Intelligent Systems (AI-2)

Computer Science cpsc422, Lecture 1

Sept, 7, 2016

People

Instructor

- **Giuseppe Carenini** (carenini@cs.ubc.ca; office CICSR 105)

Natural Language Processing, Summarization, Preference Elicitation, Explanation, Adaptive Visualization, Intelligent Interfaces……

Office hour: my office, ??

Teaching Assistant

Jordon Johnson jordon@cs.ubc.ca

Office hour: ICCS X237, for??

Emily Chen emily-404@hotmail.com

Office hour: ICCS X237, for??

Enamul Hoque Prince enamul.hoque.prince@gmail.co

Your UBC-AI Background

I took 322 Last Year

A. *yes* B. *no*

I took Machine Learning (340)

A. *yes* B. *no*

Course Essentials(1)

- **Course web-pages:**

  www.cs.ubc.ca/~carenini/TEACHING/CPSC422-16/index.html

  - This is where most information about the course will be posted, most handouts (e.g., slides) will be distributed, etc.
  - CHECK IT OFTEN! (draft already available)

- **Lectures**:
  - Cover basic notions and concepts known to be hard
  - I will try to post the slides in advance (by 8:30).
  - After class, I will post the same slides inked with the notes I have added in class.
  - Each lecture will end with a set of learning goals:

  Student can….

Course Essentials(2)

Textbook: Selected Chapters from

- **Artificial Intelligence**, 2nd Edition, by Poole, Mackworth. http://people.cs.ubc.ca/~poole/aibook/

Reference (if you want to buy a book in AI this is the one!)

- **Artificial Intelligence: A Modern Approach,** 3rd edition, by Russell and Norvig [book webpage on course webpage]

More readings on course webpage…..

Course Essentials(3)

Connect

piazza

- **Connect OR Piazza :** discussion board
  - Use the discussion board for questions about assignments, material covered in lecture, etc. That way others can learn from your questions and comments!
  - Use email for private questions (e.g., grade inquiries or health problems).

- **AIspace** : online tools for learning Artificial Intelligence
  http://aispace.org/
  - Under development here at UBC!
  - Already used in cpsc322

Course Elements

- **Practice Exercises:** 0%
- **Assignments:** 15%
- *Research Paper Questions & Summaries 10%*
- **Midterm:** 30%
- **Final:** 45%
- **Clickers** 3% bonus (1% participation + 2% correct answers)

If your final grade is >= 20% higher than your midterm grade:

- Midterm: 15% ⬇
- Final: 60% ⬆

Assignments

- **There will be five assignments in total**
  - Counting "assignment zero", which you'll get today (as a Google Form)
  - They will not necessarily be weighted equally

- **Group work** (same as 322)
  - code questions:
    - ✓ you can work with a partner
    - ✓ always hand in **your own piece of code** (stating who your partner was)
  - written questions:
    - ✓ you may discuss questions with other students
    - ✓ you may not look at or copy each other's written work
    - ✓ You may be asked to sign an honour code saying you've followed these rules

Assignments: Late Days (same as 322)

- **Hand in by 9AM on due day** (in class or on Connect)
- **You get four late days** ☺
  - to allow you the flexibility to manage unexpected issues
  - additional late days will not be granted except under truly exceptional circumstances
- **A day is defined as:** all or part of a 24–hour block of time beginning at 9 AM on the day an assignment is due
- Applicable to assignments 1– 4 **not applicable to assignment 0**, **midterm, final** !
- if you've used up all your late days, **you lose 20% per day**

Missing Assignments / Midterm / Final

Hopefully late days will cover almost all the reasons you'll be late in submitting assignments.

- However, something more serious like an extended illness may occur ☹

- **For all such cases:** you'll need to provide a note from your doctor, psychiatrist, academic advisor, etc.
- **If you miss:**
  - **an assignment,** your score will be reweighted to exclude that assignment
  - **the midterm,** those grades will be shifted to the final.
  - **the final,** you'll have to write a make-up final as soon as possible.

How to Get Help?

- Use the course **discussion board** for questions on course material (so keep reading from it !)
- If you answer a challenging question you'll get **bonus points**! ☺

- Go to **office hours** (newsgroup is NOT a good substitute for this) – times will be finalized next week DOODLE on Connect
  - **Giuseppe:** **???** **(CICSR #105)**
  - **Jordon:** **???** **(X237)**
  - **Emily:** **???** **(X237)**

Can schedule by appointment if you can document a conflict with the official office hours

Getting Help from Other Students? From the Web? (Plagiarism)

- **It is OK to talk with your classmates about assignments; learning from each other is good**
- **But you must:**
  - Not copy from others (with or without the consent of the authors)
  - Write/present your work completely on your own (code questions exception)

- **If you use external source (e.g., Web)** in the assignments. Report this.

e.g., "bla bla bla…..." [wikipedia]

Getting Help from Other Sources? (Plagiarism)

When you are in doubt whether the line is crossed:

- Talk to me or the TA's
- See **UBC official regulations** on what constitutes plagiarism (pointer in course Web-page)
- Ignorance of the rules will not be a sufficient excuse for breaking them

Any unjustified cases will be **severely dealt with** **by the Dean's Office** (that's the official procedure)

- My advice: better to skip an assignment than to have "academic misconduct" recorded on your transcript and additional penalties as serious as expulsion from the university!

Clickers – Cheating

- **Use of another person's clicker**
- **Having someone use your clicker**

is considered **cheating** with the same policies applying as would be the case for turning in illicit written work.

To Summarize

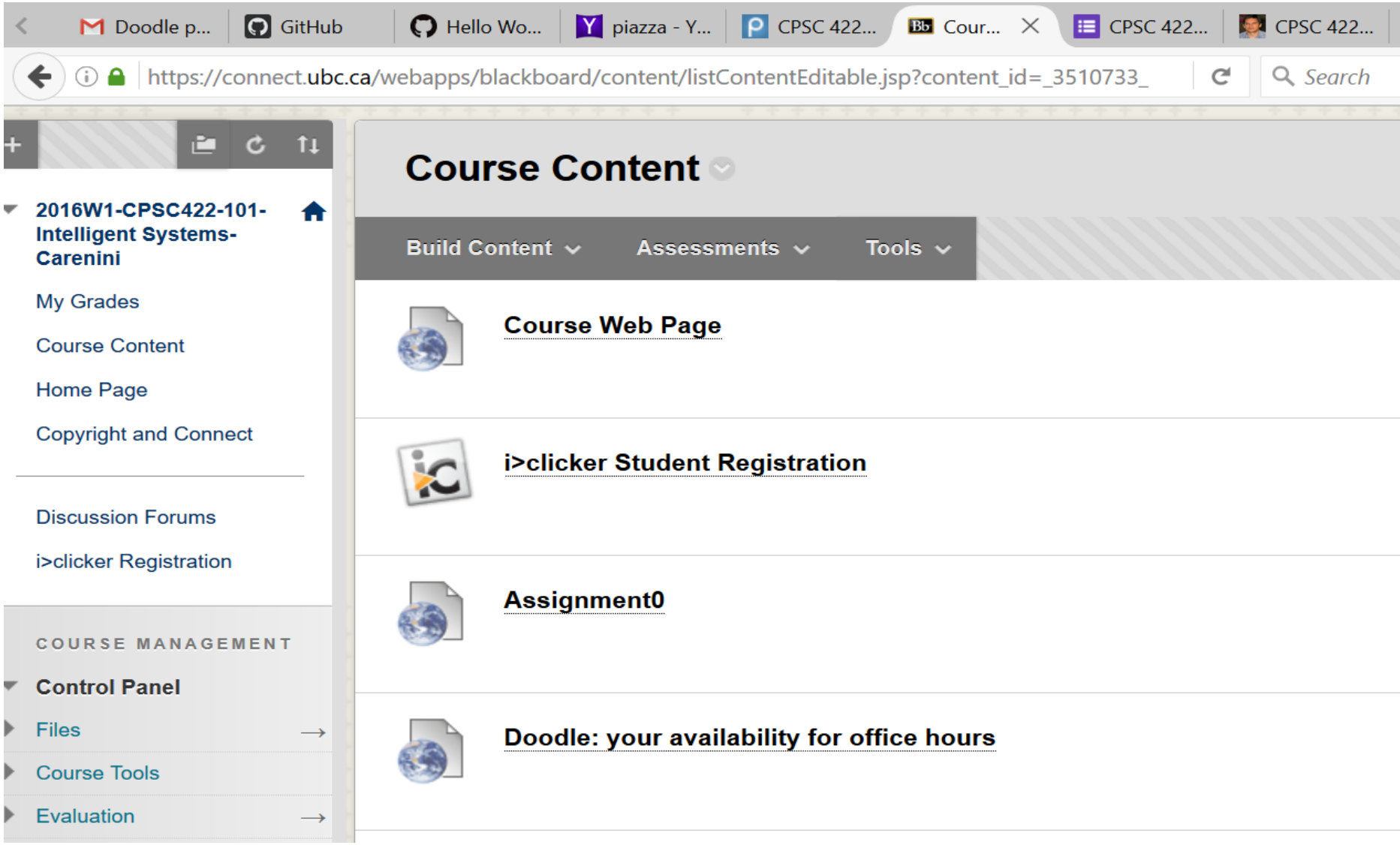
- All the course logistics are described in the course Webpage

www.cs.ubc.ca/~carenini/TEACHING/CPSC422-16/index.html

Or WebSearch: Giuseppe Carenini

(And summarized in these slides)

- Make sure you carefully read and understand them!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My Grades
Course Content
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COURSE MANAGEMENT
Control Panel
Files
Course Tools
Evaluation
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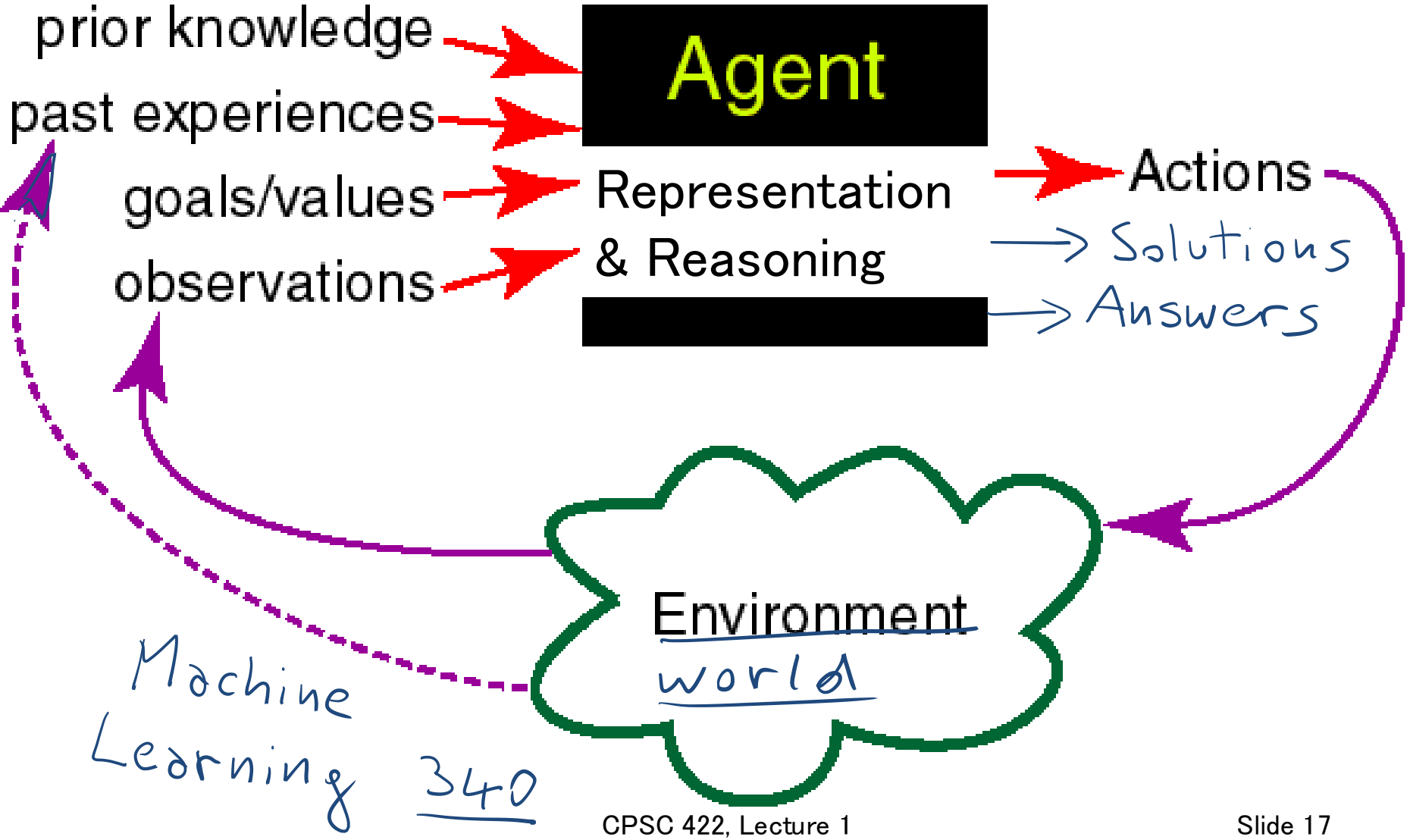
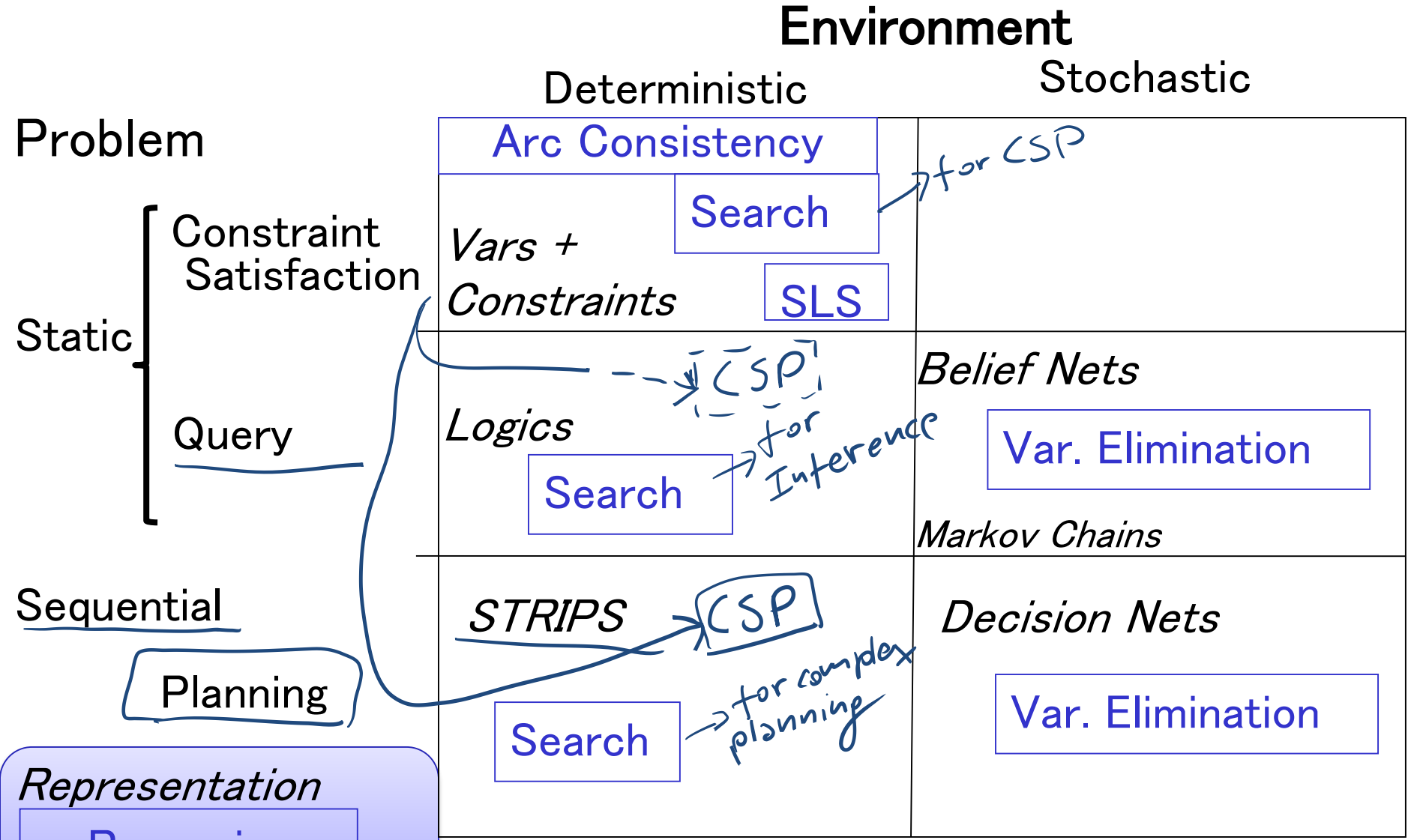
Assignment0
Doodle: your availability for office hours

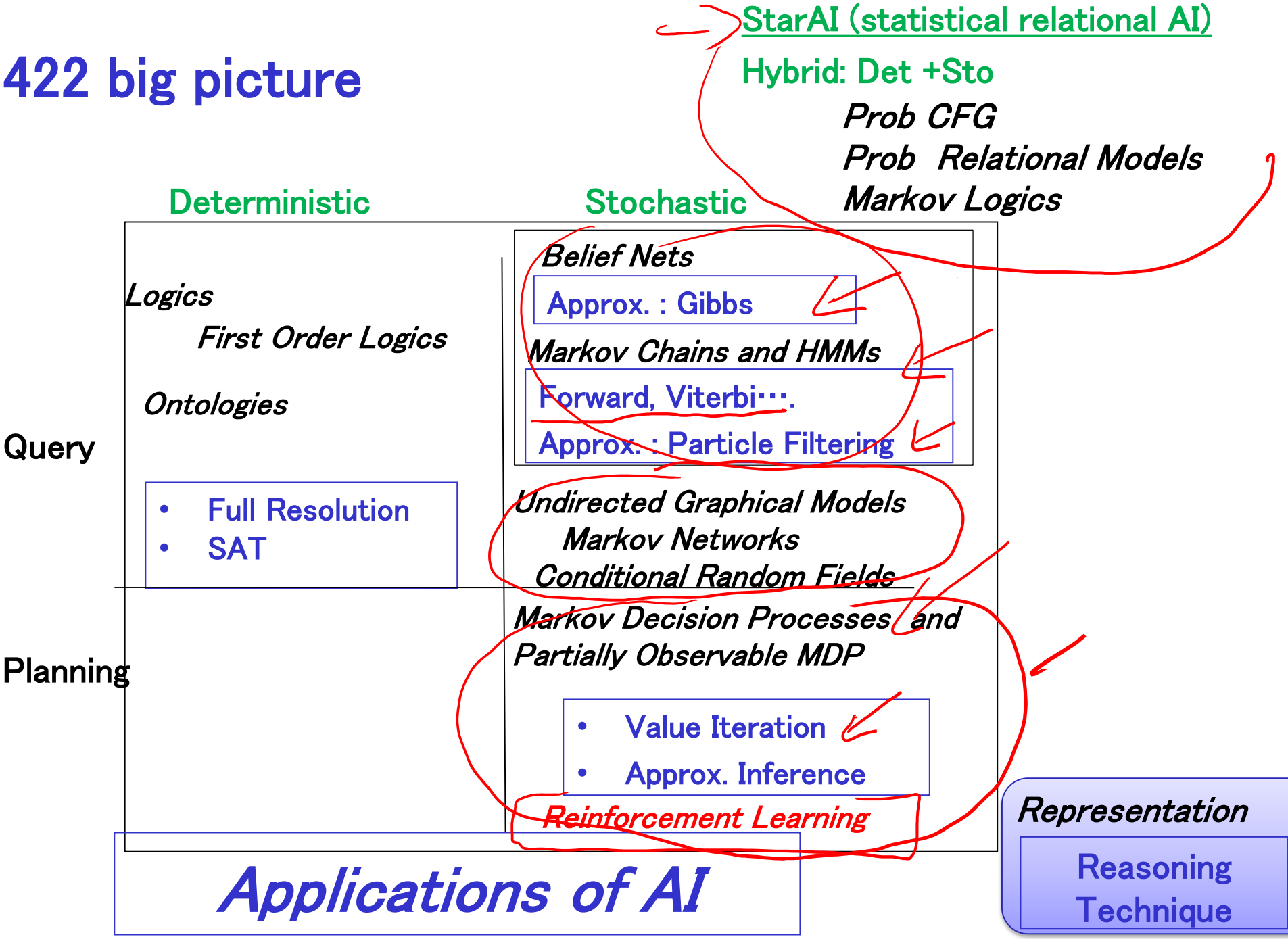
Agents acting in an environment



Cpsc 322 Big Picture



422 big picture



Datalog vs PDCL (better with colors)

First Order Logic

$\forall X \exists Y p(X,Y) \leftrightarrow \neg q(Y)$

$p(a_1, a_2)$

$\neg q(a_5)$

Propositional Logic

$\neg(p \vee q) \rightarrow (r \wedge s \wedge f)$,

p, r

Datalog

$p(X) \leftarrow q(X) \wedge r(X,Y)$

$r(X,Y) \leftarrow s(Y)$

$s(a_1), q(a_2)$

PDCL

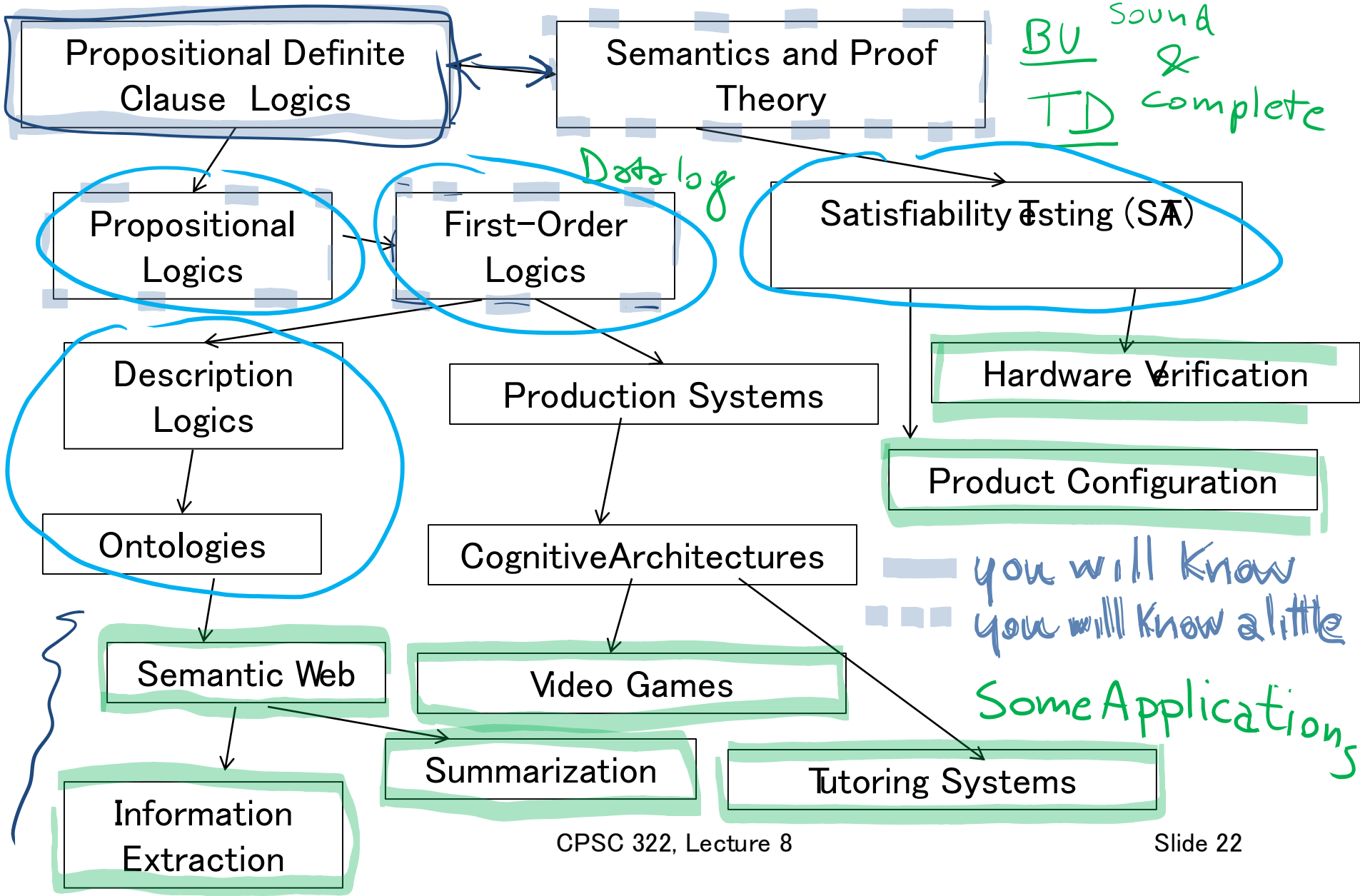
$p \leftarrow s \wedge f$

$r \leftarrow s \wedge q \wedge p$

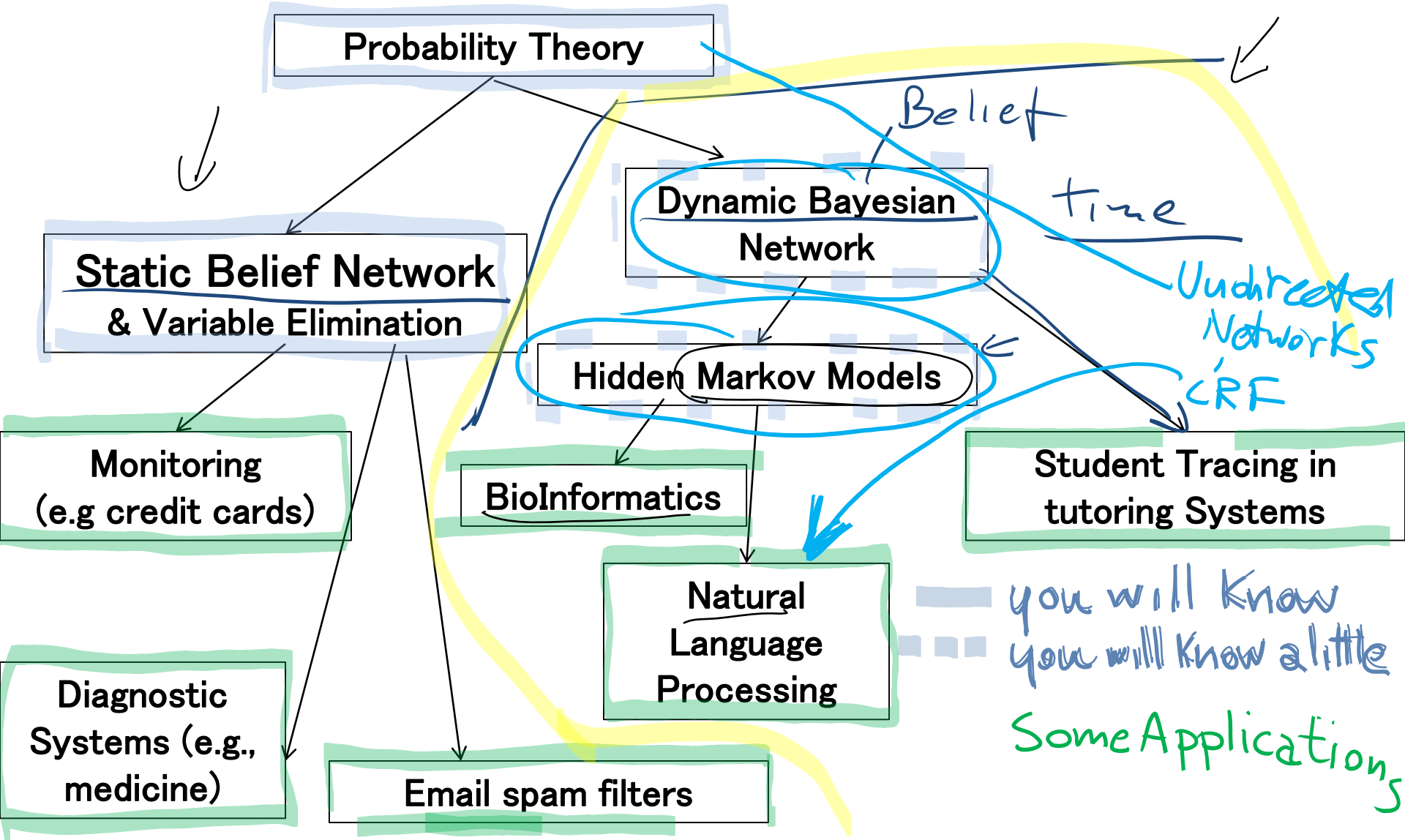
r

p

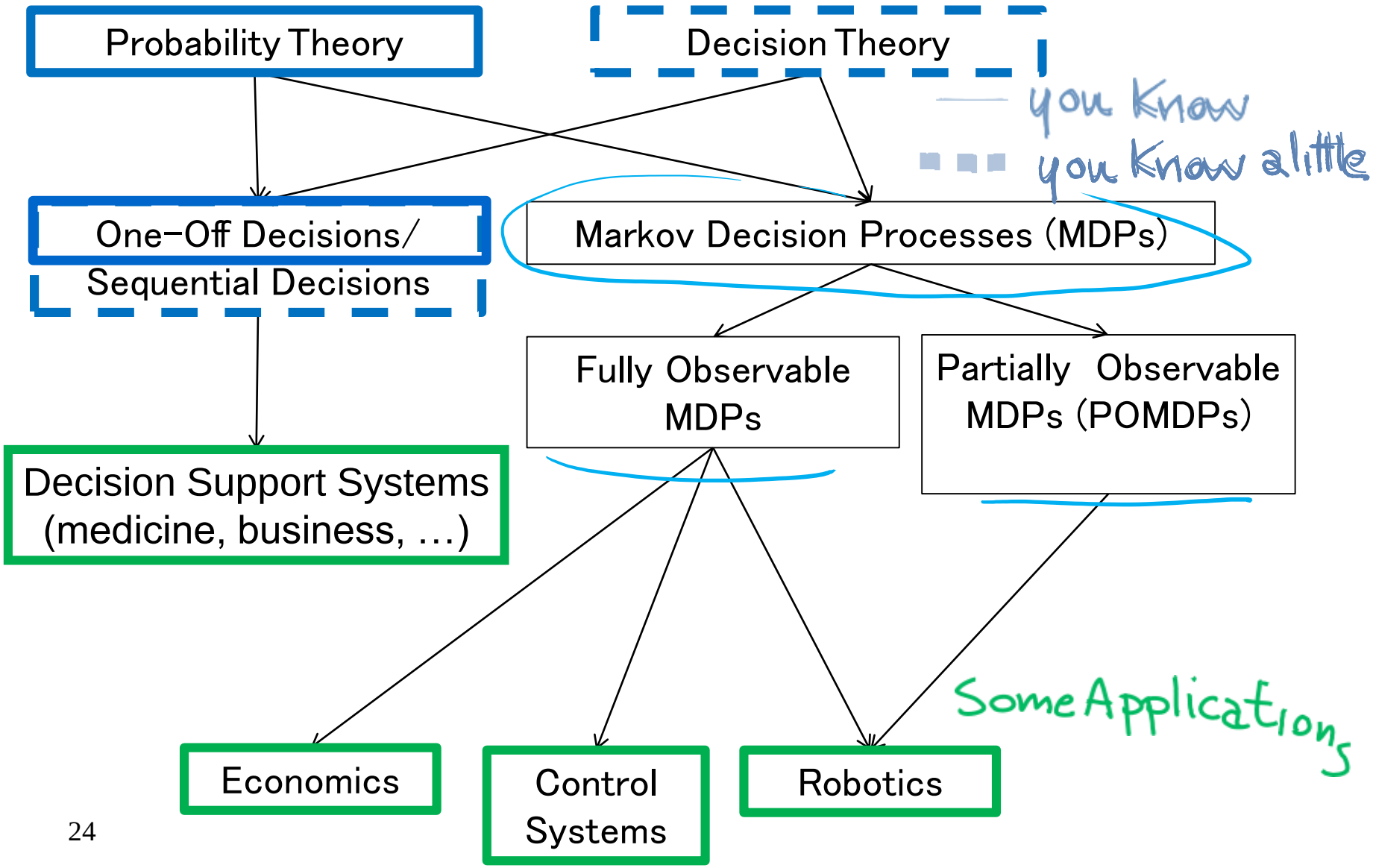
Logics in AI: Similar slide to the one for planning

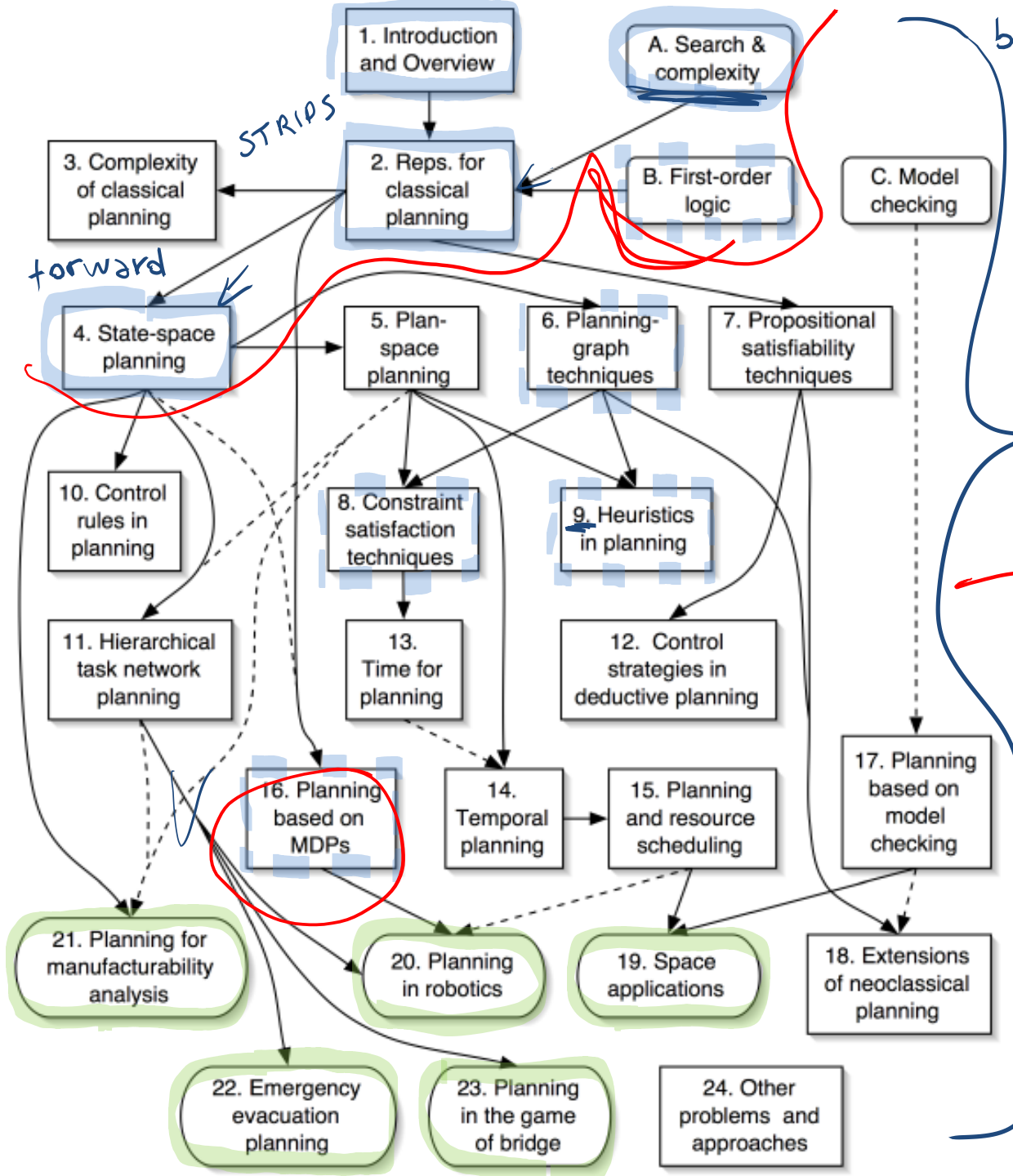


Answering Query under Uncertainty



Big Picture: Planning under Uncertainty





book chapters

No ☹, but you (will) know the key ideas ☺!

- Ghallab, Nau, and Traverso
  Automated Planning: Theory and Practice
  Morgan Kaufmann, May 2004
  New edition 2016 (Check!)
- Web site:
  - ✓ http://www.laas.fr/planning

you know

you know a little

Applications

422 big picture

StarAI (statistical relational AI)

Hybrid: Det +Sto

Prob CFG
Prob Relational Models
Markov Logics

Deterministic | Stochastic

Query

Logics
First Order Logics
Ontologies

- Full Resolution
- SAT

Belief Nets

Approx. : Gibbs

Markov Chains and HMMs

Forward, Viterbi….
Approx. : Particle Filtering

Undirected Graphical Models
Markov Networks
Conditional Random Fields

Planning

Markov Decision Processes and Partially Observable MDP

- Value Iteration
- Approx. Inference

Reinforcement Learning

Applications of AI

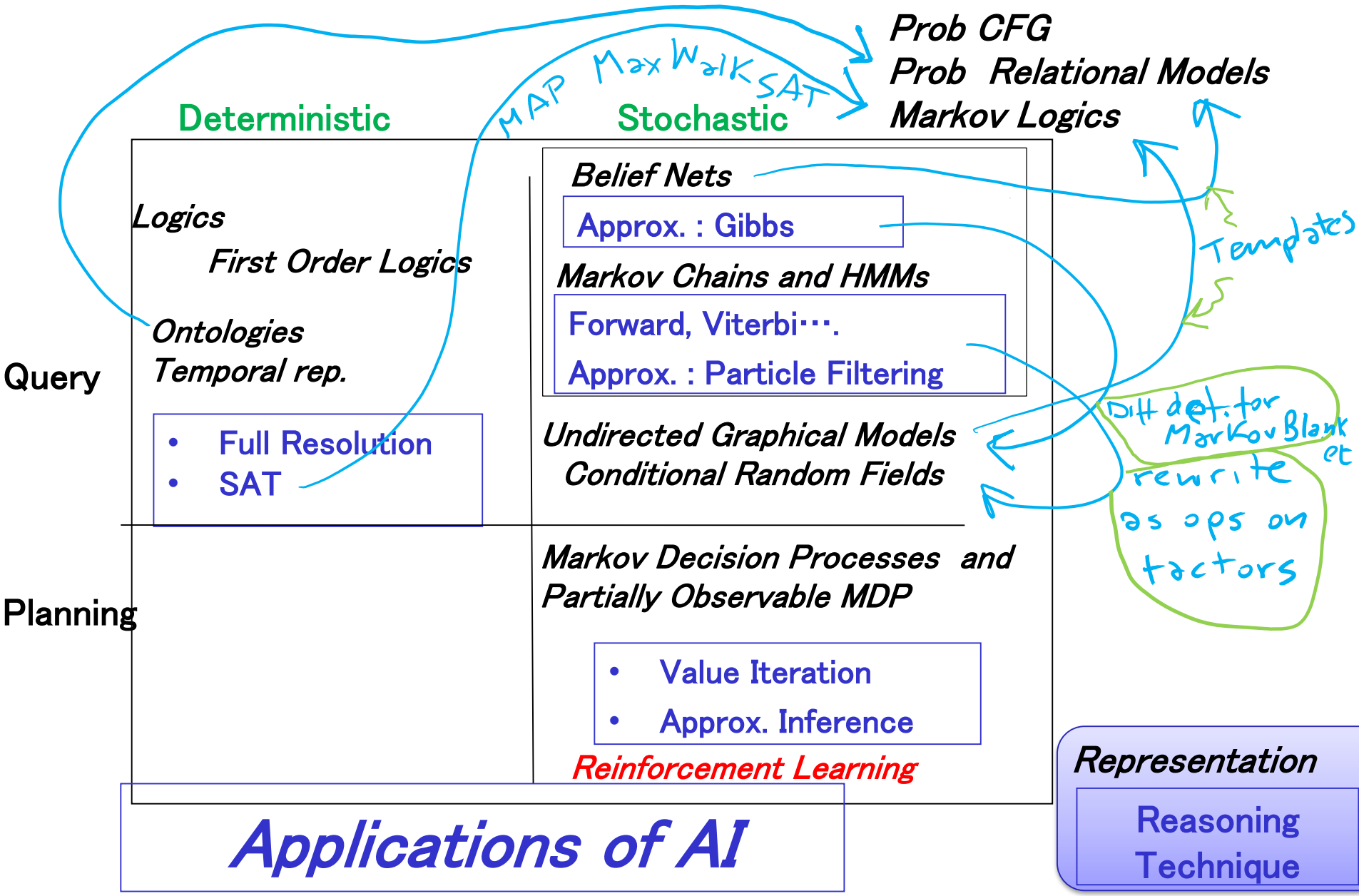
Representation

Reasoning Technique

422 big picture

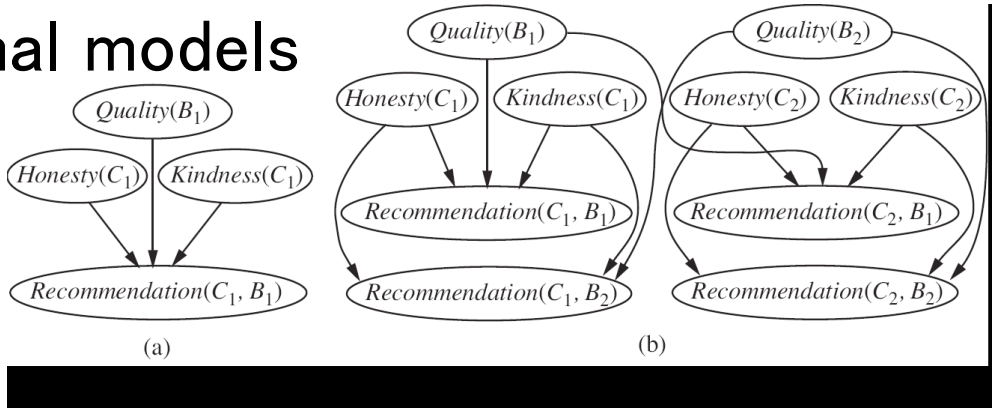
STAR AI (Statistical Relational)

Hybrid: Det +Sto



Combining Symbolic and Probabilistic R&R systems

- (a) Probabilistic Relational models
- Probs specified on relations

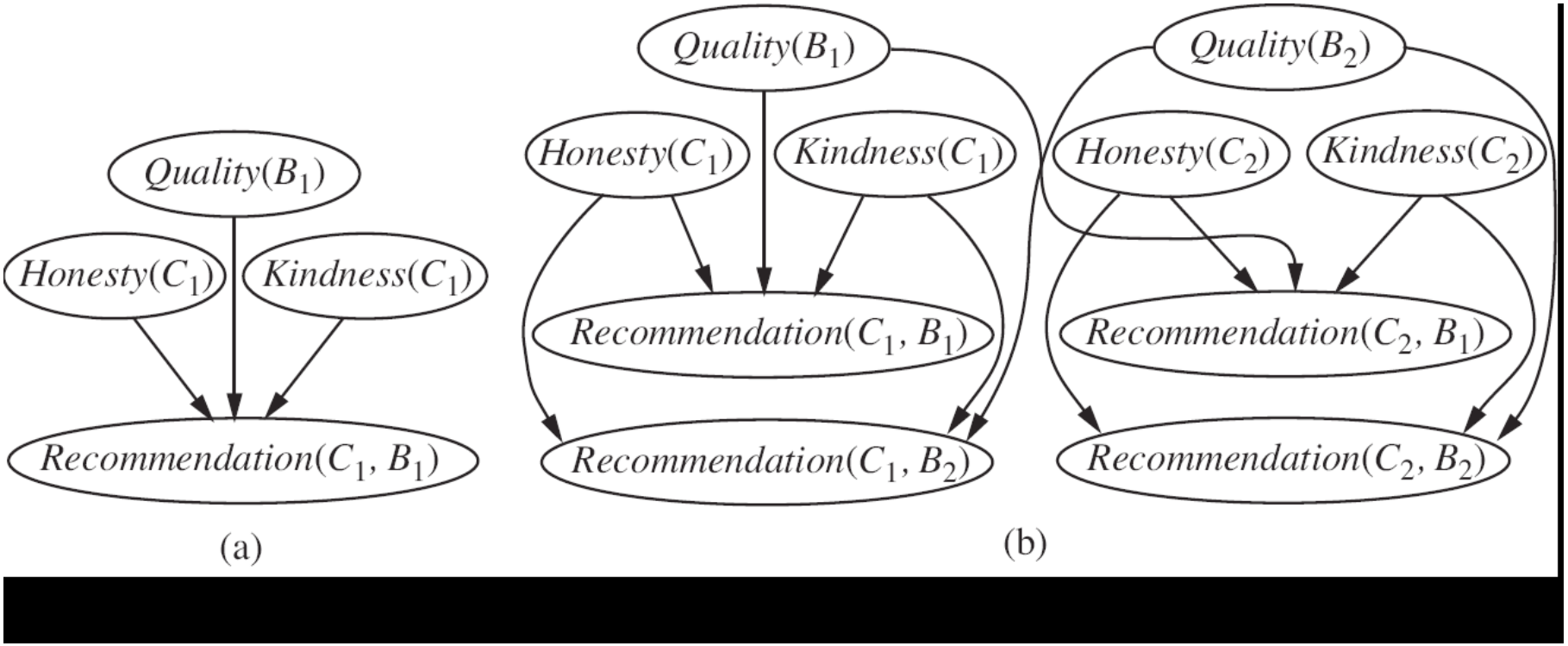


- (b) Markov Logics

$$P(\text{world}) \propto \exp\left(\sum \text{weights of formulas it satisfies}\right)$$

- (c) Probabilistic Context-Free Grammars
  - NLP parsing
  - Hierarchical Planning

(a) Example Prob. Relational models



A **customer** C will / will not *recommend* a **book** B depending On the book *quality*, and the customer *honesty* and *kindness*

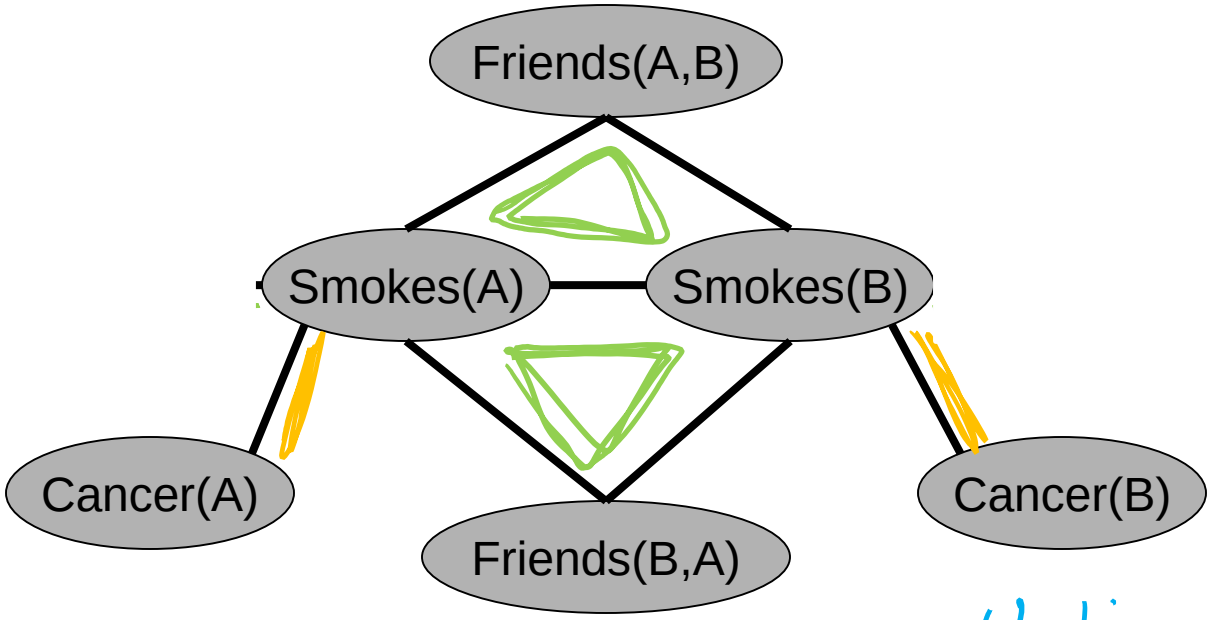
(b) Markov Logics

weights

FOL formulas

1.5	$\forall x\ Smokes(x) \Rightarrow Cancer(x)$
1.1	$\forall x, y\ Friends(x, y) \Rightarrow \big(Smokes(x) \Leftrightarrow Smokes(y)\big)$

Two constants: **Anna** (A) and **Bob** (B)



Undirected Graphical

In general, they represent feature templates for Markov Networks

Sample PCFG

$S \rightarrow NP\ VP$	[.80]	$Det \rightarrow that$ [.05] | the [.80] | a [.15]	
$S \rightarrow Aux\ NP\ VP$	[.15]	$Noun \rightarrow book$	[.10]
$S \rightarrow VP$	[.05]	$Noun \rightarrow flights$	[.50]
$NP \rightarrow Det\ Nom$	[.20]	$Noun \rightarrow meal$	[.40]
$NP \rightarrow Proper\text{-}Noun$	[.35]	$Verb \rightarrow book$	[.30]
$NP \rightarrow Nom$	[.05]	$Verb \rightarrow include$	[.30]
$NP \rightarrow Pronoun$	[.40]	$Verb \rightarrow want$	[.40]
$Nom \rightarrow Noun$	[.75]	$Aux \rightarrow can$	[.40]
$Nom \rightarrow Noun\ Nom$	[.20]	$Aux \rightarrow does$	[.30]
$Nom \rightarrow Proper\text{-}Noun\ Nom$	[.05]	$Aux \rightarrow do$	[.30]
$VP \rightarrow Verb$	[.55]	$Proper\text{-}Noun \rightarrow TWA$	[.40]
$VP \rightarrow Verb\ NP$	[.40]	$Proper\text{-}Noun \rightarrow Denver$	[.40]
$VP \rightarrow Verb\ NP\ NP$	[.05]	$Pronoun \rightarrow you$ [.40] | I [.60]	

TODO for this week

For Fri:

- Doodle on Connect: your availability for office hours
- Read textbook 9.4
- Read textbook 9.5
  - 9.5.1 Value of a Policy

For Mon:

- assignment0 – Google Form On Connect
- Read textbook
  - 9.5.2 Value of an Optimal Policy
  - 9.5.3 Value Iteration