School of Computing and Information Systems
The University of Melbourne
COMP30018/COMP90049
Knowledge Technologies (Semester 1, 2018)
Workshop exercises: Week 2

1. What do we mean when we say **knowledge technologies**?

   (a) Revise the definition of **knowledge tasks** (or **complicated** problems), with respect to **concrete tasks** (or **simple** problems).

   - From the lecture slides: concrete tasks are well-defined, we can assess whether the solution to the problem is "correct," the data is transformed in a mechanical way, and there is limited contribution to human knowledge; for knowledge tasks, the outcome is not well-defined, computers are used to mediate between the users and the data, and context (provided by the user) is critical.
   - Because all tasks are ultimately mechanical for computers, any task can be construed as a concrete task in this context. On the other hand, any problem can eventually form part of a larger system which can lead to human knowledge, so any task can potentially be a knowledge technology. To be able to decide, we must provide a context for the problem — in particular, in terms of the **user** and how the solution might extend their knowledge.

   (b) Consider the following, and decide into which category you believe they fall, referring to the definition you have decided upon above.

   - The classification depends on how your define the user's context (or lack thereof); here are some possible answers:

   i. Multiplying two floating-point numbers in base 16 - **concrete**
   ii. Playing a competitive game of naughts-and-crosses - **concrete**
   iii. Playing a competitive game of go - **knowledge**
   iv. Playing a competitive game of tennis - **knowledge**
   v. Calculating the trajectory of a thrown book - **concrete**
   vi. Selecting appropriate counter-measures after someone has thrown a book at you - **concrete**
   vii. Selecting a book that a given person will enjoy reading - **knowledge**
   viii. Translating a program written in C into Java - **concrete**
   ix. Translating a document written in Japanese in English - **knowledge**

2. How is **data** different to **knowledge**?

   - In extension from the above definition, data is just the various sensor readings/variables/record values that characterise some system, whereas knowledge results from interpreting the data in a way that helps the user to solve their problem (and learn something).

3. Describe a process through which we might be able to answer the question "Where shall we go for dinner tonight?" using Google (`http://www.google.com`) as a resource.
   (We'll touch on some of these elements as the semester goes on.)

   - Conceptually, we want to construct a query out of good keywords, parse the results that Google gives into web pages, read the web pages to find restaurants which meet our criteria (whatever those are), and then choose a single restaurant to be the response of the system. (This single response would provide the knowledge; everything else is just data!)

4. Revise the following **regular expression** operators:

   `( ) [ ] { } . * + ? ^ $ | \`

For each of the following, give a couple of examples of strings which the regular expression would match. Describe (colloquially, in a manner that a non-technical person would understand) the set of strings that the pattern is designed to match.

(a) `/[a-zA-Z]+/`

- Strings that contain one or more (English) letter characters, e.g. `cat`, `555Z29E8!`

(b) `/^[A-Za-z][a-z]*$/`

- Strings that consist entirely of one or more (English) letter characters, with the first character possibly uppercase, e.g. `Melbourne`, `ff`

(c) `/p[aeiou]{,2}t/`

- Strings that contain the letters `p` and `t`, with up to two (English) vowels in between them, e.g. `peat`, `aptitude`

(d) `/\s(\w+)\s\1/`

- Strings that contain a repeated "word" (set of alphanumeric characters separated by whitespace), e.g. `0␣0␣0`, `\ncat\ncattle\n`