Notes on the Paper

- When estimated quantities are represented using discrete data types such as integers or float they introduce three types of uncertainty bugs.
- Uncertain<T> is a programming language for uncertain data which improves the expressiveness and accuracy.
- For computing the conditionals, Bayesian network semantics are used which improves the correctness of computation.
- Uncertainity = Difference between estoimate and the true value.
- Uncertainity can be modelled using random variables which gives a probability distribution for every value which it can take.

Notes on the Paper

- When developing a program if uncertainity is ignored, this introduces three types of bugs, namely,
  - *Using estimates as facts*
  - *Computation compound errors*
  - *False positives and false negatives*
- Probabilistic programming is able to resolve parts of these bugs.
- However they require domain specific knowledge.
- Uncertain<T> is a programming language that has syntax and semantics in such a way that it is easier to use for non-experts.

Notes on the Paper

- **Claims of Uncertain<T>**
  - Uncertain<T> runtime creates a Bayesian network which can representtion computations as well as samples it at conditional expressions.
  - The network computation is executed by the sample.
  - The runtime makes use of hypothesis tests and takes only number of samples that are necessary for the particular conditionals.

- **Demonstration of these Claims**
  - The claims made on Uncertain<T> has been demonstrated using three case studies.

Notes on the Paper

- **Case Study-1:** Uncertain<T> improves the accuracy and expressiveness of speed computations from GPS.
- **Case Study-2:** Uncertain<T> makes use of prior knowledge to reduce random noise in digital sensors.
- **Case Study-3:** It enables developers to explicitely reason and improve accuracy in machine learning.

Notes on the Paper

- **Motivation:**
  - Modern applications such as mobile phones, searches etc, require uncertainity in their computations.
  - But, in to characterize the uncertainity it requires domain expertise however most of the consumers are non-experts.
  - **Example:** when the uncertainity in an example case such as GPS location is ignored and the obtained location is rather considered as a fact, it causes errors like, generation of location that requires walking through walls or driving on waters.