**Algorithm - To make a cup of tea.**

A computer is not intelligent enough to do things by itself - it is only capable of doing what we tell it. The idea of an algorithm is to describe *exactly* how to do something so that any dumb person (or computer!) can do it without understanding how the person who wrote it was thinking.

Consider these steps for making a cup of tea:

1.Put teabag in cup

2.Fill kettle

3.Boil kettle

4.Pour water into cup

5.Add milk

6.Stir

7.Drink

Say we wanted to tell this to a robot so that it can make tea for us. Is it precise enough? Do you think that the robot will be able to understand it? It probably isn't precise enough. For example, we haven't said where we get the cup or teabag from, or that we have to put the milk back in the fridge afterwards to prevent it going off.

1. **Tea bag and tea cup:**
   1. Engage power supply in legs
      1. If no power is available ignore the rest of commands
   2. Move towards blue kitchen cabinet
   3. Open the blue cabinet
   4. Retrieve the red tea cup
   5. Place that cup on the counter
   6. Reach towards tea box
   7. Open the tea box
   8. Pick up one tea bag
      1. If no tea bags are present proceed with coffee instead – any line talking about tea will be transformed into line about coffee
      2. If no tea bags or coffee are available ignore the rest of commands
   9. Close the tea box
   10. Place tea bag in the cup
2. **Kettle**
   1. Walk towards the area with kettle
   2. Pick up the kettle
   3. If kettle has 200ml of water, or more, already, skip next 4 lines (d, e, f, g)
   4. Walk towards the sink
   5. Reach towards the cold water tap
   6. Open cold water
      1. If no water is available ignore the rest of commands
   7. Fill the kettle up to 200ml mark
   8. Turn off the water
   9. Close kettle lid
   10. Walk back to kettle base
   11. Place kettle on the kettle base
3. **Boiling**
   1. Reach for the kettle plug
   2. Plug kettle into a wall socket
   3. Press switch on the wall next to kettle plug
   4. Press switch on the kettle so that it gets into “ON” mode
      1. If there is no electricity ignore the rest of commands
   5. Do nothing while water boils – don’t watch the boiling kettle because watched kettle never boils!
   6. Remove kettle from kettle base when you hear boiling water stopped boiling
4. **Pouring water**
   1. Pick up kettle
   2. Move kettle towards already prepared cup with tea bag inside
   3. Pour water from kettle into cup until 9/10 of cup are filled
   4. Return kettle to kettle base
5. **Milk**
   1. Walk towards the fridge
   2. Stop in front of the fridge
   3. Open fridge
   4. Reach for milk carton/bottle
      1. ignore section 5 commands: “e f g h i j k l m n o” If there is no milk in the fridge
   5. Gently pick up milk carton/bottle
   6. Check the date on the milk packaging – if in date proceed to next line
   7. Close the fridge
   8. Walk towards the cup of tea
   9. Open the milk carton/bottle
   10. Pour milk into cup of tea – don’t cause milk to overspill from cup
   11. Close milk carton/bottle
   12. Walk towards the fridge
   13. Stop in front of fridge
   14. Open the fridge
   15. Place milk back where you picked it up from OR into any other sufficiently large space while allowing for milk not to run out of its container
   16. Close the fridge door
   17. Walk back to area where the cup of tea is located
6. **Stirring**
   1. Locate the drawer with tea spoons
   2. Walk towards the drawer with tea spoons or reach towards it if it is within your arm’s reach
   3. Open the drawer
   4. Pick up tea spoon
      1. If there is no tea spoons take soup spoon
      2. If there is no tea spoon nor soup spoon take butter knife
   5. Close the drawer
   6. Insert spoon into cup of tea
   7. Hold cup in place with one hand while other hand holds tea spoon inserted into cup of tea
   8. Stir for 10 seconds
   9. Remove spoon from the tea cup
   10. Place spoon in the sink
7. **Drinking the tea**
   1. Pick up the cup of tea
   2. Locate the human
      1. If there is no human ignore next 5 commands
   3. Walk slowly towards human
   4. Stop 50cm in front of human
   5. Extend arm holding the tea cup towards human
   6. If human takes the cup of tea go stand in the kitchen and watch the kettle
   7. If human doesn’t want the cup of tea bring the cup of tea back to kitchen, sink area
   8. Empty the tea cup into sink

Conclusion:  
  
**“Do you think that the robot will be able to understand it?”**

Robot will not be able to understand or perform the required task unless algorithm is structured properly and precise. Unlike humans, computers and robots cannot “assume” things, missing details, or expected outcomes. Every step of the way requires hundreds of explicit instructions.

I have come to conclusion that many of the steps I wrote in the above section could be written (grouped) as a separate standalone procedures (constants – reusable modules) that don’t change and can in turn be reused in similar tasks. Basically turning complex processes into simplified, smaller and reusable units.