PROPER MOTIONS

How Do The Faintest Of Stars Move

Prashansa Gupta

July 29,2015

Indian Institute of Science Education and Research, Mohali, India

PROBLEM STATEMENT

Objective

We wish to look at the faintest of stars in the sky and investigate their kinematics.

MOTIVATION

Two Ways

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2. Or wait long enough so that a compromise over precision can be made

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  - even fainter stars - complete upto 20th magnitude
  - a billion stars with an accuracy of about $20 \mu as$ at 15 mag, and $200 \mu as$ at 20 mag.

First way

But their still remains one shortcoming, they do not give data for fainter stars beyond 20th magnitude.

There are quite a lot of stars even between 20 and 21 magnitude. Roughly estimated, for RR lyrae stars, these magnitudes translate to 92 and 120 kpc. One can easily see how big a volume of the sky are we missing out on!

SECOND WAY

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- different catalogs have different astrometric calibration - we need to calibrate them to the same reference system defined by PS1 galaxies.

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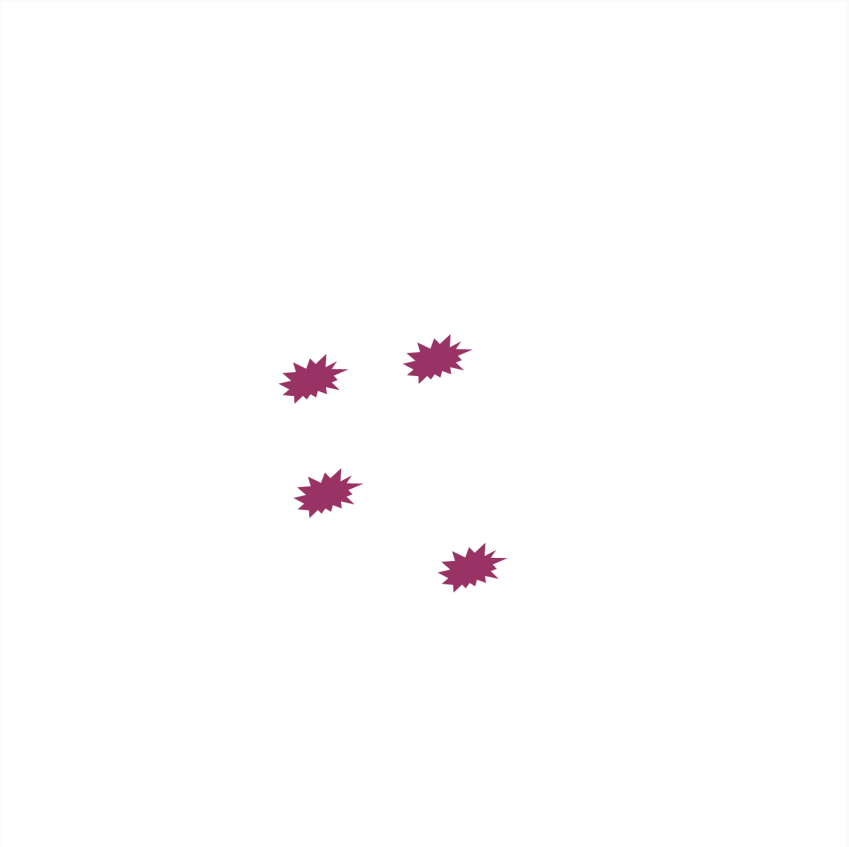

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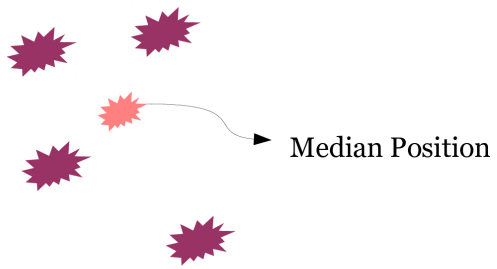

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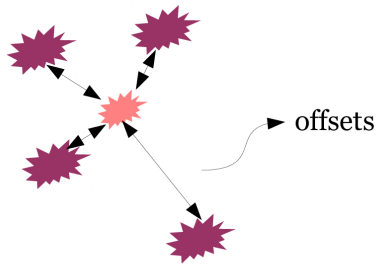

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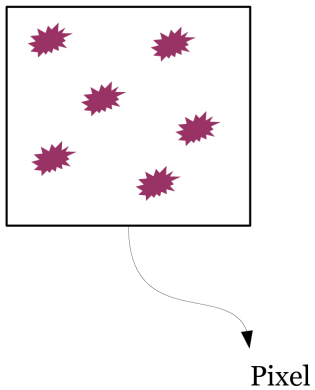

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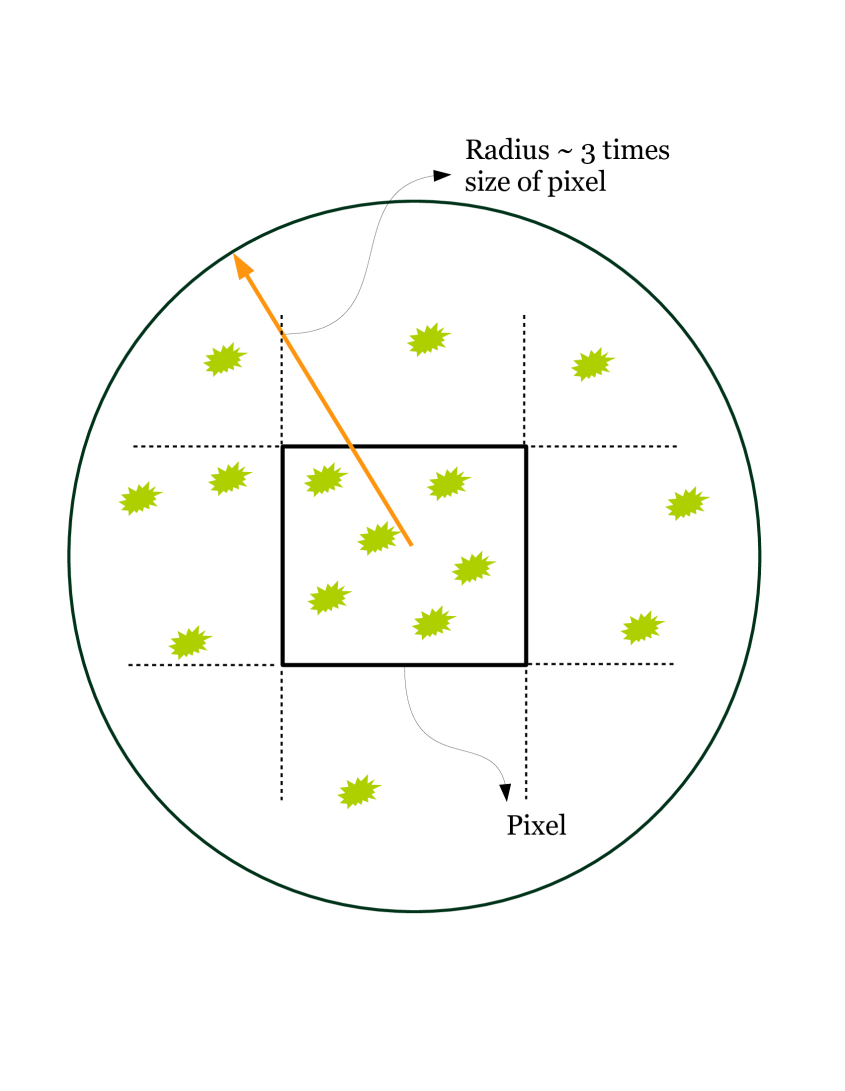

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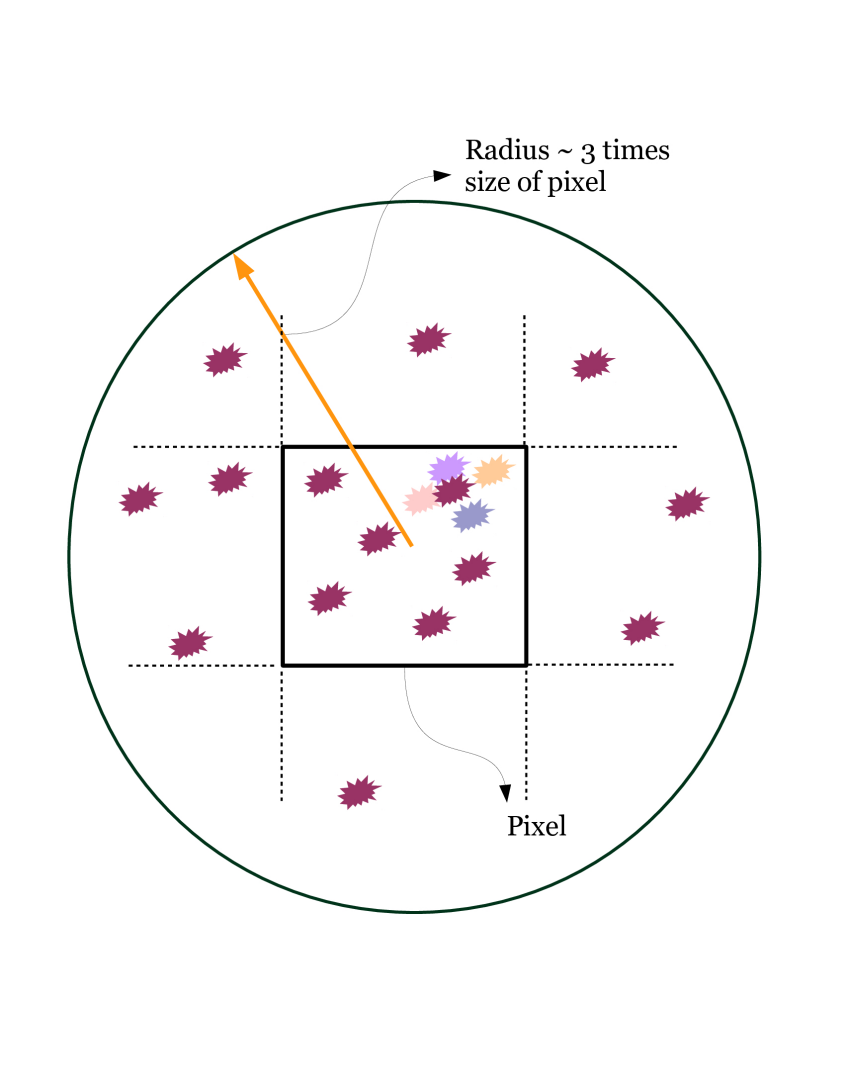

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   - for each pixel, update the original position by the offset epochwise average.
3. Finally calibrate positions of stars

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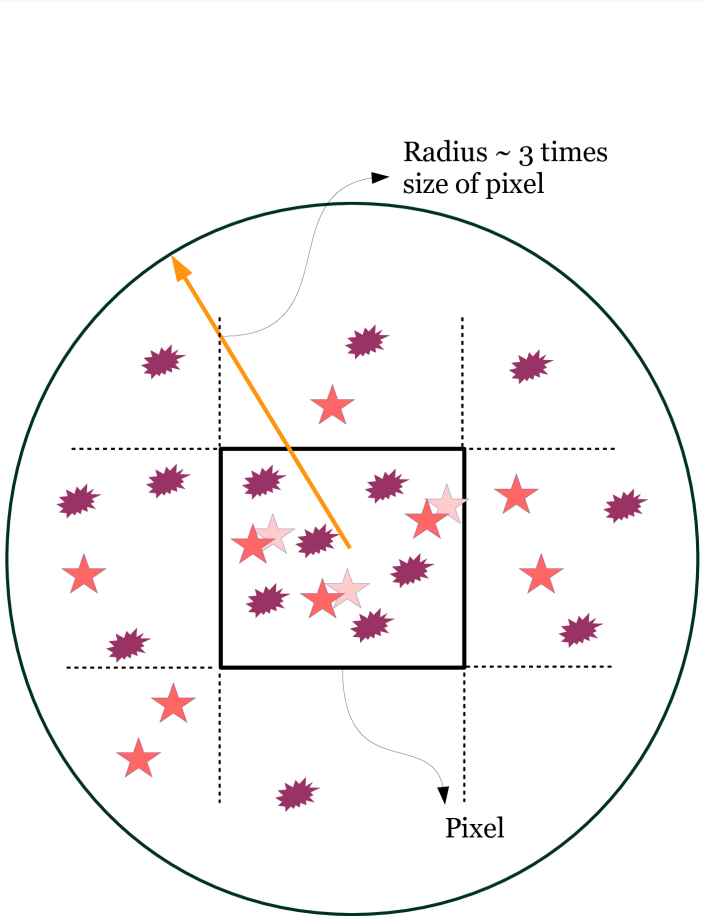
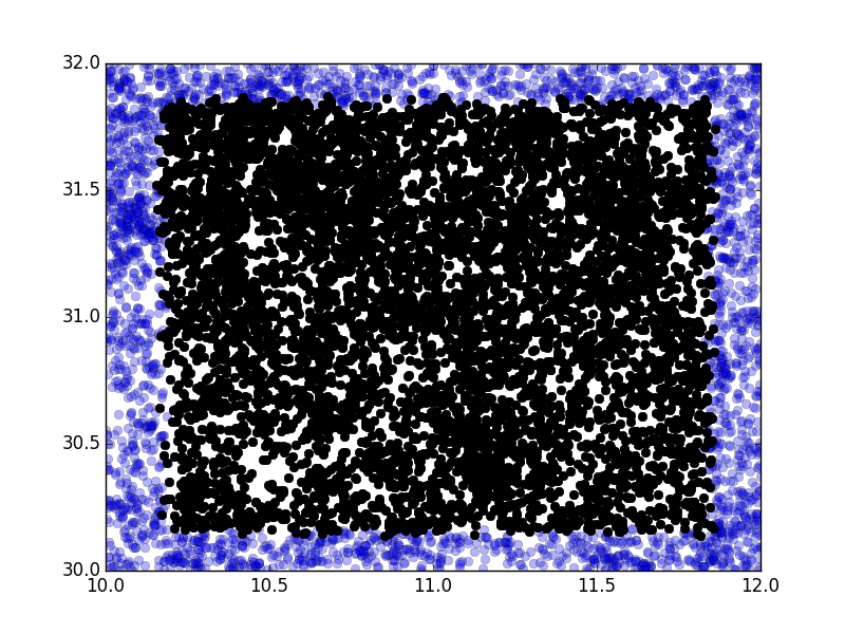


EDGE EFFECTS



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- The code for fixing galaxies as the background has been written.
- The code for calculating movement of stars given the fixed background has been written.
- The final data will be stored in database format.

BUGS

- $numpy.in1d(ar1, ar2, assume\_unique = False, invert = False)$ Test whether each element of a 1-D array is also present in a second array. Returns a boolean array the same length as ‘ar1‘ that is True where an element of ‘ar1‘ is in ‘ar2‘ and False otherwise.

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- fixed it using the python library ’pandas’ *IndexError: unsupported iterator index* – maybe not compatible with numpy :(

FUTURE GOALS

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- Move on to the other datasets and finally obtain proper motions of stars under consideration.

COLOPHON

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This work is available at

`github.com/prashansa/properMotions`

Questions?