Lecture 5: Handling Complicated Problems

Su, Danyang

Simulate an Economy:

- Learn how to formulate a complicated economy in Matlab
- Learn a bit more advanced programming techniques.
- Learning by doing

Problem:

- Assignment
- More coding involved
- Complicated

How:

- Conceptualization
- Pseudo-code
- Break up the problem into functions
- Program

Conceptualization:

- Identify key components, key words: random match, incumbents, entrants,
- Procedure:
  - let in new entrants and goods
  - hold auctions
  - exits
  - clean up for next auction
  - collect bid information for new bidding strategy

Conceptualization:

- Calculate optimal bid given valuation
  - $b = V - V_c$ (second price auction)
  - $V_c = (1-p)\cdot(1-\rho)QS$
  - $S = p\cdot(V-C)+(1-p)\cdot(1-\rho)QS$
- Contraction mapping
- Avoid using nested optimizer

Pseudo-code:

- More refined than the first step
- Ordering of the program
  - for loop
  - sequence of information update
- Start to visualize functions
  - Conceptual functions
  - Utility functions

Functions:

- Avoid redundancy
- Make code easier to read
- Determine output and (to less degree) input
- Determine best way to realize functions
- Make adjustments to pseudo-codes (vectorization rather than for loop)
- Name of function (inputs/outputs) should be natural y

Functions:

- bid_data = get_bid_info(grid,parameters,bid,type, auction_history)
  - process auction_history
  - name and I/O should be informative
  - find order statistics
  - Interpolation or discretization?

Program:

- Go through multiple iterations
  - Don't get bothered by bugs in the first iteration
- Document/comments
- Code should be intuitive
- Avoid redundancy (e.g. initialize outside the loop)

Some Useful Hotkeys:

- Ctrl+R/T: comment/uncomment
- ctrl+]/[: indent/de-indent
- ctrl+c: force terminate running program