BASE Version Control

SJTU-Software 2015

*This document specifies all the version upgrades of the **BASE** project.*

1. judge

A function to find out whether the biobrick of a certain type is in the database or not, and returns result by printing "Yes" or "No".

Call function *judge*.pl to judge, the result is shown in Table 1.

Table 1: Test result of judge function

Command	Expectation	Result
perl judge.pl BBa_B0034 RBS	Yes	Yes
perl judge.pl BBa_B0034 Regulatory RBS	No	No
perl judge.pl BBa_R0040 Regulatory	Yes	Yes
perl judge.pl BBa_Z Regulatory	No	No

2. baseadvice

- perl advice_v4.pl "--" RBS ""
  - Expectation
    The function should return the *RBS* biobricks and rank them by scores.
  - Result
    BBa_B0034 | 54.02
    BBa_B0032 | 40.06
    BBa_B0030 | 40.01
    ...
    BBa_K783048 | 12.86
    BBa_K783047 | 12.86
    BBa_J34803 | 12.81
    BBa_J34801 | 12.81
    BBa_J70591 | 12.80

- perl advice_v4.pl BBa_B0034 Coding "Lux"
  - Expectation
    The function should return the *Coding* biobricks about *Lux* and rank them by scores.
  - Result
    BBa_C0062 | 28.75
    BBa_K594001 | 24.68
    BBa_K082006 | 22.96
    BBa_K091109 | 13.70
    BBa_K581013 | 13.61
    BBa_K1230000 | 13.61
    BBa_K199125 | 13.59
    BBa_K199143 | 13.58
    BBa_K199142 | 13.58

BBa_K1202002 | 13.58
...

- perl advice_v4.pl BBa_B0034*BBa_C0062 terminator “”
  - Expectation
    The function should return the *terminator* biobricks and rank them by scores
  - Result
    BBa_B0011 | 37.76
    BBa_B0021 | 37.56
    BBa_B0025 | 32.87
    BBa_B1006 | 28.32
    BBa_B1007 | 27.95
    BBa_B1003 | 27.94
    BBa_B1010 | 27.94
    BBa_B1005 | 27.94
    BBa_K731722 | 24.77
    BBa_K731721 | 24.69
    ...

3. **gscore**

   A function to score the biobrick based on the features of biobrick and the weight of features, and returns the score of biobrick and scores of features.

4. **basesearch**

   A function to search the biobrick according to the name, type or description of the biobricks, and returns the biobrick and its feature. The biobricks are ranked by the score in the descending order.

   Use *hcount_v1*.pl to call the function basesearch

- perl hcount_v1.pl RBS brick 10*10*5*5*10*5*10*10*5*5*10*5 50
  - Expectation
    The function should return the biobrick parts about *RBS* with score > 50 and rank them by scores.
  - Result
    BBa_B0034 | RBS | RBS (Elowitz 1999) – defines RBS efficiency | Vinay S Mahajan, Voichita D. Marinescu, Brian Chow, Alexander | 2003/1/31 | 66.78 10.00 | 0 | 5.00 | 5.00 | 11.52 | 5.00 | 10.00 | 0 | 5.00 | 0.26 | 10.00 | 5.00
    BBa_J33204 | Reporter | xylE reporter gene with rbs | Chris French | 2006/10/17 | 57.19 10.00 | 0 | 5.00 | 5.00 | 0.02 | 5.00 | 10.00 | 10.00 | 5.00 | 0.17 | 2.00 | 5.00
    BBa_K346004 | Translational_Unit | RBS(B0034)_MBP(lead metal binding peptide egineered from PbrR)+Terminator(B0015) | Junyi Jiao | 2010/10/14 | 51.11 10.00 | 0 | 5.00 | 0 | 0.01 | 5.00 | 10.00 | 10.00 | 5.00 | 0.10 | 1.00 | 5.00
    BBa_K863005 | Coding | ecol laccase from E. coli with T7 promoter, RBS and His-tag | Isabel Huber | 2012/9/18 | 51.07 10.00 | 0 | 5.00 | 0 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.07 | 1.00 | 5.00
    BBa_J44001 | RBS | Reverse RBS (RBS_{rev}) – corresponds to BBa_B0030 | Todd Eckdahl | 2006/8/2 | 50.24 10.00 | 0 | 5.00 | 5.00 | 0.06 | 5.00 | 10.00 | 10.00 | 5.00 | 0.19 | 0.00 | 0
    BBa_B0030 | RBS | RBS.1 (strong) – modified from R. Weiss | Vinay S Mahajan, Voichita D. Marinescu, Brian Chow, Alexander D | 2003/1/31 | 50.06 10.00 | 0 | 5.00 | 5.00 | 2.42 | 5.00 | 10.00 | 0 | 5.00 | 0.31 | 3.00 | 4.33

- perl hcount_v1.pl RBS brick 5*5*10*5*5*10*5*5*10*10*15*5 50
  - Expectation
    The function should return the biobrick parts about *RBS* with score > 50 and rank them by scores

- Result
  BBa_B0034 | RBS | RBS (Elowitz 1999) – defines RBS efficiency | Vinay S Mahajan, Voichita D. Marinescu, Brian Chow, Alexander | 2003/1/31 | 66.78 10.00 | 0 | 5.00 | 5.00 | 11.52 | 5.00 | 10.00 | 0 | 5.00 | 0.26 | 10.00 | 5.00
  BBa_J33204 | Reporter | xylE reporter gene with rbs | Chris French | 2006/10/17 | 57.19 10.00 | 0 | 5.00 | 5.00 | 0.02 | 5.00 | 10.00 | 10.00 | 5.00 | 0.17 | 2.00 | 5.00
  BBa_K346004 | Translational_Unit | RBS(B0034)_MBP(lead metal binding peptide egineered from PbrR)+Terminator(B0015) | Junyi Jiao | 2010/10/14 | 51.11 10.00 | 0 | 5.00 | 0 | 0.01 | 5.00 | 10.00 | 10.00 | 5.00 | 0.10 | 1.00 | 5.00
  BBa_K863005 | Coding | ecol laccase from E. coli with T7 promoter, RBS and His-tag | Isabel Huber | 2012/9/18 | 51.07 10.00 | 0 | 5.00 | 0 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.07 | 1.00 | 5.00
  BBa_J44001 | RBS | Reverse RBS (RBS_{rev}) – corresponds to BBa_B0030 | Todd Eckdahl | 2006/8/2 | 50.24 10.00 | 0 | 5.00 | 5.00 | 0.06 | 5.00 | 10.00 | 10.00 | 5.00 | 0.19 | 0.00 | 0
  BBa_B0030 | RBS | RBS.1 (strong) – modified from R. Weiss | Vinay S Mahajan, Voichita D. Marinescu, Brian Chow, Alexander D | 2003/1/31 | 50.06 10.00 | 0 | 5.00 | 5.00 | 2.42 | 5.00 | 10.00 | 0 | 5.00 | 0.31 | 3.00 | 4.33

- perl hcount_v1.pl Generator devic 10*10*5*5*10*5*10*10*5*5*10*5 55
  - Expectation
    The function should return the biobrick devices about *Generator* with score > 55 and ranking by scores.
  - Result
    BBa_E0840 | Reporter | GFP generator | Jennifer Braff | 2004/10/18 | 58.48
    10.00 | 0 | 5.00 | 5.00 | 0.53 | 5.00 | 10.00 | 10.00 | 5.00 | 0.28 | 3.00 | 4.67
    BBa_K145201 | Generator | INPUT TetR generator | Jonas Demeulemeester | 2008/8/20 | 56.17
    10.00 | 0 | 5.00 | 5.00 | 0.02 | 5.00 | 10.00 | 10.00 | 5.00 | 0.15 | 1.00 | 5.00
    BBa_K143082 | Generator | Pveg-spoVG RFP expression construct | Chris Hirst | 2008/10/27 | 56.15
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.15 | 1.00 | 5.00
    BBa_K143079 | Generator | Pveg-spoVG GFP expression construct | Chris Hirst | 2008/10/27 | 56.15
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.15 | 1.00 | 5.00
    BBa_K084007 | Signalling | Lac repressible lasI generator (No LVA) | Masahiro Tominaga,Yoshimi Iyama,Kohei Kawasaki | 2008/9/18 | 56.14
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.14 | 1.00 | 5.00
    BBa_K084012 | Signalling | Lac repressible 3OC6HSL generator (No LVA) | Yoshimi Iyama, Kohei Kawasaki, Masahiro Tominaga | 2008/9/22 | 56.09
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.08 | 1.00 | 5.00
    BBa_K084008 | Signalling | Lac repressible RhlI generator (No LVA) | Masahiro Tominaga, Yoshimi Iyama, Kohei Kawasaki | 2008/9/18 | 56.08
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.08 | 1.00 | 5.00
    BBa_K081022 | Composite | Plambda regulated luxR generator and Plux | Lorenzo Pasotti, Paolo Magni | 2008/10/19 | 56.08
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.08 | 1.00 | 5.00
    BBa_J45319 | Generator | PchA & PchB enzyme generator | Andr?Green II | 2006/10/28 | 55.16
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.16 | 1.00 | 4.00
    BBa_K081008 | Translational_Unit | luxI protein generator (TERM-) | Lorenzo Pasotti, Paolo Magni | 2008/10/18 | 55.16
    10.00 | 0 | 5.00 | 5.00 | 0.02 | 5.00 | 10.00 | 10.00 | 5.00 | 0.14 | 1.00 | 4.00

- perl hcount_v1.pl Generator devic 10*10*5*5*10*5*10*10*5*5*10*5 80
  - Expectation

Nothing. The weight is the same as above, but the score limit is 80. There is no brick with score > 80.

- Result
  nothing

- perl hcount_v1.pl Generator*RBS*Lux devic 10*10*5*5*10*5*10*10*5*5*10*5 55
  - Expectation
    The function should return the biobrick devices about *Generator*, *RBS*, or *Lux*, with score > 55 and are ranked by scores.
  - Result
    BBa_E0840 | Reporter | GFP generator | Jennifer Braff | 2004/10/18 | 58.48
    10.00 | 0 | 5.00 | 5.00 | 0.53 | 5.00 | 10.00 | 10.00 | 5.00 | 0.28 | 3.00 | 4.67
    BBa_K145201 | Generator | INPUT TetR generator | Jonas Demeulemeester | 2008/8/20 | 56.17
    10.00 | 0 | 5.00 | 5.00 | 0.02 | 5.00 | 10.00 | 10.00 | 5.00 | 0.15 | 1.00 | 5.00
    BBa_K143082 | Generator | Pveg-spoVG RFP expression construct | Chris Hirst | 2008/10/27 | 56.15
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.15 | 1.00 | 5.00
    BBa_K143079 | Generator | Pveg-spoVG GFP expression construct | Chris Hirst | 2008/10/27 | 56.15
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.15 | 1.00 | 5.00
    BBa_K084007 | Signalling | Lac repressible lasI generator (No LVA) | Masahiro Tominaga,Yoshimi Iyama,Kohei Kawasaki | 2008/9/18 | 56.14
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.14 | 1.00 | 5.00
    BBa_K084012 | Signalling | Lac repressible 3OC6HSL generator (No LVA) | Yoshimi Iyama, Kohei Kawasaki, Masahiro Tominaga | 2008/9/22 | 56.09
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.08 | 1.00 | 5.00
    BBa_K084008 | Signalling | Lac repressible RhlI generator (No LVA) | Masahiro Tominaga, Yoshimi Iyama, Kohei Kawasaki | 2008/9/18 | 56.08
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.08 | 1.00 | 5.00
    BBa_K081022 | Composite | Plambda regulated luxR generator and Plux | Lorenzo Pasotti, Paolo Magni | 2008/10/19 | 56.08
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.08 | 1.00 | 5.00
    BBa_J45319 | Generator | PchA & PchB enzyme generator | Andr?Green II | 2006/10/28 | 55.16
    10.00 | 0 | 5.00 | 5.00 | 0.00 | 5.00 | 10.00 | 10.00 | 5.00 | 0.16 | 1.00 | 4.00
    BBa_K081008 | Translational_Unit | luxI protein generator (TERM-) | Lorenzo Pasotti, Paolo Magni | 2008/10/18 | 55.16
    10.00 | 0 | 5.00 | 5.00 | 0.02 | 5.00 | 10.00 | 10.00 | 5.00 | 0.14 | 1.00 | 4.00

5. evaluate

- Input
  - The first parameter: the biobrick ID of these parts within a device, the biobrick IDs are split by ","
  - The second parameter: the keyword of these parts within a device, the biobrick IDs are split by ",", and split by "+" if there are more than two keywords for a part.
  - The third parameter: precision of the evaluation, the default precision is 20 for low level, 40 for middle level, 80 for high level.
- Output
  - In the first line, it judges the completion, 0 for incomplete and 1 for complete(the completion means if there are Regulatory, Coding and Terminator part)
  - In the second line, it judges the order, 0 for unordered and 1 for ordered(the order means if the first part is Regulatory, the last part is Terminator and the coding part is between Regulatory and Terminator)

- In the third line, it outputs the score of the device.
- The following lines show the biobrick ID the user inputs and evalute the best ten parts for each part according to their types and keywords.

- Example 1 : Evaluate the complete and ordered device with low accuracy and no keyword.
  - Command
    perl score.pl BBa_R0010,BBa_J33204,BBa_E0040,BBa_B0021 ,,, 20
  - Expectation
    1(mean complete)
    1(mean ordered)
    The score of the device
    The biobrick we evalute
  - Result
    1
    1
    55.11
    BBa_R0010
    BBa_J23114, BBa_J23106, BBa_I719005, BBa_J23103, BBa_J23118, BBa_R0053, BBa_J23101, BBa_J23113, BBa_R0011, BBa_J23110
    BBa_J33204
    BBa_J52008, BBa_J33204, BBa_K145015, BBa_K763002, BBa_I715019, BBa_I715020, BBa_K330002, BBa_K895007, BBa_J33202, BBa_K598001
    BBa_E0040
    BBa_E1010,BBa_E0040,BBa_E0030, BBa_K592009 ,BBa_K103001, BBa_I712019, BBa_J31005, BBa_K538004, BBa_K103004, BBa_K863005, BBa_K190028
    BBa_B0021
    BBa_B1006, BBa_B0011, BBa_J61048, BBa_K731722, BBa_K731721, BBa_B0024, BBa_K864600, BBa_K923004, BBa_B0025, BBa_B1002

- Example 2 : Evaluate the complete and ordered devices with high accuracy and no keyword
  - Command
    perl score.pl BBa_R0010,BBa_J33204,BBa_E0040,BBa_B0021 ,,, 80
  - Expectation
    1(mean complete)
    1(mean ordered)
    The score of the device
    The biobrick we evaluate which may be diffenent from the low accuracy
  - Result
    1
    1
    55.11
    BBa_R0010
    BBa_K398326, BBa_K091100, BBa_J23114, BBa_K206000, BBa_K143012,BBa_J2 3106, BBa_I719005, BBa_J23103, BBa_J23118, BBa_J23115
    BBa_J33204
    BBa_J52008, BBa_J33204, BBa_J54103, BBa_K145015, BBa_K763002, BBa_I7150 19,BBa_I715020, BBa_E0032, BBa_E0022, BBa_K330002
    BBa_E0040
    BBa_E1010, BBa_E0040, BBa_E0030, BBa_K592009, BBa_K103001, BBa_I71201 9,BBa_J31005, BBa_K538004, BBa_K103004, BBa_K863005, BBa_K190028
    BBa_B0021
    BBa_B1006, BBa_B0011, BBa_J61048, BBa_K731722, BBa_K731721, BBa_B0024, BBa_K864600, BBa_K923004, BBa_B0025, BBa_B0010

- Example 3 : Evaluate the complete and ordered devices with low accuracy and some keywords

  - Command
    perl score.pl BBa_R0010,BBa_J33204,BBa_E0040,BBa_B0021 lacI+regulated,Reporter,Coding, Terminator 20
  - Expectation
    1(mean complete)
    1(mean ordered)
    The score of the device
    The biobrick we evaluate
  - Result
    1
    1
    55.11
    BBa_R0010
    BBa_K731500, BBa_K731300, BBa_R0011, BBa_R0010, BBa_K101001, BBa_K091112, BBa_K091110,BBa_K09111
    BBa_J33204
    BBa_J33204, BBa_K330002, BBa_K812030, BBa_K1555000, BBa_K1555001, BBa_K775004, BBa_K821001, BBa_K766003, BBa_K1020001, BBa_K1555002
    BBa_E0040
    BBa_K118003, BBa_K118002, BBa_K118015, BBa_I732005, BBa_K1072001, BBa_K118000, BBa_K118022, BBa_K118023, BBa_K118001, BBa_K118008, BBa_C0024
    BBa_B0021
    BBa_B1006, BBa_J61048, BBa_K731722, BBa_K731721, BBa_B0024, BBa_K864600, BBa_K923004, BBa_B0025, BBa_B1002, BBa_K1051008

- Example 4 : Evaluate the complete and unordered devices with low accuracy and some keywords
  - Command
    perl score.pl BBa_B0021,BBa_R0010,BBa_J33204,BBa_E0040 Terminator, Regulatory,Reporter, Coding 20
  - Expectation
    1(mean complete)
    0(mean not ordered)
  - Result
    1
    0

- Example 5 : Evaluate the incomplete and unordered devices with low accuracy
  - Command
    perl score.pl BBa_R0010,BBa_E0040 Regulatory, Coding 20
  - Expectation
    0(mean not complete)
    0(mean not ordered)
  - Result
    0
    0

- Example 6 : Evaluate the complete and ordered devices with low accuracy and the type of one of the biobricks is *Inverter* or *Generator*.
  - Command
    perl score.pl BBa_I13409,BBa_B0021 ,Terminator 20
  - Expectation
    1(mean complete)
    1(mean ordered)
    The score of the device
    The biobrick we evalute

– Result
1
1
18.64
BBa_I13409
BBa_K1385000, BBa_K1385001, BBa_K377704, BBa_I13409, BBa_K1362991, BBa_M1398
BBa_B0021
BBa_B0025, BBa_B1006, BBa_B1007, BBa_B1003, BBa_B1005, BBa_K731722, BBa_K731721, BBa_B0024, BBa_J61048, BBa_B1002

- Example 7 : Evaluate the complete and unordered devices with low accuracy and the type of one of the biobricks is *Inverter* or *Generator*.
  – Command
  perl score.pl BBa_E0040,BBa_I13409 Coding, Inverter 20
  – Expectation
  1(mean complete)
  0(mean not ordered)
  – Result
  1
  0

6. upload

A function to upload the basic information of the new biobrick to the database.

Use *upload*.pl to call the function upload.

- perl upload.pl BBa_check*check*check*check*check*check*check*check*check*check*check*check* check*check brick
  – Expectation
  The information of BBa_check will be added into database table *brick*.
  – Result

```
mysql> select * from brick where bri_id = "BBa_check";
+-----------+--------+------------+-------+-------------+---------------+-------
-------+-------------+------+------------+-----------------------+-------------
---+-------+--------+-----------------+-----------------+------------+-------+--
-----+
| Bri_id    | Author | Enter_time | Btype | Part_status | Sample_status | Part_r
esults | Star_rating | Uses | DNA_status | Qualitative_experience | Group_favori
te | Del   | Groups | Confirmed_times | Number_comments | Ave_rating | Des   | S
core |
+-----------+--------+------------+-------+-------------+---------------+-------
-------+-------------+------+------------+-----------------------+-------------
---+-------+--------+-----------------+-----------------+------------+-------+--
-----+
| BBa_check | check  | check      | check | check       | check         | check
       |           0 |    0 | check      | check                 | check
   | check | check  |               0 |               0 |     -1.000 | check |
0.00 |
+-----------+--------+------------+-------+-------------+---------------+-------
-------+-------------+------+------------+-----------------------+-------------
---+-------+--------+-----------------+-----------------+------------+-------+--
-----+
1 row in set (0.01 sec)
```

- perl upload.pl BBa_check*check*check*check*check*check*check*check*check*check*check*check* check*check devic
  – Expectation
  The information of BBa_check will be added into database table *combine*.

– Result

```
mysql> select * from combine where com_id = "BBa_check";
+-----------+--------+------------+-------+-------------+---------------+-------
-------+-------------+------+------------+-------------------------+-------------
---+-------+--------+-----------------+-----------------+------------+-------+--
-----+
| Com_id    | Author | Enter_time | Ctype | Part_status | Sample_status | Part_r
esults | Star_rating | Uses | DNA_status | Qualitative_experience | Group_favori
te | Del   | Groups | Confirmed_times | Number_comments | Ave_rating | Des   | S
core |
+-----------+--------+------------+-------+-------------+---------------+-------
-------+-------------+------+------------+-------------------------+-------------
---+-------+--------+-----------------+-----------------+------------+-------+--
-----+
| BBa_check | check  | check      | check | check       | check         | check
       |           0 |    0 | check      | check                   | check
   | check | check  |               0 |               0 |     -1.000 | check |
0.00 |
+-----------+--------+------------+-------+-------------+---------------+-------
-------+-------------+------+------------+-------------------------+-------------
---+-------+--------+-----------------+-----------------+------------+-------+--
-----+
1 row in set (0.00 sec)
```