Subject: Re: yet another 2d matching question
Posted by pgrigis on Fri, 30 Jul 2010 18:13:19 GMT
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On Jul 30, 1:21 pm, Gray <grayliketheco...@gmail.com> wrote:
> On Jul 30, 1:09 pm, Gray <grayliketheco...@gmail.com> wrote:
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>> On Jul 30, 12:12 pm, Paolo <pgri...@gmail.com> wrote:
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>>> On Jul 30, 12:06 pm, Gray <grayliketheco...@gmail.com> wrote:
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>>>> On Jul 30, 11:59 am, Paolo <pgri...@gmail.com> wrote:
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>>>> > On Jul 30, 11:41 am, Gray <grayliketheco...@gmail.com> wrote:
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>>>> > > On Jul 30, 11:25 am, Gray <grayliketheco...@gmail.com> wrote:
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>>>> > > > On Jul 30, 11:23 am, Gray <grayliketheco...@gmail.com> wrote:
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>>>> > > > > On Jul 30, 11:15 am, Paolo <pgri...@gmail.com> wrote:
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>>>> > > > > > On Jul 30, 10:01 am, Gray <grayliketheco...@gmail.com> wrote:
>
>>>> > > > > > > Hi all,
>
>>>> > > > > > > For quite a while I've been using JD Smith's match_2d routine to match
>>>> > > > > > > xy coords between lists. However, this and all the other matching
>>>> > > > > > > codes I've seen out there suffer from a variation of the uniqueness of
>>>> > > > > > > matches problem.
>
>>>> > > > > > > Codes like SRCOR in the NASA IDL library let you specify a one-to-one
>>>> > > > > > > match, i.e. enforcing that each element in list 2 only be matched to
>>>> > > > > > > one element in list 1; using match_2d's match_distance keyword one
>>>> > > > > > > could implement the same effect oneself. However, while that excludes
>>>> > > > > > > multiple matches to the same element, it's all done after the fact,
>>>> > > > > > > after the original match was determined.
>
>>>> > > > > > > What I'm looking for is an algorithm that matches 2 lists, identifies
>>>> > > > > > > multiple-matches, and then looks for additional matches within the
>>>> > > > > > > search radius for elements which would become unmatched after
>>>> > > > > > > enforcing a one-to-one relationship. What I mean is, say element 0 in
>>>> > > > > > > list 2 is matched to both element 3 and element 5 in list 1, and that
>>>> > > > > > > the distance between 2_0 and 1_3 is smaller than the distance between
>>>> > > > > > > 2_0 and 1_5. In that case, 1_5 would become unmatched; but what if
>>>> > > > > > > there is element 2_1 which is also within the search radius of 1_5?
>>>> > > > > > > Then, 1_5 should be re-matched with 2_1.

>
>>>> > > > > > > My best idea thus far is to run match_2d once, identify multiple-
>>>> > > > > > > matches, keep the matches with minimum distance using match_distance,
>>>> > > > > > > then iterate with the remaining elements until match_2d returns no
>>>> > > > > > > matches. Can anyone come up with a better solution?
>
>>>> > > > > > Hmmm... what about starting with first point (a) in list 1, finding
>>>> > > > > > the nearest
>>>> > > > > > point (b) to (a) in list 2, removing (b) from list 2 and repeat for
>>>> > > > > > all points
>>>> > > > > > in list 1? [this assumes list 1 and list 2 have the same number of
>>>> > > > > > elements N,
>>>> > > > > > which is a necessary condition for a one-to-one matching].
>
>>>> > > > > > With some smart partitioning of list 1 it will take ~log(N) to find
>>>> > > > > > the nearest
>>>> > > > > > point, so we are looking at ~ N log(N) operations...
>
>>>> > > > > > Ciao,
>>>> > > > > > Paolo
>
>>>> > > > > > > --Gray
>
>>>> > > > > I'm fine with having there be points which don't match at all w/in the
>>>> > > > > search radius, I'm just looking to force any matches that exist to be
>>>> > > > > recognized.
>
>>>> > > > > The straight FOR-loop method is certainly serviceable, but I had hoped
>>>> > > > > there was a more efficient way to do it... but it's certainly possible
>>>> > > > > (or even likely) that anything fancier I try to do is LESS efficient.
>
>>>> > > > > --Gray
>
>>>> > > > Though I have trouble believing that FOR is the way to go when I have
>>>> > > > ~50k elements in each list.
>
>>>> > > AND... there's no guarantee that the first match you find for a given
>>>> > > element in list 2 is the best one.
>
>>>> > what is the "best" match you would like to obtain?
>
>>>> > Ciao,
>>>> > Paolo
>
>>>> Smallest distance between two points.
>
>>> In the sense that the sum of all distances between matched points of
>>> list (1) and (2) is minimal?

>
>>> Ciao,
>>> Paolo
>
>> Hmmm... not exactly. In the sense that for any point in either list,
>> it is matched to the closest point within the search radius which is
>> not matched to a closer point. So, for example, if my matching radius
>> is 1.5, and my 2 lists are:
>
>> 1,1 1,2 3,5 6,6
>> and
>> 1,2.1 0,1.5 5,6 2,2
>
>> Then, the optimal match would be to match 2_1 with 1_2, 2_2 with 1_1
>> (even though 2_2 is closer to 1_2 than 1_1, 1_2 is closer to 2_1), 2_3
>> with 1_4, and neither 1_3 or 2_4 are matched because they do not have
>> an unmatched star w/in the search radius. In match_2d and srcor, 2_2
>> wouldn't be matched with anything, because the first pass would match
>> 2_2 with 1_2, but 2_1 would have priority (because it is closer to
>> 1_2) and 2_2 would become unmatched.
>
> Sorry, typo. My example makes more sense if 2_1 = 0,1.6

Let me argue that the algorithm you are describing for matching
points does not deliver very satisfactory results.

In fact it is much easier to think about this as a 1-dim
problem (and ignoring for now the fact that you reject some matches
if they are too far apart).

Data:
List 1: [1,5 ,8,9]
List 2: [0,2.5,3,6]

Now the algorithm would be to travel along a list
from first to last elements and assign the closest
unmatched points.

Let's start with building matches from list 1:
1 <-> 0
5 <-> 6
8 <-> 3
9 <-> 2.5

(you get this numbers by starting from 1, looking for closest number
which is 0, assigning 1 <-> 0 match and removing the matched points
from the list, then looking for the nearest element to 5 etc.)

On the other hand if you start building matches from list 2:
0 <-> 1
2.5 <-> 5
3 <-> 8
6 <-> 9

These solutions are different from each other.

Moreover, if the arrays are reordered internally,
another different solution would be found.

You would probably want a way of finding matches that
does not depend on the internal order of the 2 lists,
or on which list you start with.

Ciao,
Paolo
