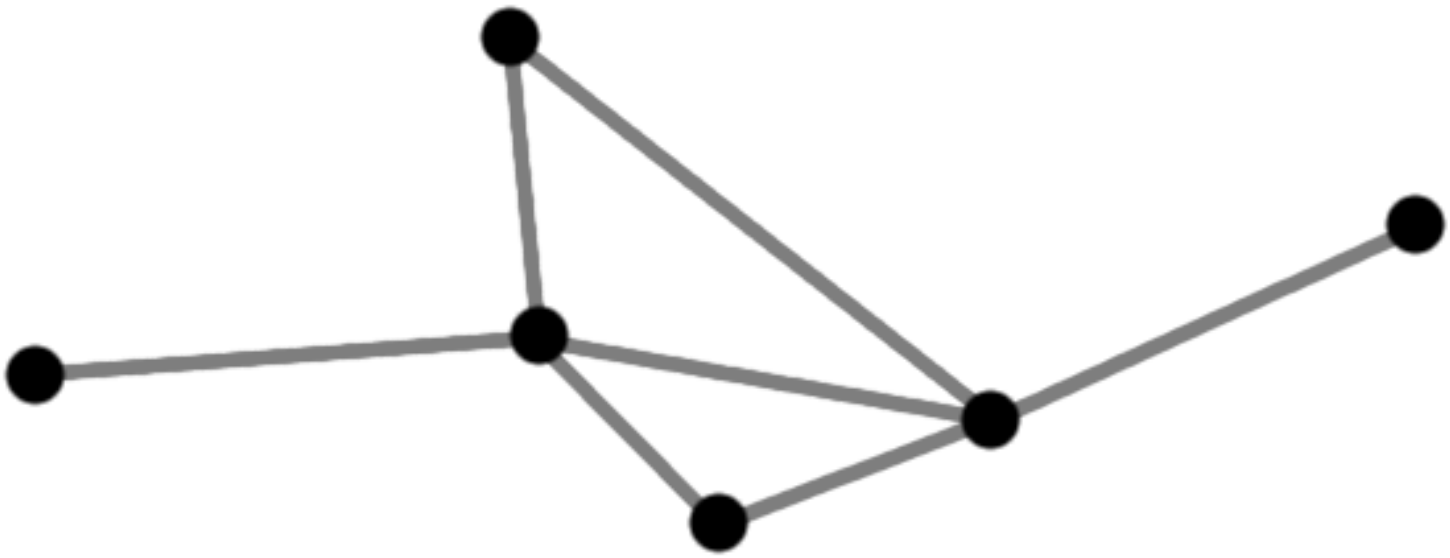


Side note: circle function

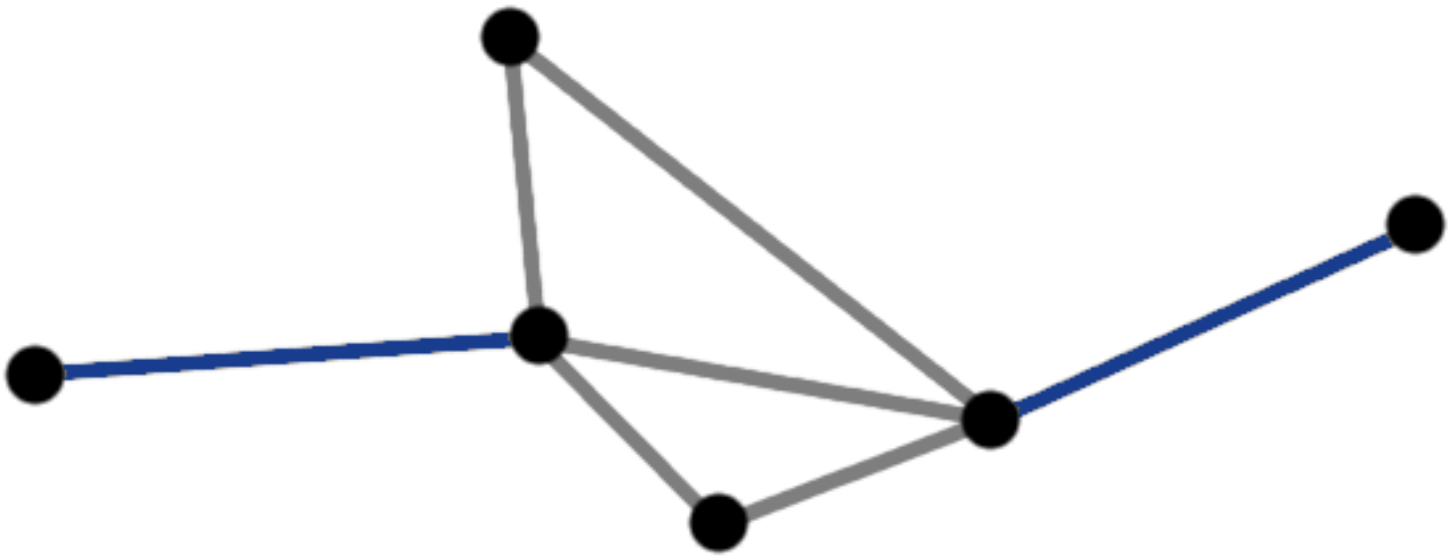
Distance

```
6371×¯2○(1×.○lat1 lat2)+2×.○(long1-long2)lat1 lat2
```

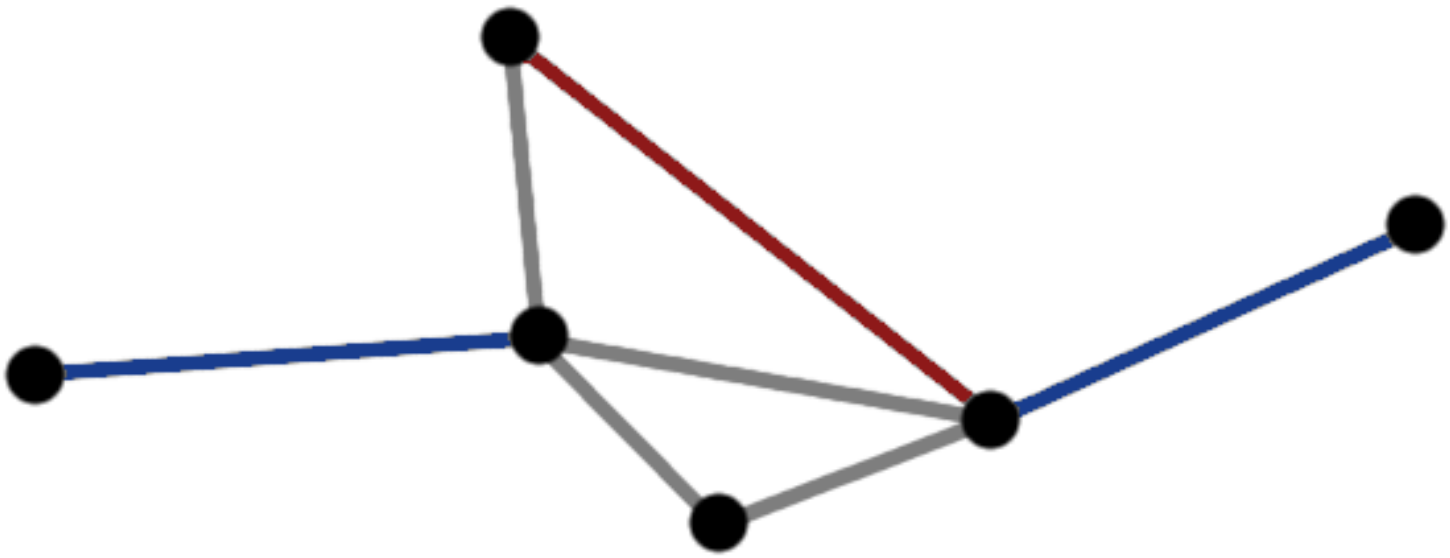
Trimming redundancy



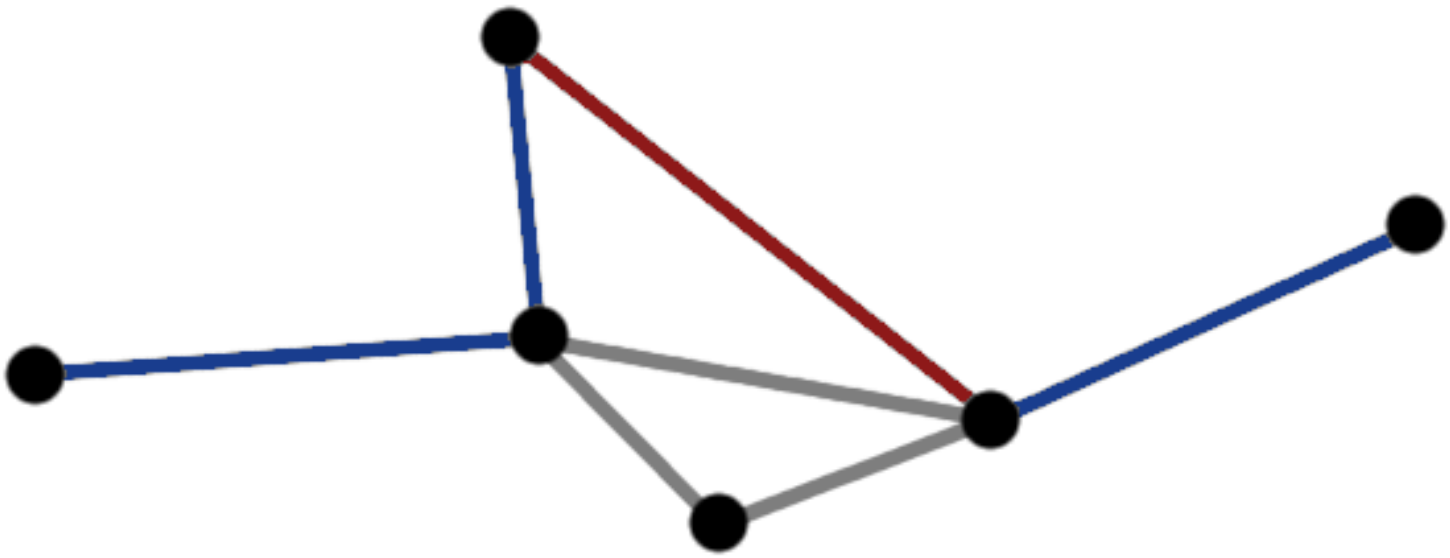
Trimming redundancy



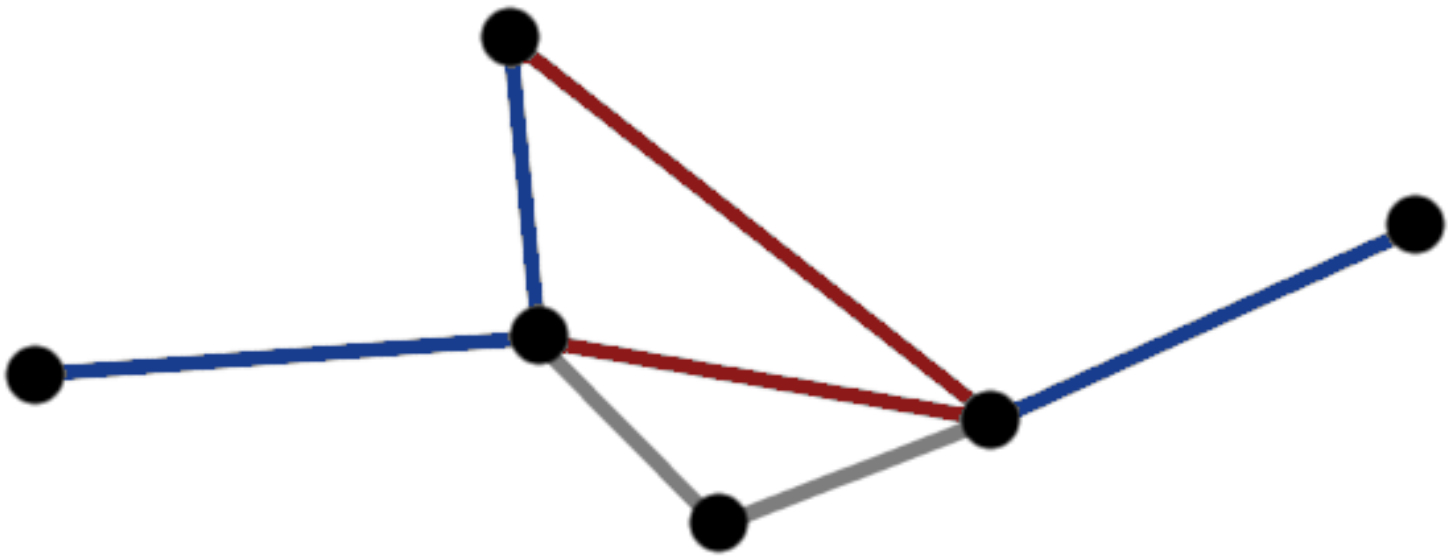
Trimming redundancy



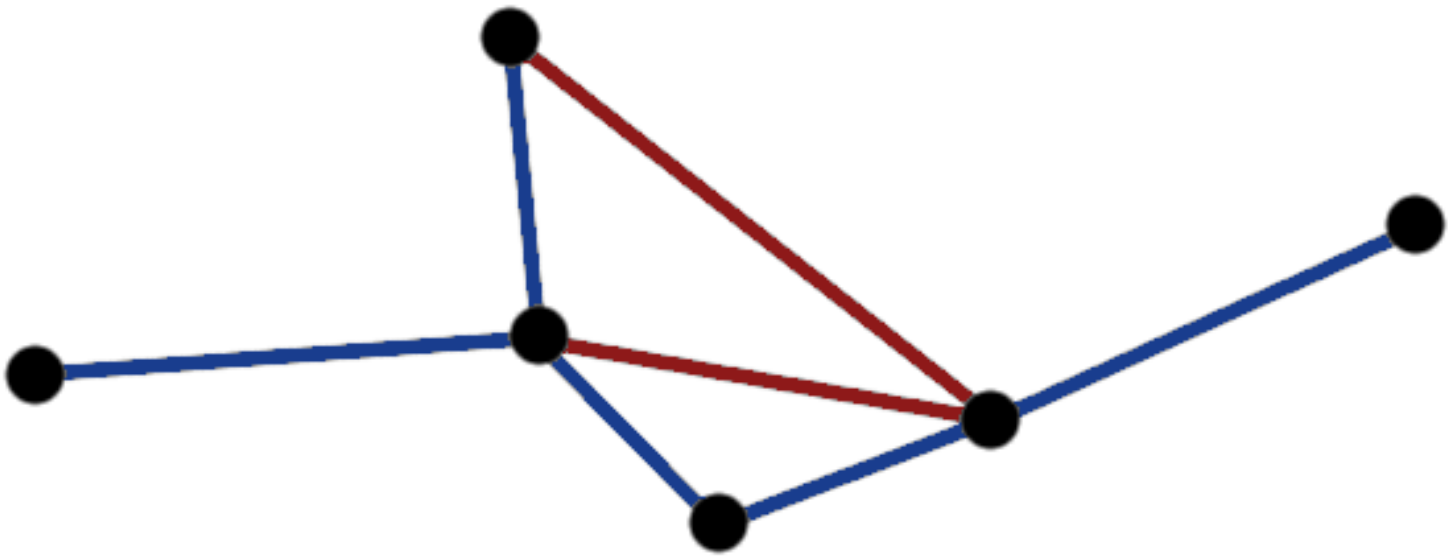
Trimming redundancy



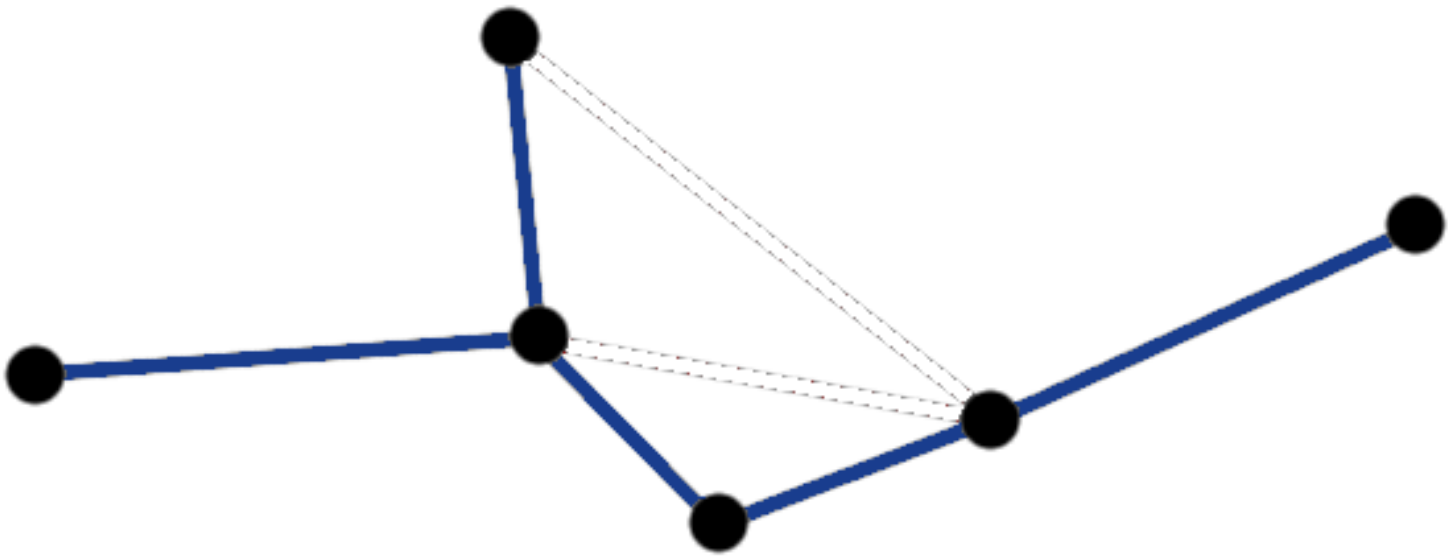
Trimming redundancy



Trimming redundancy



Trimming redundancy



Noisy patterns

- Make a string a certain percent noisy
- Find a pattern in a text with some error tolerance

Noisification

```
addNoise←{
(roll upto)←÷1∨α*1 ¯1
('X',ω)[1+(upto<?(⍴ω)⍴roll)×⍳⍴ω]
}
```

If α=0.000397, roll=1000000 and upto=397

I miss map

I miss map

```
toLower←('abcdefghijklmnopqrstuvwxyz',⍵)[(⎕A,⍵)⍳⍵]
```

Who needs n-wise reduce?

Let's find apl in ``an apl app''

Who needs n-wise reduce?

0	ϕ	a	n		a	p	l		a	p	p
1	ϕ	a	n		a	p	l		a	p	p
2	ϕ	a	n		a	p	l		a	p	p

Who needs n-wise reduce?

a =	a	n		a	p	l		a	p	p
p =	n		a	p	l		a	p	p	a
l =		a	p	l		a	p	p	a	n

Who needs n-wise reduce?

$$
\begin{array}{cc|cccccccccc}
 & & 1 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 0 & 0 \\
 & & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 1 & 0 \\
+ & & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0
\end{array}
$$

Who needs n-wise reduce?

tolerance <	1	0	0	3	0	0	0	2	1	0
	a	n		a	p	l		a	p	p

Images

- Grayscale <-> RGB conversion
- Scaling
- Convolution
- Gaussian Matrix

DNA bind sites

- Create a position weight matrix from sequences
- Score subsequences against pwm

Keywords

- Tokenize strings
- Create a dictionary from article titles
- Search titles for keywords using cosine similarity

More lowercase fun

```
tokenize←{
a←'abcdefghijklmnopqrstuvwxyz'
lc←(a,a,⎕D,' ')[(a,⎕A,⎕D,' ')⍳⍵]
⎕ML←3
(' '≠lc)⊂lc
}
```

Occurrence counting

```
ids←⍵[⍋⍵](dict⍳tokenize string) 1+⍴dict
⎕ML←3
counts[∪ids]←⊃⍴¨ids⊂ids
```

Recap: Trouble

- ↄ
- Functional impedance mismatch

Recap: Favorite Moments

```
allTrips←⍵(⍺∨⍺∨.∧⍵⍤≡)⍵

toLower←('abcdefghijklmnopqrstuvwxyz',⍵)[(f⌷A,⍵)⍳⍵]

convolve←1⌊0⌈⊃+/,C×cY∘.⊖cX⌽⍤⊂pattern

cosine←(v1+.×v2)÷×/(+/⍤v1 v2*2)*0.5

sort←⍵[⍒⍵[;4];]
```

Thanks for coming

Questions?

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