$_td, the standard LSTD algorithm was reviewed and two versions of the differential TD learning algorithm were represented. A$
$cost value function [?, ?]. However, such choices are heavily problem-$
$dependent and no standard methods exist. In most traditional examples of TD learning, a predetermined set of basis function$
$The chosen function class may not be rich enough to give a good approximation of the value function.$
$_td in a reproducing kernel Hilbert space (RKHS) setting. It is organized as follows-$
$Ins: rkhs_basics, a concise introduction to kernel functions and the RKHS theory is provided. A more detailed discussion of its$
$a brief introduction is provided in s: erm. Obtaining solutions to such problems is made possible via the classical representer the$
$norm problem in ^2()$
$_td_gradTD_norm_error of approximating the gradient of the solution to Poisson's equation is reformulated as an equivalent ER$
$optimal solution that lies on a subspace of the original RKHS is also presented. We provide a short review of an error analysis is ap$

?
?
?
?
?
: $\times \to$
$\Re$
$N \in$
N
$\{x^i \in$:
$1 \le$
$i \le$
$N\}$

$$\sum_{i=1}^{N}\sum_{j=1}^{N}\alpha_i\alpha_j(x^i, x^j) \geq 0, \forall \alpha_i \in \Re, \forall x^i \in$$

(1)
f

$$f(\cdot) = \sum_{i=1}^{N}\alpha_i(x^i, \cdot),$$

(2)
$N \in$
$N, \alpha_i \in$
$\Re, \{x^i \in$:
$1 \le$
$i \le$
$N\}$
$_0$
f
g

$$g(\cdot) = \sum_{j=1}^{M}{}_j(x^j, \cdot),$$

(3)
$_j \in$
$\Re$
$\{x^j\}_1^M$
$f, g \in^0$

$$\langle f,\ g\rangle \sum_{i=1}^{N}\sum_{j=1}^{M}\alpha_{i\,j}(x^i, x^j).$$

(4)
f
g

$$\langle f, g\rangle = \sum_{i=1}^{N}\alpha_i g(x^i) = \sum_{j=1}^{N}{}_j f(x^j)$$

(5)
$_inner_product and is given by, \langle(x, \cdot), f(\cdot)\rangle =$
$f(x) \forall x \in$
$, \forall f \in^0$
$.(6)$
f
x
$_x =$
$(x, \cdot)$
$\langle_{x,x'}\rangle = (x, x') = (x', x) = \langle_{x',x}\rangle.$

(7)
f
$_frkhs, that are endowed with the inner product defined in e: rkhs_inner_product (denoted as \langle\cdot, \cdot\rangle$
$\|f\|_{\sqrt{\langle f,f\rangle}}$
:
$\times \to$
$\Re$
L^2
$f \in$
$\{f_n\} \subset$
$\|f_n -$
$f\|_{\to} 0$
$n \to$
∞
$x \in$
$$\lim_{n\to\infty} f_n(x) = \lim_{n\to\infty}\langle_x, f_n\rangle_= \langle_x, f\rangle_= f(x)$$