Equation generator

<https://www.codecogs.com/latex/eqneditor.php>

RSMprop

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\Theta \_{i+1}=\Theta \_i-\eta \_i\bigtriangledown L\_i

\\

\eta \_i = \frac{\eta}{\sigma \_i}

\\

\sigma \_i = \sqrt{\alpha \sigma \_{i-1}^2+(1-\alpha )(g\_i)^2}, where\ g\_i =\bigtriangledown L\_i

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Momentum

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\Theta \_{i+1}=\Theta \_i + v\_i

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v\_i = \lambda v\_{i-1} + \eta \bigtriangledown L\_i

\\

Adam

\\

\Theta \_{i+1}=\Theta \_i-\eta \_i\bigtriangledown L\_i

\\

\eta\_i = \eta \frac{\hat{m}\_i}{\sqrt{\hat{v}\_i}+\varepsilon }

\\

\hat{m}\_i = \frac{m\_i}{1 - \beta \_1}

\\

m\_i = \beta\_1 v\_{i-1} + (1-\beta\_1 )\bigtriangledown L\_i

\\

\hat{v}\_i = \frac{v\_i}{1 - \beta \_2}

\\

v\_i = \beta\_2 v\_{i-1} + (1-\beta\_2 )(\bigtriangledown L\_i)^2

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EM

E-step

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\gamma \_{ik} = \frac{L(\Theta \_{ik})}{\sum\_{j=1}^{n}L(\Theta \_{ij})}

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for\ Gaussian\ mixture\ model\ with\ n\ components

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\gamma \_{ik} = \frac{\pi\_{k}f(x\_{i}|\mu\_{k}, \sigma\_{k} )}{\sum\_{j=1}^{n}\pi\_{j}f(x\_{i}|\mu\_{j}, \sigma\_{j} )}

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M-step

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\pi\_{k} = \frac{1}{N}\sum\_{i=1}^{N}\gamma \_{ik}

\\

\mu\_{k} = \frac{1}{\sum\_{i=1}^{N}\gamma \_{ik}}\sum\_{i=1}^{N}\gamma \_{ik} x\_{i}

\\

\sigma\_{k}^{2} = \frac{1}{\sum\_{i=1}^{N}\gamma \_{ik}}\sum\_{i=1}^{N}\gamma \_{ik} x\_{i}^{2} - \mu\_{k}^{2}

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