Meta: Enabling Programming Languages to Learn from the Crowd

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Motivation

- Increase expertise sharing
  - In code reuse, capturing input / output examples
  - In performance optimization, suggesting alternative implementations
  - In testing, warning when function fails with others

Demo

Count the vowels in a string **str** to **int** **60** users **2.162** ms

```
import re

@meta(parent="5700375c2f6a2f000330436a")
def count_vowels(s):
        return len(re.findall('[aeiou]', s, flags=re.I))
```

*Warning: Meta has found a possible alternative that is **1.3** times faster*

Example inputs:

```
count_vowels("UIST") #=> 2
```

```
count_vowels("CHI") #=> 1
```

Known errors:

```
count_vowels(['CHI', 'UIST']) #=> expected string
```

You can load this snippet with:

```
count_vowels = meta.load("http://www.meta-lang.org/5700a")
```

https://www.youtube.com/watch?v=wQIPnnGuVxM

Using Meta

- Annotations indicate a function should be instrumented with meta

```
@meta("Current temperature in a city, in Celsius")
def get_temp_of_location(city, country, apikey : private):
    response = urlopen("api.openweathermap.org/...")
    return json.loads(response)["main"]["temp"]

get_temp_of_location("Tokyo", "JP", my_api_key) #=> 15.83
```

Evaluation

- Had 7 developers complete ML task with Meta
- Participants
  - wrote 748 lines of code,
  - 26% of all code was covered by Meta functions
  - created17 Meta functions
  - loaded 6 unique Meta functions
  - executed Meta functions 15,077 times
  - completed task in 5 hours
- Challenges with security, privacy, starting community

Questions for discussion

- Overall reaction to the paper

- Would you use such a system for your everyday programming?
  - Why or why not?

- Is a function the right place to start?

- Are there solutions to the privacy and security issues?