

Real Time Identification in Crowds

J L Gouws¹

Supervisor: Mr. J Connan¹

¹Rhodes University

28 March 2022

Predator[1]



Predator [1]

Why the TLD approach?



Why the TLD approach?

✦ Fast and Lightweight



Why the TLD approach?

- ✦ Fast and Lightweight

- ✦ No prior “training”

- ✦

Why the TLD approach?

- ✦ Fast and Lightweight
- ✦ No prior “training”
- ✦ Learns quickly
- ✦

Why the TLD approach?

- ✦ Fast and Lightweight
- ✦ No prior “training”
- ✦ Learns quickly
- ✦ Synergy with recognition
- ✦

Why the TLD approach?

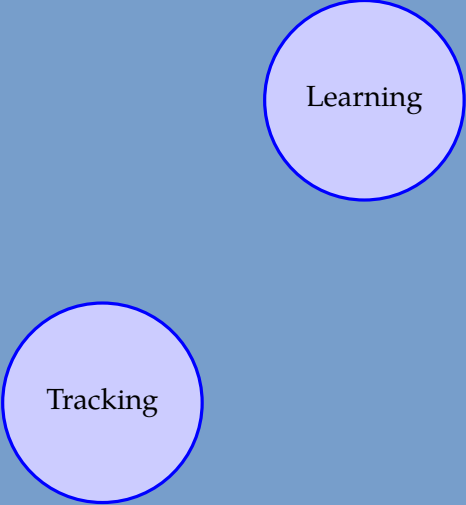
- ✦ Fast and Lightweight
- ✦ No prior “training”
- ✦ Learns quickly
- ✦ Synergy with recognition
- ✦ Generic

TLD Approach[2]



Tracking

TLD Approach[2]

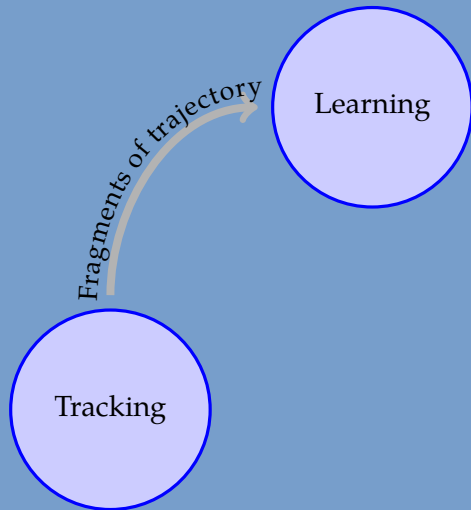


Learning

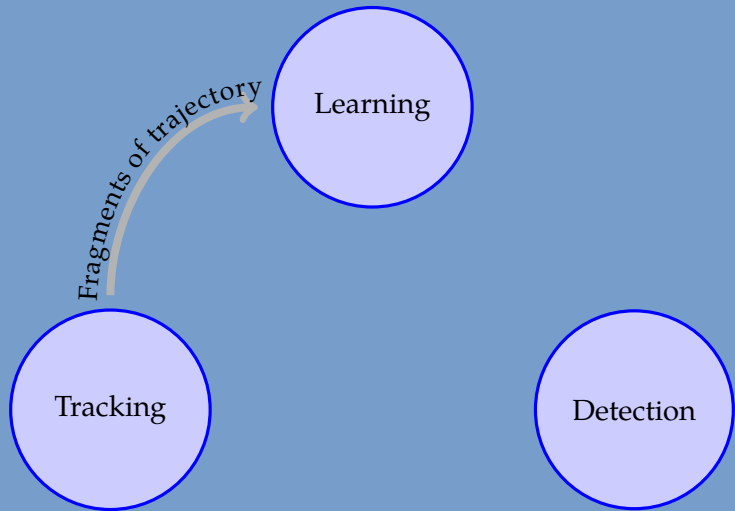
The diagram consists of two light purple circles with dark blue outlines. One circle is positioned in the upper right quadrant and contains the word 'Learning'. The other circle is positioned in the lower left quadrant and contains the word 'Tracking'.

Tracking

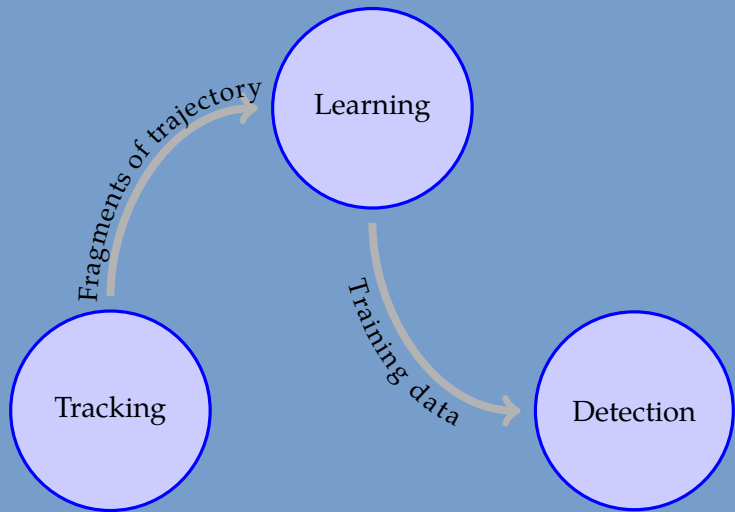
TLD Approach[2]



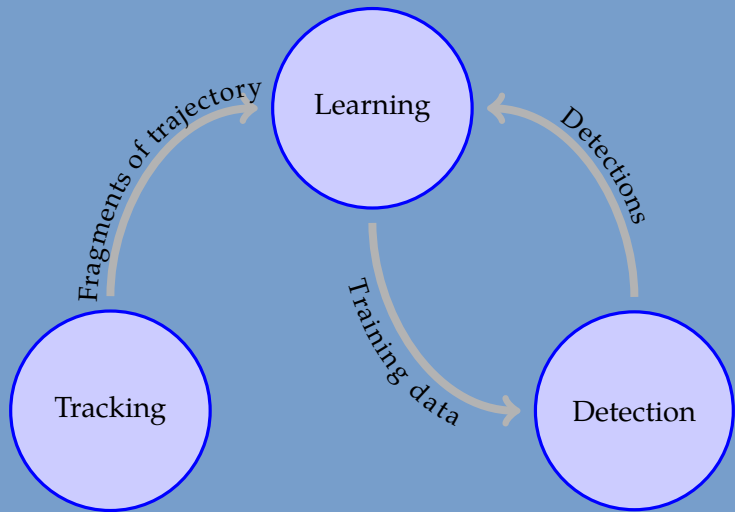
TLD Approach[2]



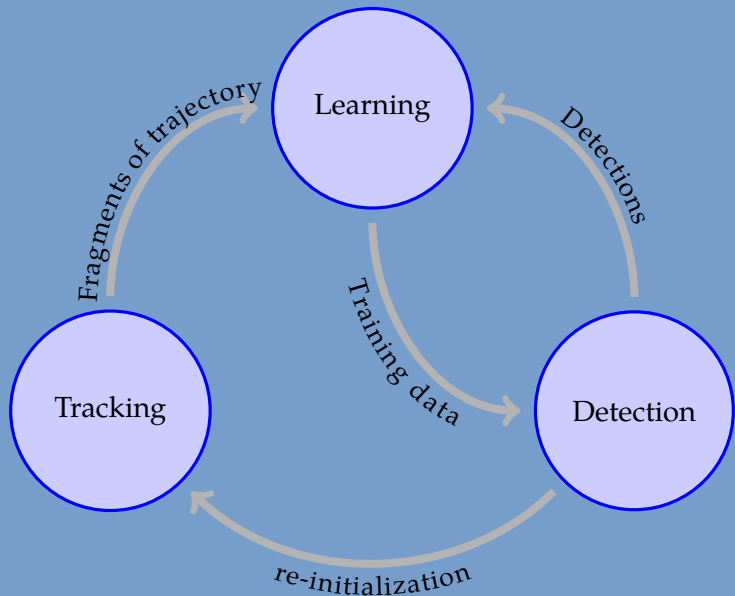
TLD Approach[2]



TLD Approach[2]



TLD Approach[2]



Improvements to Predator



Improvements to Predator

- ✠ Relatively bad tracking algorithm



Improvements to Predator

- ✦ Relatively bad tracking algorithm
- ✦ Kernelized Correlation Filters [3]
- ✦

Improvements to Predator

✦ Relatively bad tracking algorithm

✦ Kernelized Correlation Filters [3]



Algorithm	feature	Mean precision	Mean FPS
KCF	HOG ¹	73.2%	172
KCF	Raw pixels	56.0%	154
TLD		60.8%	28



¹Histogram of Oriented Gradients

Improvements to Predator

✚ Relatively bad tracking algorithm

✚ Kernelized Correlation Filters [3]



Algorithm	feature	Mean precision	Mean FPS
KCF	HOG ¹	73.2%	172
KCF	Raw pixels	56.0%	154
TLD		60.8%	28

✚ Better Learning Models

¹Histogram of Oriented Gradients


Further applications

Further applications




Class
Register?

Further applications


A red, cloud-like shape with a double outline, containing the text "Class Register?".

Class
Register?


A blue, cloud-like shape with a double outline, containing the text "Assitive technologies?".

Assitive
technologies?


Further applications



Class
Register?




Assitive
technologies?




Airport
security?


Further applications




Class
Register?



Monotoring
animals?



Assitive
technologies?



Airport
security?

Further applications

Class
Register?

...?

Monotoring
animals?

Assitive
technologies?

Airport
security?

Deliverables



Deliverables



Deliverables

- ✚ Full Implementation of Predator in C++
 - ◇ 3rd week of 2nd term

Deliverables

- ✦ Full Implementation of Predator in C++
 - ◇ 3rd week of 2nd term
- ✦ Integrating KCF into Predator
 - ◇ End of 2nd term

Deliverables

- ✦ Full Implementation of Predator in C++
 - ◇ 3rd week of 2nd term
- ✦ Integrating KCF into Predator
 - ◇ End of 2nd term

Deliverables

- ✦ Full Implementation of Predator in C++
 - ◇ 3rd week of 2nd term
- ✦ Integrating KCF into Predator
 - ◇ End of 2nd term
- ✦ Reviewing Implementation
 - ◇ 1st week of 2nd Semester

Deliverables

- ✦ Full Implementation of Predator in C++
 - ◇ 3rd week of 2nd term
- ✦ Integrating KCF into Predator
 - ◇ End of 2nd term
- ✦ Reviewing Implementation
 - ◇ 1st week of 2nd Semester

Deliverables

- ✦ Full Implementation of Predator in C++
 - ◇ 3rd week of 2nd term
- ✦ Integrating KCF into Predator
 - ◇ End of 2nd term
- ✦ Reviewing Implementation
 - ◇ 1st week of 2nd Semester
- ✦ Improving Implementation
 - ◇ 2nd week of 2nd Semester

Deliverables

- ✦ Full Implementation of Predator in C++
 - ◇ 3rd week of 2nd term
- ✦ Integrating KCF into Predator
 - ◇ End of 2nd term
- ✦ Reviewing Implementation
 - ◇ 1st week of 2nd Semester
- ✦ Improving Implementation
 - ◇ 2nd week of 2nd Semester

Deliverables

- ✦ Full Implementation of Predator in C++
 - ◇ 3rd week of 2nd term
- ✦ Integrating KCF into Predator
 - ◇ End of 2nd term
- ✦ Reviewing Implementation
 - ◇ 1st week of 2nd Semester
- ✦ Improving Implementation
 - ◇ 2nd week of 2nd Semester
- ✦ Extension to Multiple Object Tracking
 - ◇ Beginning of 4th Term

References

- [1] Z. Kalal, “Predator - tracker that learns and improves,” Youtube. (2011), [Online]. Available: <https://www.youtube.com/watch?v=1GhNXHCQGSM>.
- [2] Z. Kalal, K. Mikolajczyk, and J. Matas, “Tracking-learning-detection,” *IEEE transactions on pattern analysis and machine intelligence*, vol. 34, pp. 1409–1422, 7 2011.
- [3] J. F. Henriques, R. Caseiro, P. Martins, and J. Batista, “High-speed tracking with kernelized correlation filters,” *IEEE transactions on pattern analysis and machine intelligence*, vol. 37, pp. 583–596, 3 2014.