2013年3月1日
15:24

mss = maximum . sum* . segs

segs = concat . inits* . tails

sum = foldr (+) 0

maximum = foldr1 max

mss

= maximum . sum* . segs

= maximum . sum* . concat . inits* . tails

= maximum . concat . sum** . inits* . tails

= maximum . maximum* . sum** . inits* . tails

= maximum . (maximum . sum* . inits)* . tails

$$\sum_{i=0}^{n} \prod_{j=0}^{i-1} u_j = 1 + u_0 + u_0 u_1 + u_0 u_1 u_2 + \dots + u_0 u_1 \dots u_{n-1}$$

$$= 1 + u_0(1 + u_1(1 + u_2(1 + \dots + u_{n-1})))$$

sum . product* . inits = foldr (⊛) e where

e = 1

u ⊛ z = e + u × z

foldr1(⊕) . (foldr(⊗) e)* . inits = foldr(⊛) e where u ⊛ z = e ⊕ (u ⊗ z)

$a + \max b\ c = \max (a+b)\ (a+c)$

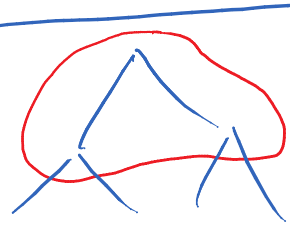
$T\alpha = \mu F\alpha$

$L\alpha = \mu G\alpha$ where $G\alpha\beta = \alpha \times F\,1\,\beta$

subterms :: $T\alpha \to L(T\alpha)$

scan :: $(F\alpha\beta \to \beta) \to T\alpha \to L\beta$

scan φ = fmap (fold φ) . subterms



$H\alpha\beta = 1 + F\alpha\beta$

$U\alpha = \mu H\alpha$

M monad

$k :: M\beta \to \beta$

mzero :: $M\alpha$

mplus :: $M\alpha \to M\alpha \to M\alpha$

return :: $\alpha \to M\alpha$

comp :: $(\beta \to M\gamma) \to (\alpha \to M\beta) \to (\alpha \to M\gamma)$

join :: $M(M\alpha) \to M\alpha$

join mzero = mzero

join (mplus x y) = mplus (join x) (join y)

$\alpha \to M\beta$

$k :: M\beta \to \beta$ $\qquad\qquad \oplus / e$

$k \cdot \mathrm{return} = \mathrm{id}$

$k \cdot \mathrm{join} = k \cdot \mathrm{liftM}\ k$

$k\ (\mathrm{mzero}) = e$

$k\ (\mathrm{mplus}\ x\ y) = k\, x \oplus k\, y$

$\mathrm{prune} :: T\alpha \to M\,(U\alpha)$

$\qquad :: \mu F\alpha \to M\,(\mu H\alpha)$

$\mathrm{prune} = \mathrm{fold}\ \varphi$

$\varphi :: F\alpha\,(M\,(U\alpha)) \to M\,(U\alpha)$

$\varphi = \mathrm{liftM}\ \mathrm{In}_H \cdot \mathrm{opt}\ \mathrm{Nothing} \cdot \mathrm{liftM}\ \mathrm{Just} \cdot \delta$

$\mathrm{opt}\ a\ x = \mathrm{return}\ a\ \text{`mplus`}\ x$

$\delta :: F\alpha\,(M\beta) \to M\,(F\alpha\beta)$

$\mathrm{contents} :: L\alpha \to M\alpha$

$\mathrm{gsegs} = \mathrm{join} \cdot \mathrm{liftM}\ \mathrm{prune} \cdot \mathrm{contents} \cdot \mathrm{subterms}$

$\varphi :: F\alpha\beta \to \beta$ $\qquad\qquad$ maybe φ b ::

$$\frac{\varphi :: F\,\alpha\,\beta \to \beta}{\mathit{fold}\ \varphi :: T\,\alpha \to \beta} \qquad \frac{\mathit{maybe}\ \varphi\ b :: (1 + F\,\alpha\,\beta) \to \beta}{\mathit{fold}\ (\mathit{maybe}\ \varphi\ b) :: U\,\alpha \to \beta}$$

$$\mathit{gmss} = \oplus/_e \cdot \mathit{liftM}\ (\mathit{fold}\ (\mathit{maybe}\ \varphi\ b)) \cdot \mathit{gsegs}$$

$$\begin{tikzcd}
F\,\alpha\,(M\,\beta) \arrow[r, "\delta"] \arrow[d, "\mathit{bimap}\ \mathit{id}\ (\oplus/_e)"'] & M\,(F\,\alpha\,\beta) \arrow[r, "\mathit{liftM}\ \varphi"] & M\,\beta \arrow[d, "\oplus/_e"] \\
F\,\alpha\,\beta \arrow[rr, "\varphi"'] & & \beta
\end{tikzcd}$$

then

$$\mathit{gmss} = \oplus/_e \cdot \mathit{contents} \cdot \mathit{scan}\ ((b\oplus) \cdot \varphi)$$
