Legend	
PE	Positional encoding matrix
$rows$	Total number of rows
$cols$	Total number of columns
$cells$	Total number of cells ($rows \times cols$)
i	Row index
j	Column index
d_{model}	Hidden size dimension

Each 2D position (i, j) is assigned a unique index in the first dimension of $PE \in R^{\text{cells} \times d_{model}}$, where each row stores a d_{model} dimensional positional encoding. Assuming $rows$ is even, we compute differently based on whether j is even or odd for all rows of PE:

$$
\mathbf{PE}\big[i \times cols + j, \; : \; \big] = \begin{cases} \sin\left(\dfrac{i}{10^{\left(4 \times 2 \times \texttt{torch.arange}(d_{model})\right)}}\right) \\ \\ + \sin\left(\dfrac{j}{10^{\left(4 \times 2 \times \texttt{torch.arange}(d_{model})\right)}}\right), & j \,\%\, 2 = 0 \\ \\ \\ \sin\left(\dfrac{i}{10^{\left(4 \times 2\,(\,\texttt{torch.arange}(d_{model}) + 1\,)\right)}}\right) \\ \\ + \sin\left(\dfrac{j}{10^{\left(4 \times 2\,(\,\texttt{torch.arange}(d_{model}) + 1\,)\right)}}\right), & j \,\%\, 2 \neq 0 \end{cases}
$$