15-859 Algorithms for Big Data Assignment 1

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1: Scratcy Scratch

$$T = \left\{(x, \sin\frac{1}{x}) : x \in (0,1]\right\} \cup \{(0,0)\}$$

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$$\left(\frac{1}{x}\right)$$

$$\left[\frac{1}{x}\right]$$

$$\left\{\frac{1}{x}\right\}$$

$$\left\|\frac{1}{x}\right\|$$

$$|\frac{1}{x}|$$

$$\left\|\frac{1}{x}\right\|$$

$$\left\lceil\frac{1}{x}\right\rceil$$

We denote the historical trajectory as $\tau=(s_1, a_1, \ldots, a_{t-1}, s_t)$ and action-observation history (AOH) for player i as $\tau^i=\left(\Omega^i\left(s_1\right), a_1, \ldots, a_{t-1}, \Omega^i\left(s_t\right)\right)$, which encodes the trajectory from player i 's point of view.

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$$X = (X_1, ..., X_n) \qquad \text{(using "...")}$$
$$X = (X_1, \ldots, X_n) \qquad \text{(using "\textbackslash dots")}$$

"Hello World!"

Problem: Show that if $(x_n)_n$ converges to x in the usual sense, then $\lim_{n\to\infty} x_n = \lim_{\mathcal{F}} x_n$.

Suppose that $(x_n)_n$ converges to x. We show that this x is also the $\mathcal{F}$-limit of $(x_n)_n$.

Proof. Take any ε. Then we know that for some large enough N, if $n \geq N$, then $x_n \in B_\varepsilon(x)$. Since every non-principal ultrafilter on $\mathbb{N}$ contains $\mathcal{F}_\infty$, then $\mathcal{F}$ also contains $\{n : n \geq N\}$, since the complement is finite. Therefore since filters are closed upwards, any sequence items x_n with $n < N$ that happen to fall in the ball around x, i.e, $x_n \in B_\varepsilon(x)$ is also contained in some filter element, so $\{n \in \mathbb{N} : |x_n - x| < \varepsilon\} \in \mathcal{F}$, as desired.

□

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$$P(X) = \int P(X \mid z; \theta) P(z) dz.$$

$$P(X) = \int xyz dx.$$

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1 A

Definition 1.1 (Using \mathbb)**.** A sequence $(x_n)_n : \mathbb{N} \to X$ is a Cauchy sequence if $\forall \varepsilon > 0, \exists N \in \mathbb{N}$ such that $\forall n, m \geq N$, $d(x_n, x_m) < \varepsilon$.

Definition 1.2 (Using \mathbbm)**.** A sequence $(x_n)_n : \mathbb{N} \to X$ is a Cauchy sequence if $\forall \varepsilon > 0, \exists N \in \mathbb{N}$ such that $\forall n, m \geq N$, $d(x_n, x_m) < \varepsilon$.