li r r for r soning on r n omi lgorithms in CO

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nu r 4 2

1 Intro tion

This libran f ms a basis f n neas nin n nand mised al nithms in the pn f assistant C Q [4]. The s un e files ane a ailable as a C q ntnibuti n (see http q.inria.fr).

As pn p sed b zen [1 2] we intenpnet pn babilisti pn nams as measune tnansf nmens; the n inalit f un appn a h is t iew this intenpnetati n as a m nadi tnansf nmati n n fun ti nal nams Usin this

2.2 eci cati n U

- C nstants 0 and 1
- C nstru t n Unt $n(\equiv \frac{1}{}$

T talt f the nden

Hypoth sis U q_d u n y U ¬ ¬ == y → == y.

Hypoth sis U _t ta y U (≤ y

3. .2 ropertie of

mma U _ $u\,t\_ri$ t y (× y ≤).

mma U _ $u\,t\_$ ft y (× y ≤ y).
Hint R s v U _ $u\,t\_ri$ t U _ $u\,t\_$ ft.

mma $Uinv\_$ _ r $\_ri$ t y U (≤ ([-] y)) → y ≤ ([-]).
Hint R s v $Uinv\_$ r

. Definiti n x^n

point U (U) (n nat) {$stru$ t n} U =
at n wit O (S) × U $nd.$

.9 Definiti n an erties $x\&y$

A nj n ti n perati n whi h in ides with min and mult n 0 and see M n an & M en

Hint R s v si a_in rR

mma$R$ _ _

R$R$$R$$R$$tRRRRR$R($R$

mma n_su n_s q U su .

Hint R s v n_su .

mma u _ $q\_$ us u $(fun$ n

aU y t a F330.522. 3 0.5.3Tf35.0TdTJF3.3Tf 0 .5 .5Td a y Uy3u L q_t at_ri t
(U (U u t ? ?y) (U u t ? ?)) a y U u t_ _ at_ ft
(U (U u t ? ?) (U u t ?y ?)) a y U u t_ _ at_ri t
(U (U u t ? ?) (U u t ? ?y)) s t id _r writ (U u t_sy y);
a y U u t_ _ at_ri t
(U (U u t ? ?y) (U u t ? ?)) s t id _r writ (U u t_sy y);
a y U u t
_ q_ at_ ft
(U q (U u t ? ?) (U u t ?y ?)) a y U u t_ q_ at_ri t
(U q (U u t ? ?) (U u t ? U u t ? ? (U q (U u t ? ?y) (U u t ? ?)) s t id
_ _ at_ri t
(U q (U u t ? ?y) (U u t ? ?)) a y U u t

.3.2 Expecte propertie of mea ure

D finition $n\ t\ ni$ (Ty) ( ) Dr =

. O erati ns n istri uti ns

D finition $\_distr$ (Ty) (2 $distr$) := f (u f) ≤ (u 2 f).

D finition q_distr (Ty) (2 $distr$) := f (u f) == (u 2 f).

mma $q\_distr\_$

Proc.V: Composition of Distribution

Required Export

[redacted]

7.1 Definiti [redacted]

$p \leq [e](q)$ is defined as p [redacted]

Definition k ([redacted]

Definition $kfun$ ([redacted]

$:=$ (k ( ) ([redacted]

7.2 ta ilit erties [redacted]

Lemma k

(Ty) (' U) ($distr$) (q ' $\rightarrow U$) [redacted]

' $\leq$ $\rightarrow$ q q' $\rightarrow$ k q $\rightarrow$ ' q' [redacted]

q q'

7.3.3 ule for con itional

$p_1 \leq [e_1]($

sin : → *n ist* *add* : → *n ist* → *n ist.*

D fin t on *d* (: *n ist*) : :=
at *wit* (*sin* *a*) *a* (*add a* _) *a* *nd.*

i point *a* (: *n ist*) {*stru t* } : *n ist* :=
at *wit* (*sin* *a*) *add a* (*add a*) *add a* (*a*) *nd.*

i point *r v_a* (: *n ist*) {*stru t* } : *n ist* :=
at *wit* (*sin* *a*) *add a* (*add a*) *r v_a* (*add a*) *nd.*

D fin t on *5.3Tf3.550T TJF3.3Tf2.0Tn istTJF 5.3Tf2 . 0 0Td333TJF3.3Tf .3 0Td TJt*

at *wit* (*sin* *a*)

11.2.1 Assumptions

We need extra properties on p_1, p_2 and $choice$.

- p_1 and p_2 terminate with probability 1
- Q values on

Hint R s v _ .

Lemma i