Opatrec

J.Hrivnac

Moose, CERN, 5/10/94

- Reason for This Work
- Problem Statement
- Pattern Recognition Algorithm
- Design
- Perfomance
- Future Plans

Opatrec

Reason for This Work

- **The classes may be in future incorporated into the common prototype by inheritance bringing new Pattern Recognition possibility.**
- To try a project from the beginning to the end (to learn).

Opatrec

Problem Statement

To find all Hits (= space points) from the Road (= set of Hits) belonging to each Track (= circle).

Opatrec

Pattern Recognition Algorithm

Before applying the algorithm, Road (r:ROAD**) must be created and filled with Hits (**hits_in_road:HITS**).**

Opatrec

Pattern Recognition Algorithm

(r.find_tracks)

- **Find (all) 3-tuples among Hits from the Road** (t:TRACK)**.**
- **Put a circle through 3-tuples.**
- **Create space from the parameters of circles** (tracks_in_road:TRACKS)**.**
- **Clusterise in the created space with a defined metric (create real tracks).**
- **Recall all Hits belonging to clusters (Tracks)** (hits_in_tracks:HITS)**.**

Opatrec

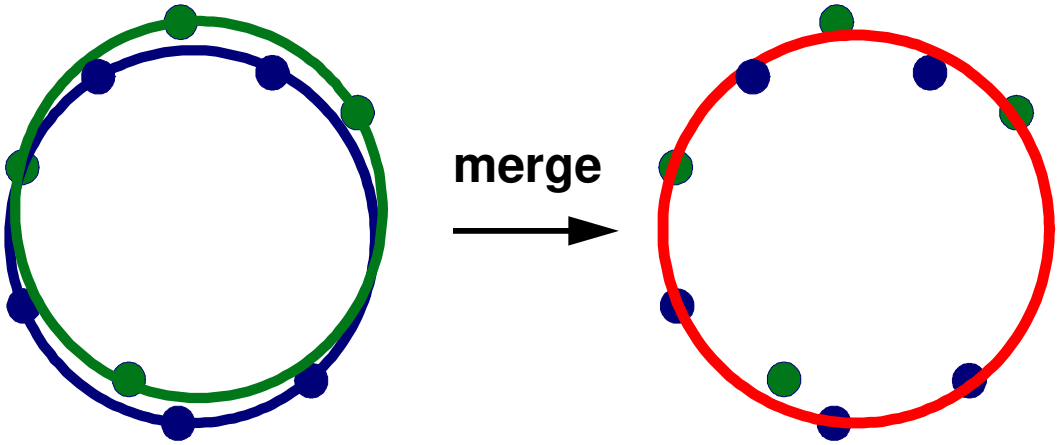
Pattern Recognition Algorithm

After this procedure, Hits for each Track may be fitted.

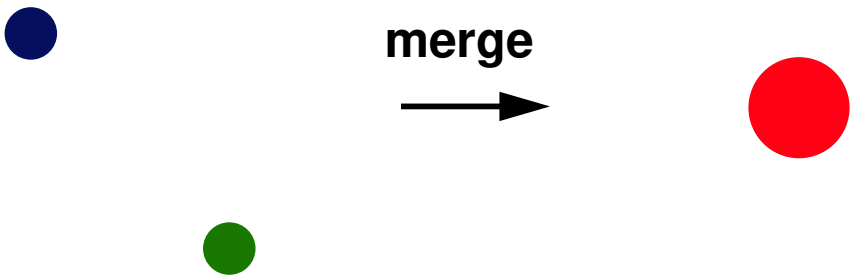
Opatrec

Track merging

real space:

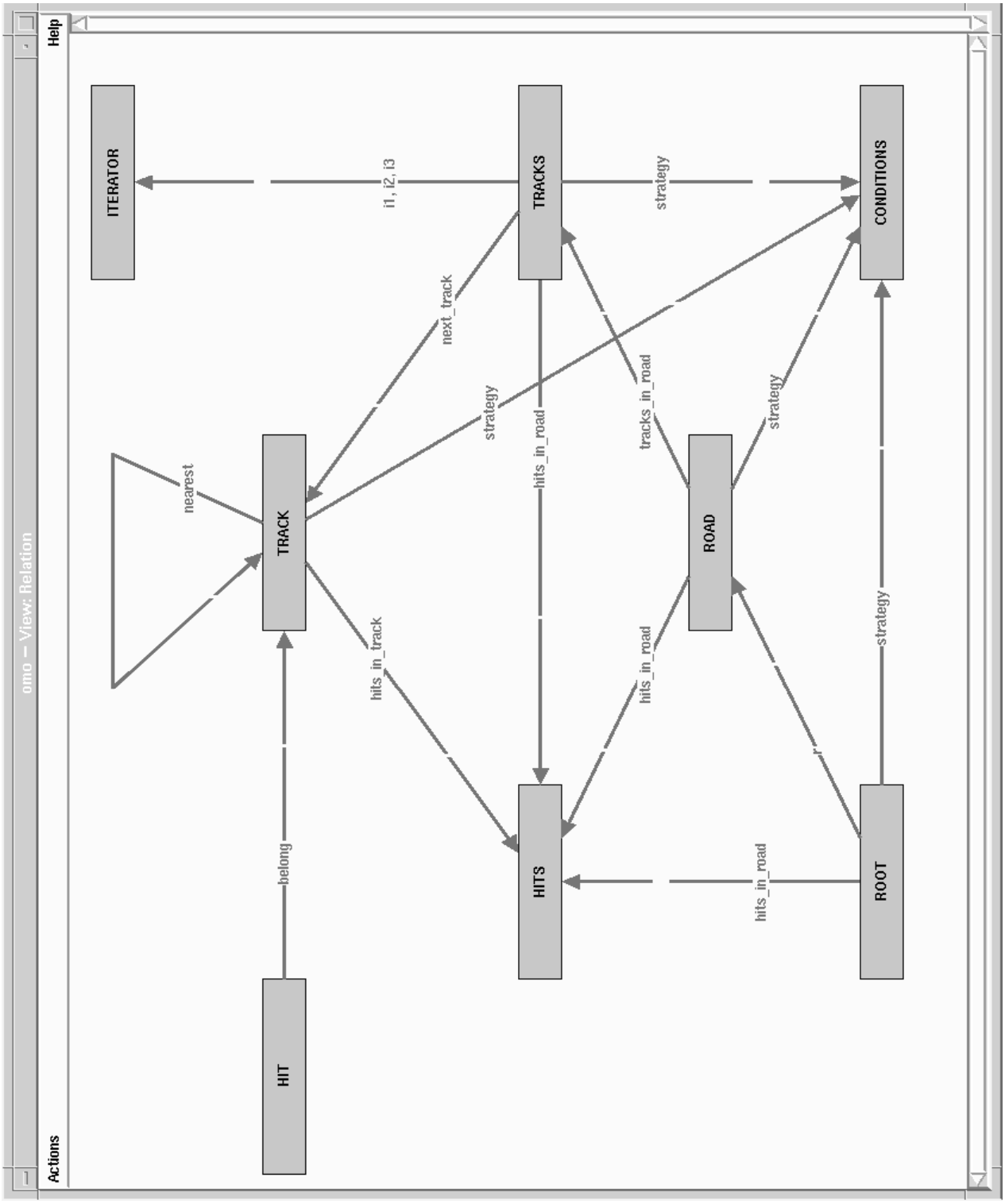


space of parameters:



Opatrec

Design



Opatrec

class ROOT

- go
- **define_road**
- print
- plot
- **hits_in_road:HITS**
- **r:ROAD**
- strategy:CONDITIONS

Opatrec

class CONDITIONS

- make(...)
- ...

Opatrec

class ROAD

- make(found_hits:HITS str:CONDITIONS)
- **find_tracks**
- print
- plot
- **hits_in_road:HITS**
- **tracks_in_road:TRACKS**
- strategy:CONDITIONS

Opatrec

class HIT

- make(x,y,z,r:REAL chck:INTEGER)
- **in_track(t:TRACK)**
- plot
- **belong:TRACK**
- x,y,z,r:REAL
- chck:INTEGER

Opatrec

class HITS

LIST[HIT]

- make
- **put(x,y,z,r:REAL t:INTEGER)**
- **puth(h:HIT)**
- print
- plot

Opatrec

class TRACK

- make(h:HITS s:CONDITIONS)
- **merge(t:TRACK)**
- **find_nearest(tracks_in_road:TRACKS): REAL**
- **get_parameters**
- print
- plot
- **hits_in_track:HITS**
- **nearest:TRACK**
- strategy:CONDITIONS
- r0,t0,x0,y0,z0,a0,w0:REAL

Opatrec

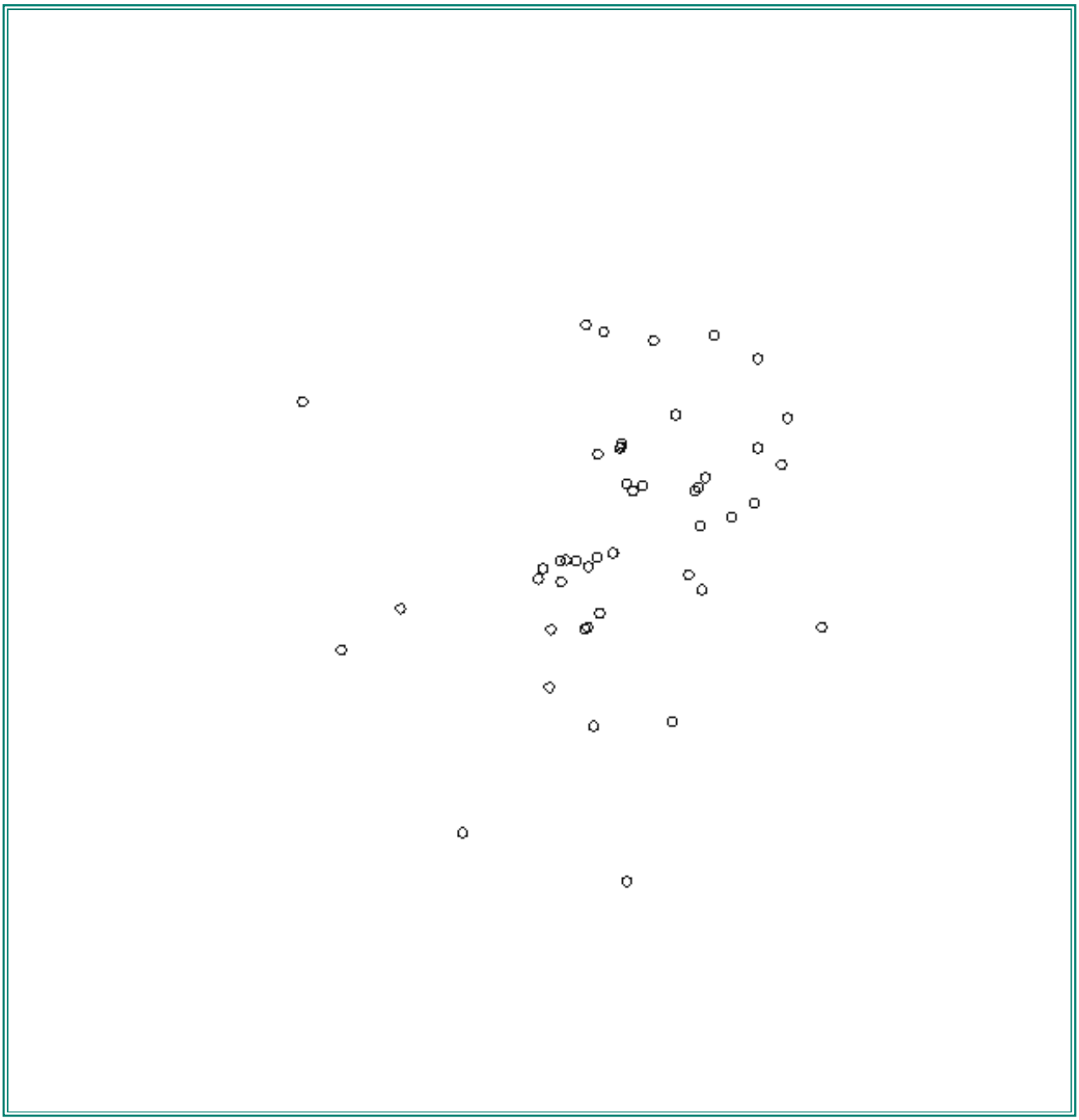
class TRACKS

LIST[TRACK]

- make(hir:HITS s:CONDITIONS)
- **find_next**
- print
- plot
- **next_track:TRACK**
- **hits_in_road:HITS**
- strategy:CONDITIONS
- i1,i2,i3:ITERATOR
- nomore:BOOLEAN

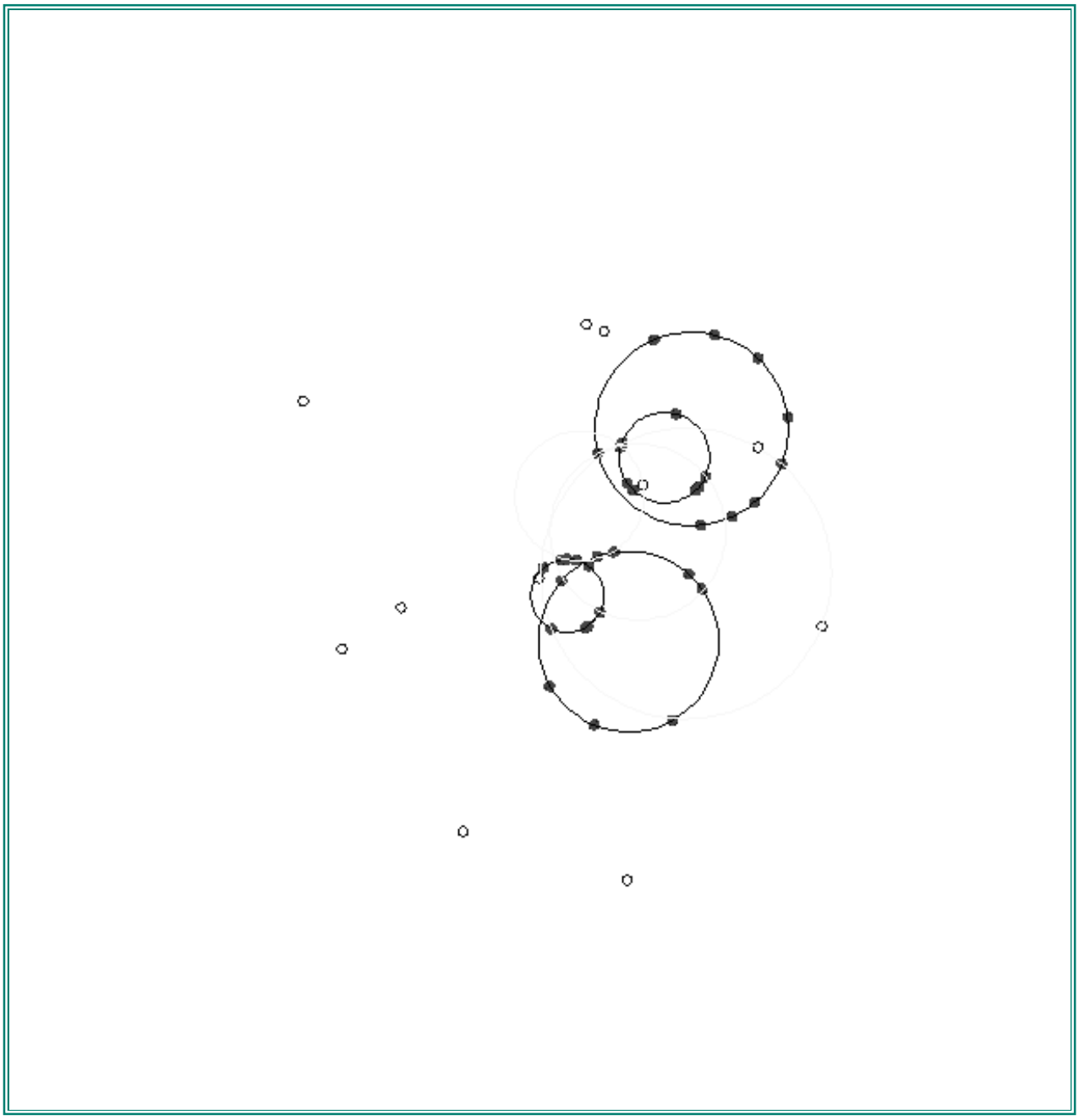
Opatrec

Artificial Hits Before Processing



Opatrec

Artificial Hits After Processing



Opatrec

Future Plans

- Clean the code.
  - » “Once” methods.
  - » I/O
- R*z-line constrain.
- Implement better clustering algorithm.
- Add Assertions.
- Merge into *Prototype II*.
- Do for spirals.
- Do for general curves (via ANN).