Feb Log

February 2, 2021

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1.1 Chess

Remark 1. A blunder free game with weak positional moves:

`https://www.chess.com/analysis/game/live/6409740211?tab=analysis`

Remark 2. A complicated blunder filled game:

`https://www.chess.com/a/CbAJ8Wm4XAX8`

To Analyze:

1.2 Complex Analysis

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2.1 Chess

Remark 3. Talk about a clean game:

`https://www.chess.com/a/Gzp6PJxWXAX8`

Remark 4. My first brilliant move!:

`https://www.chess.com/a/2BfrDrz2JXAX8`

2.2 Technical Animation

Interesting 1. TA Arjun is interested in PDEs and numerical simulation.

Remark 5. Course Website:

`http://graphics.cs.cmu.edu/nsp/course/15464-s21/www/`

Computer Animation: Algorithms and Techniques is the course textbook. In drive.

Question 1. Does greater physical simulation accuarcy lead to a less palatable viewing experience?

Answer 1. Not sure but often directors will personify animations and we have different parameters to give differenter personfications. For example "angry storm".

Answer 2. It seems exaggerated motion is often more digestestible(think actors for example). Often used actors in motion capture

Interesting 2. Rig Net: automatically rigging meshes. Note: rigging is process of jointing meshes, providing structure/skeleton.

Remark 6. Beginning of rigging: find medial axis of geometry and impose some structure.

2.3 On Lp Brunn-Minkowski Type Inequalities

Tag: BrunnMinkowski

Remark 7. V is $1/n$ concave measure w.r.t Minkowsi sum. Need normalizing $1/n$ powers

Prop 1.

$$h_{K+L}(u) = h_K(u) + h_L(u)$$

Remark 8. **Brascamp-Lieb**

$\alpha \geq -1/n, t \in [0,1]$. With $f, g, h : \mathbb{R}^n \to \mathbb{R}_+$ satisfy

$h((1-t)x + ty) \geq [(1-t)f(x)^\alpha + tg(y)^\alpha]^{1/\alpha}$ then

$\int_{R^n} h(x)dx \geq [(1-t)(\int_{R^n} f(x)dx)^{\alpha/1+n\alpha} + t(\int_{R^n} g(x)dx)^{\alpha/1+n\alpha}]^{1+n\alpha/\alpha}$

Prekopa lindler is $\alpha = 0$

Prop 2.

$$(1-t)X_s 1_A \oplus_s tX_s 1_B = 1_{(1-t)A+tB}$$

Remark 9. Changing operator: minkwoski sum, to l_p variants.

Remark 10. Also some kind of interplay beteween functional inequalities and volume inequalities. Between supremal convolutions and Lp minkwoski sums.

2.4 PDEs and Data Analysis

TAG: OptimalTransport

Theme 1. The more assumptions you make on a measure the better approximation you can achieve

Interesting 3. Shimaa is interested in stochastic BDEs. Wes interested in foundations of machine learning.

Theme 2. Look at a measure as some kind of energy landscape and the transport map as the process of rearranging mass.

Remark 11. Often transportation cost is $|x-y|^p$.

Remark 12. Optimal transport minimizes transportation cost.

Theme 3. Goal is to find weaker problem which provides good solution to wider class of subproblems.

3 2/2

3.1 Goals

1. Chess: 1300 in blitz
2. Research: 3 hours worked, some progress, email tkocz
3. Thesis: 5 pages
4. Homework: Animation
5. Get glenn to agree to a time

3.2 DRL

TAG: DRL

Question 2. what is computational design?

Remark 13. Course link:

`https://cmudeeprl.github.io/403_website/`

Remark 14. Katerina F.

`"My genes have strong priors from the world"`

Remark 15. Inconsistent rewards lead to addiction.

Remark 16. For a long time large emphasis on discovering new behaiors in DRL. Now thinking we need to develop behavior repetoire and associate with some stimuli.

Remark 17. Curiosity, a desire to see new things, very intrinsically powerful.

Remark 18. Conor Igoe:

`For a fixed known opponent, the evolution of chess is markovian from the perspective of the ma`

In some cases(such as driving) we need multiple frames/time steps to even attempt to play. But this can also be redefined as markovian by letting states correspond to multiple time steps.

Remark 19. Model vs. non-model based. Can we learn via simulation or not.

Remark 20. Cannot use gradient based optimization often in DRL. We can if we have a model.

3.3 The Embodiment Hypothesis

Remark 21. Link:

`https://cogdev.sitehost.iu.edu/labwork/6_lessons.pdf`

Remark 22. The six lessons from child deveopment:

1. Be multimodal

3.4 Modeling Evolution

Remark 23. Selection or drift: tug of war between determinism and randomness.