Mini Matlab

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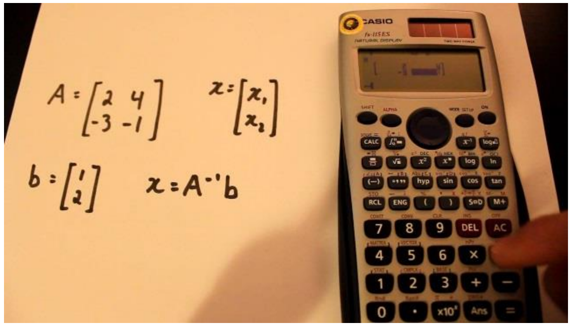


Background

- Sparse matrix
  - Many zero terms in a matrix
  - Store row, col, and value to save memory space

An sparse matrix object

3	4	5

Dim: 3×4,
with 5 nonzero terms

	Row	Col	Value
a[0]	0	0	3
a[1]	0	2	1
a[2]	1	0	1
a[3]	1	1	3
a[4]	2	0	-1

	0	1	2	3
0	3	0	1	0
1	1	3	0	0
2	-2	0	0	0

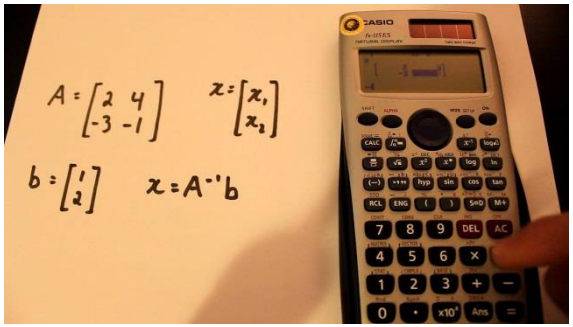
Our Mini Matlab

- Sparse matrix calculator
  - Given some matrices and their data
  - Given some arithmetic expressions in the infix notation
  - Postfix notation conversion
  - Expression evaluation

$$(A' + B) * C - D$$

$$\longrightarrow \quad A'B + C * D -$$

$$\longrightarrow \quad \text{Output the results}$$

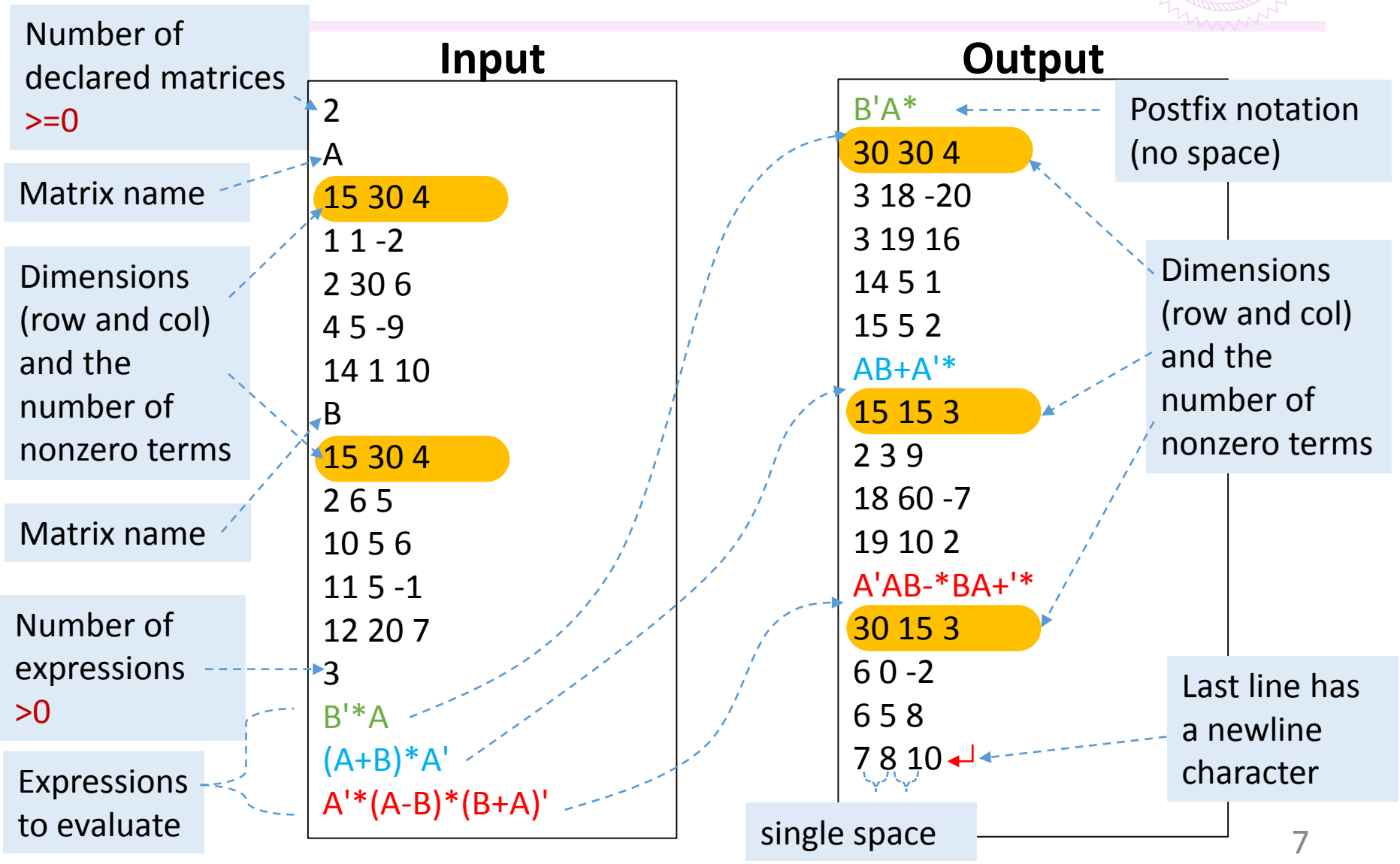


Input information

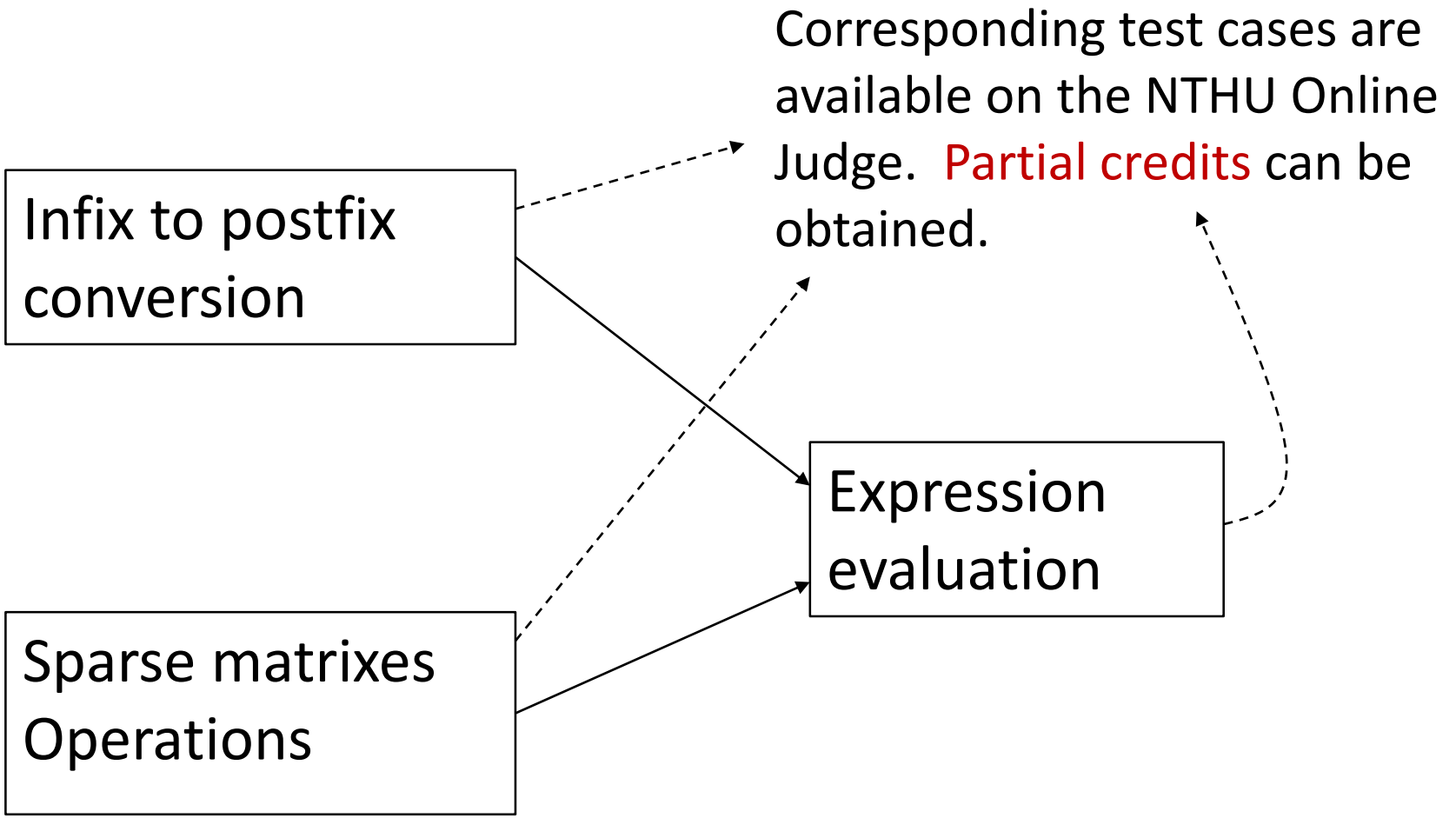
- Operands
  - Naming: A~Z
  - Amount: 26 at most
  - Dimension at most 100 * 100
- Operators
  - * multiplication
  - + addition
  - - subtraction
  - ' (apostrophe) transpose
- Delimiters
  - (,) Parentheses
- Example
  - (A'+B)*C-D

Input Output Format

Note: this is just a format illustration, not a real example



Suggested Design Flow



Some Tips

- Apostrophe character, ''', is denoted as '\'' in C and C++
- It would be better to redirect standard I/O to file I/O during development and testing
  - Manually handling matricis is slow and error-prone
- Resulting zero terms, e.g., [1, 50, 0], should be removed for keeping sparsity
- Test data will be available for testing
- For simplicity, it is allowed to create a 100-entry array of matrices for evaluating expressions
  - 26 arrays for operands A~Z
  - Other 74 for temporal matrices
  - Test cases have corresponding limited size

Other Information

- Mini Matlab uses three techniques that are taught by the textbook
- TA and the professor are glad to help everybody to finish this assignment !
- Please feel free to ask questions
- Online infix-to-postfix converter
  - http://scriptasylum.com/tutorials/infix_postfix/infix_postfix.html