## Final Project Presentation Guidelines

Kuan Fang CS231A 03/16/2018

## Logistics

- Time:
  - 03/19/2018, 12:30 pm 2:30 pm
- Place:
  - Room 1: Oshman 125, Sign up sheet
  - Room 2: 450 Serra Mall, 300-300, Sign up sheet
- Format:
  - 3.5 minutes (3 minutes talk + 0.5 minute QA)
- Submission:
  - The deadline to change your slides or send your taped videos for SCPD students is 03/18/2018 at 5:00 pm.
  - The deadline of the final report is 03/22/2018 at 11:59pm.

## Grading

Project Proposal: 1%

Project Milestone: 5%

Final Project Report: 25%

Final Project Presentation: 7%

#### Caveats

- Please submit your slides on time. We will disable the editing by the deadline.
- Please do not change the order of or modify the slides of any other group.
- Only SCPD students are allowed to tape the video unless explicitly approved by the head TA.

#### **Presentation Contents**

- Problem Definition and Motivation
  - What is the problem you are trying to solve? How is it related to the course material? What is your goal? What is the challenges in this problem?
- Previous Works (Optional)
  - How do previous people solve this problem? What are their limitations?
- Technical Details
  - Highlight your main technical contributions. 3 minutes is too little for detailed math.
- Experiments
  - o Experimental setup. Quantitative results. Qualitative results. Other expected results.
- Conclusion (Optional)

## Tips for the Presentation

## 1. Make a Storyline.



## 2. Highlight Your Contributions and Efforts.

Your presentation is an advertisement of your project.

People will read your report later for details.



### 3. A picture is worth a thousand words.

After all, we are doing a computer vision course...

Animated figure is even better.

n, and, andry, another, answer, any anyone, anything, anytime, appear, apple, are, area, arm, army, around, arrive, art, as, ask, at, ttack, aunf, autumn, away. baby, base, back, bad, bag, ball, bank, basket, bath, be, bean, bear, beautiful, beer, bed, bedroom, behave efore, begin, behind, bell, below, besides, best, better, between, big, bird, birth, birthday, bit, bite, black, bleed, block, blood, blow, blue oard, boat, body, boil, bone, book, border, born, borrow, both, bottle, bottom, bowl, box, boy, branch, brave, bread, break, breakfast, reathe, bridge, bright, bring, brother, brown, brush, build, burn, business, bus, busy, but, buy, by, cake, call, can, candle, cap, car, car are, careful, careless, carry, case, cat, catch, central, century, certain, chair, chance, change, chase, cheap, cheese, chicken, child, hildren, chocolate, choice, choose, circle, city, class, clever, clean, clear, climb, clock, cloth, clothes, cloud, cloudy, close, coffee, oat, coin, cold, collect, colour, comb, comfortable, common, compare, come, complete, computer, condition, continue, control, cook ool, copper, corn, corner, correct, cost, contain, count, country, course, cover, crash, cross, cry, cup, cupboard, cut. dance, angerous, dark, daughter, day, dead, decide, decrease, deep, deer, depend, desk, destroy, develop, die, different, difficult, dinner irection, dirty, discover, dish, direction, do, dog, door, double, down, draw, dream, dress, drink, drive, drop, dry, duck, dust, duty, each ar. early, earn, earth, east, easy, eat, education, effect, egg, eight, either, electric, elephant, else, empty, end, enemy, enjoy, enough, nter, equal, entrance, escape, even, evening, event, every, everyone, exact, everybody, examination, example, except, excited, xercise, expect, expensive, explain, extremely, eye, face, fact, fail, falls, family, famous, far, farm, father, fast, fault, fear, sed, feel, female, fever, few, fight, fill, film, find, fine, finger, finish, fire, first, fit, five, fix, flag, flat, float, floor, flour, flower, fly, fold, foo xol, foot, football, for, force, foreign, forest, forget, forgive, fork, form, fox, four, free, freedom, freeze, fresh, friend, friendly, from, front uit, full, fun, funny, furniture, further, future. game, garden, gate, general, gentleman, get, gift, give, glad, glass, go, goat, god, gold, ood, goodbye, grandfather, grandmother, grass, grave, great, green, grey, ground, group, grow, gun. hair, half, ha usband, hurt. 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August each see a land, left, in the collection is the land, leg, left, but, lock, jone, job. reasure, meat, medicine, men mental perition method middle, milk, milion have finute miss, mistake, mix, toment, money, morkey, mad moor man outside milk, milion have finute miss, mistake, mix, toment, money, morkey, mad moor man outside milk, milion have finute miss, miss mistake, mix, toment, money, morkey, mad moor man outside milk, milion have finute more more milion and milion milk, milion have finute more more milion method middle, milk, milion have finute miss, miss misstake, mix, toment, more milk, mix, milion have finute miss, miss miss miss misstake, mix, toment, more milion mix milion mix more milion milion mix more milion mix more milion mix more milion pen, opposite, or, orange, order, other, our, out, outside, over, own, page, pain, pain, pain, pan, paper, parent, park, part, partner, part ass, past, path, pay, peace, pen, pencil, people, pepper, per, perfect, period, person, petrol, photograph, piano, pick, picture, piece, pic in, pink, place, plane, plant, plastic, plate, play, please, pleased, plenty, pocket, point, poison, police, polite, pool, poor, popular, osition, possible, potato, pour, power, present, press, pretty, prevent, price, prison, private, prize, probably, problem, produce romise, proper, protect, provide, public, pull, punish, pupil, push, put, queen, question, quick, quiet, quite, radio, rain, rainy, raise, reac and ready real really receive record red remember remind remove rent repair repeat reply report rest restaurant result aturn, rice, rich, ride, right, ring, rise, road, rob, rock, room, round, rubber, rude, rule, rule, run, rush, sad, safe, sail, salt, same, sand, ave say school science scissors search seat second see seem sell send sentence serve seven several sex shade shado hake shape share sharp she sheep sheet shelf shine ship shirt shoe shoot shop short should shoulder shout show sick. ide, signal, silence, silly, silver, similar, simple, single, since, sing, sink, sister, sit, six, size, skill, skin, skirt, sky, sleep, slip, slow, moke, small, smell, smile, smoke, snow, so, soap, sock, soft, some, someone, something, sometimes, son, soon, sorry, sound, soup outh, space, speak, special, speed, spell, spend, spoon, sport, spread, spring, square, stamp, stand, star, start, station, stay, steal, team, step, still, stomach, stone, stop, store, storm, story, strange, street, strong, structure, student, study, stupid, subject, substance uccessful, such, sudden, sugar, suitable, summer, sun, sunny, support, sure, surprise, sweet, swim, sword. table, take, talk, tall, tasti ixi, tea, teach, team, tear, telephone, television, tell, ten, tennis, terrible, test, than, that, the, their, then, there, therefore, these, thick, in thing think third this though threat three tidy lie title to today toe together tomorrow tonight too tool tooth top total such town train tram travel free trouble true trust twice try turn type uncle under understand unit until up use useful usua sually vegetable very village voice visit wait wake walk want warm wash waste watch water way we weak wear weather edding week weight welcome well west wet what wheel when where which while white who why wide wife wild will win ind window wine winter wire wise wish with without woman wonder word work world worry worst write wrong year yes.

#### 4. Less is More.

If you are not talk about a figure/text, remove it from your slides.

Only make 3~6 slides.



#### 5. Practice.

Rehearse in front of your partners/friends.

Measure your time.

Record your voice.



# Recurrent Autoregressive Networks for Online Multi-Object Tracking

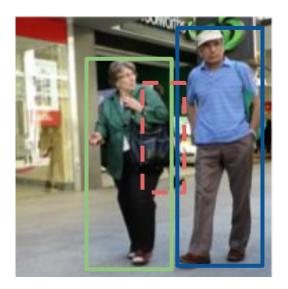
Kuan Fang, Yu Xiang, Xiaocheng Li, Silvio Savarese Stanford University

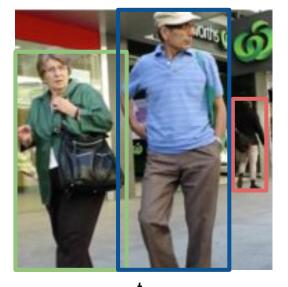


## Online Multi-Object Tracking

**Goal**: Reliably associate object trajectories with detections in each video frame based on their tracking history.





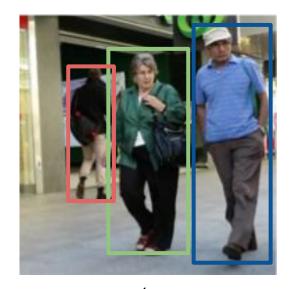


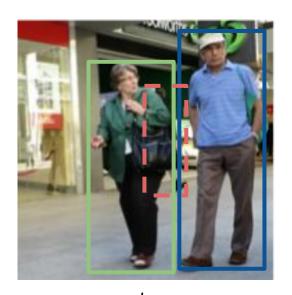
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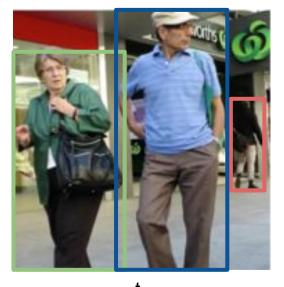
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## Challenges

- Handle occlusions and false alarms.
- Train a neural network model using only limited amount of labeled videos.



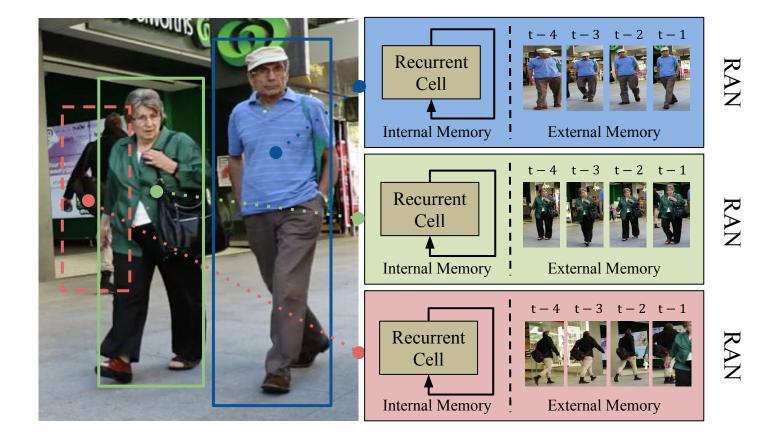




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## Internal Memory and External Memory



#### Quantitative Results on MOT Benchmarks

Method	Mode	MOTA(↑)	MOTP(↑)	$  IDS(\downarrow)$
CNNTCM	Batch	29.6	71.8	712
MHT_DAM	Batch	32.4	71.8	435
NOMT	Batch	33.7	71.9	442
SCEA	Online	29.1	71.1	604
MDP	Online	30.3	71.3	680
AMIR15	Online	37.6	71.7	1,026
Our Model (RAN)	Online	35.1	70.9	381

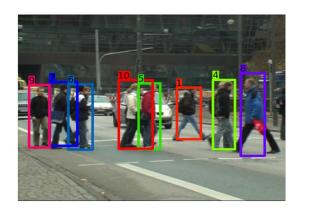
Method	Mode	MOTA(↑)	MOTP(↑)	$  IDS(\downarrow)$
JMC	Batch	46.3	75.7	657
NOMT	Batch	46.4	76.6	359
NLLMPa	Batch	47.6	78.5	629
EAMTT	Online	38.8	75.1	965
oICF	Online	43.2	74.3	381
Our Model (RAN)	Online	45.9	74.8	648

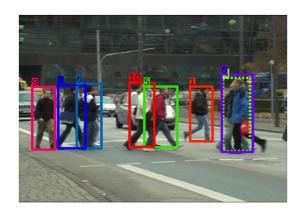
Tracking performance on MOT2015 benchmark.

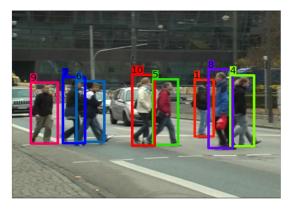
Tracking performance on MOT2016 benchmark.

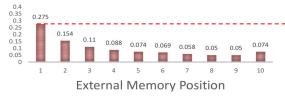
## Adaptive Autoregressive Weights Estimated by RAN

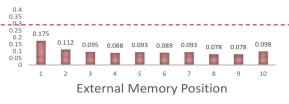
The estimated parameters of object 8

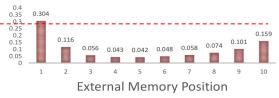












#### Conclusions

- A novel multi-object tracking pipeline using neural networks.
- A data efficient network architecture using internal and external memories.
- Outperforms previous methods on the MOT benmarks.