ReDiffDet: Rotation-equivariant Diffusion Model for Oriented Object Detection

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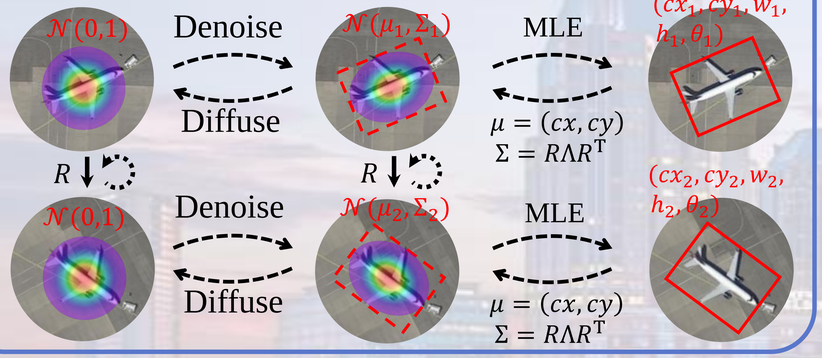
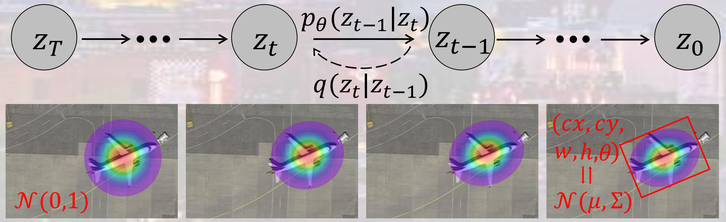
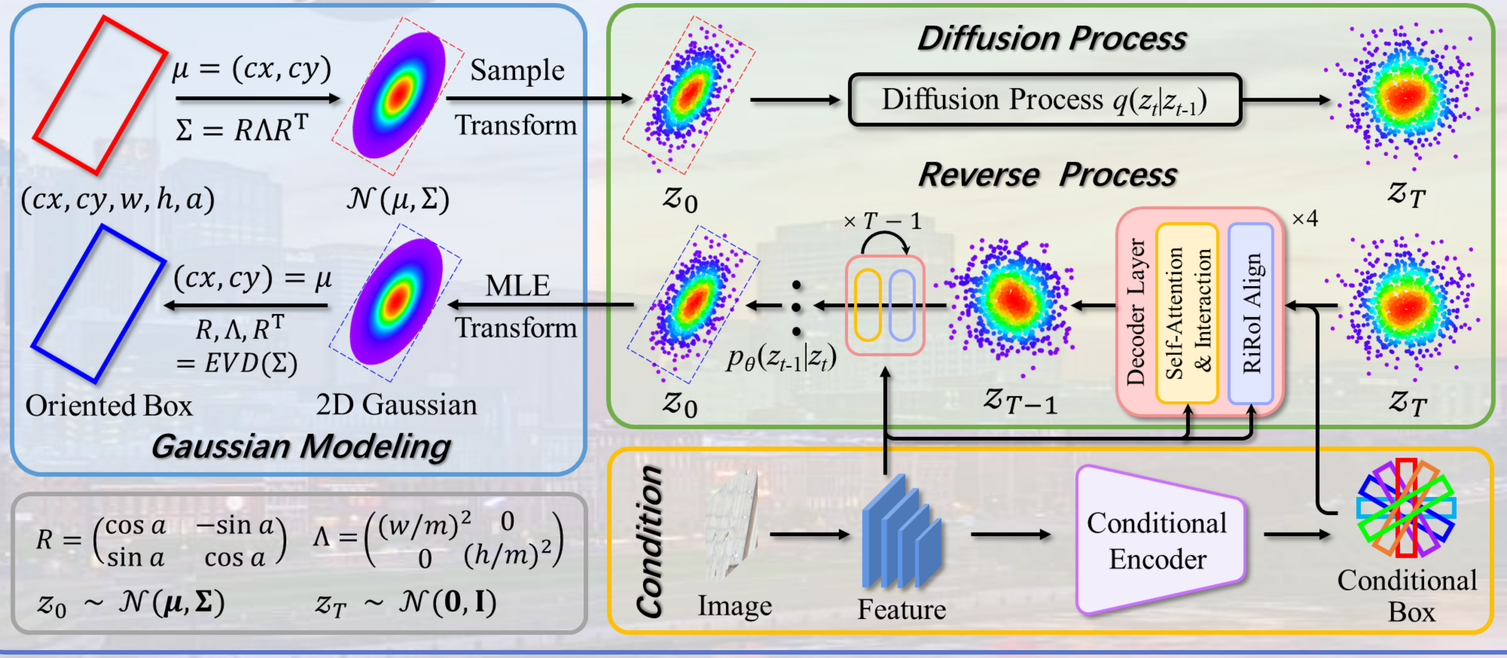
Rotation-equivariant



Diffusion



Overview



Proposition

- At time T in $p_\theta(\cdot)$, the function $p(z_T)$ is rotation invariant, *i.e.*, $p(z_T)=p(R(z_T))$ under *SO(2)*.
- During $1<t<T$ in p_θ, the function $p_\theta(z_{t-1}|z_t)$ is rotation equivariant, *i.e.*, $p_\theta(z_{t-1}|z_t)=p_\theta(R(z_{t-1})|R(z_t))$ under *SO(2)*, as long as $R\big(\mu_\theta(z_t,t)\big)=\mu_\theta(R(z_t),t)$.
- At time $t=1$ in p_θ, given the rotation invariant $p(z_T)$, *i.e.*, $p(z_T)=p(R(z_T))$, and the rotation equivariant $p_\theta(z_{t-1}|z_t)$, *i.e.* , $p_\theta(z_{t-1}|z_t)=p_\theta(R(z_{t-1})|R(z_t))$, then the $p_\theta(z_0)$ is also rotation invariant, *i.e.* , $p_\theta(z_0)=p(R(z_0))$ under *SO(2)*.