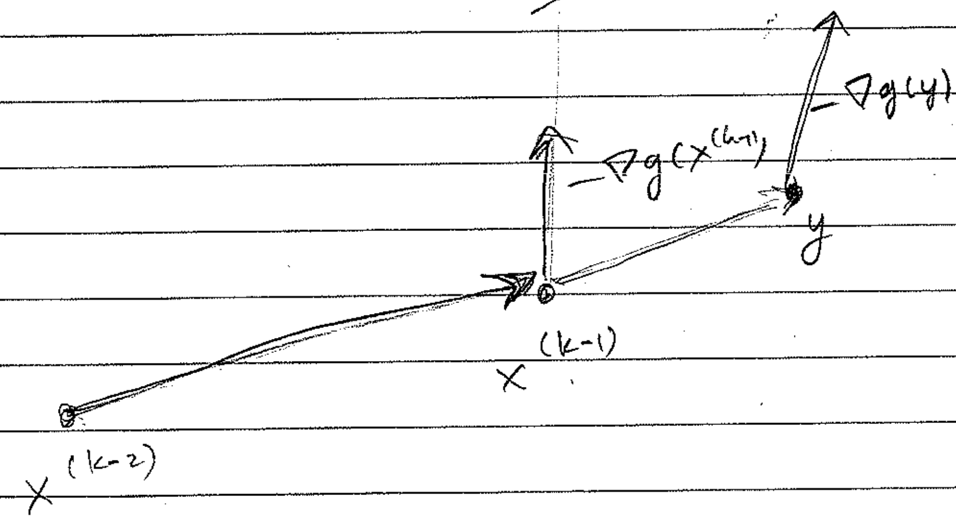
$k=1 \qquad x^{(0)} = x^{(-1)}$

$$y = x^{(0)} + \cancel{\frac{1-2}{1+1}\left(x^{(0)} - x^{(-1)}\right)}$$



θ_k

$$y = (1-\theta_k)\, x^{(k-1)} + \theta_k\, u^{(k-1)} \leftarrow$$

$$x^{(k)} = \text{prox}_t(y - t_k \nabla g(y))$$

$$u^{(k)} = x^{(k-1)} + \frac{1}{\theta_k}(x^{(k)} - x^{(k-1)})$$

$$\theta_k = \frac{2}{k+1}$$

$$u^{(k-1)} = x^{(k-2)} + \frac{1}{\theta_{k-1}}(x^{(k-1)} - x^{(k-2)})$$

$$y = (1-\theta_k)\, x^{(k-1)} + \theta_k\, x^{(k-2)} + \frac{\theta_k}{\theta_{k-1}}(x^{(k-1)} - x^{(k-2)})$$

$$= x^{(k-1)} + \underbrace{\theta_k\left(\frac{1}{\theta_{k-1}} - 1\right)}(x^{(k-1)} - x^{(k-2)})$$

$$= \frac{2}{k+1}\left(\frac{k}{2} - 1\right)$$

$$= \frac{k-2}{k+1}$$

$$\underbrace{\frac{1}{2}\|y-Ax\|_2^2}_{g} + \underbrace{\lambda\|x\|_1}_{h}$$

$$v = x^{(k-1)} + \frac{k-2}{k+1}\left(x^{(k-1)} - x^{(k-2)}\right)$$

$$x^{(k)} = S_{\lambda t_k}\left(v + tA^T(y - Av)\right)$$

prox_t

$$\begin{aligned}
\text{prox}_t(x) &= \underset{z}{\text{argmin}}\ \frac{1}{2t}\|x-z\|_2^2 + \lambda\|z\|_1 \\
&= \underset{z}{\text{argmin}}\ \frac{1}{2}\|x-z\|_2^2 + \underline{\lambda t}\|z\|_1 \\
&= S_{\lambda t}(x)
\end{aligned}$$

$$f(x) = \underline{\underline{\text{[censored]}}} + \lambda\|x\|_1$$

$$f(x) = g(x) + \lambda h(x)$$

$$\frac{1}{2}\|y - Ax\|_2^2 + \lambda \|x\|_1$$

$$\hat{x}(\lambda)$$

- λ_1 : $x^{(0)} = 0$, solve to get $\hat{x}(\lambda_1)$
- λ_2 : $x^{(0)} = \hat{x}(\lambda_1)$, solve to get $\hat{x}(\lambda_2)$

$\vdots$

$$X^+ = S_\lambda\left(P_\Omega(A) + P_{\Omega^\perp}(X)\right)$$

SVD

$$S_\lambda(Z) = U \Sigma_\lambda V^T$$

$$Z = U \Sigma V^T$$

$$(\Sigma_\lambda)_{ii} = (\Sigma_{ii} - \lambda)_+$$

$$L = 1, \quad t = 1/L = 1.$$