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UNIVERSIDAD DE BUENOS AIRES

FACULTAD DE CIENCIAS EXACTAS Y NATURALES

1. DEPARTAMENTO: Computación

2. CUATRIMESTRE: Primero de 2001

3. ASIGNATURA: Aprendizaje Automático

4. CARRERA: Licenciatura en Ciencias de la Computación

5. CARACTER DE LA MATERIA: Optativa

6. NUMERO DE CODIGO DE CARRERA: 18

7. NUMERO DE CODIGO DE MATERIA: C .....

8. PUNTAJE: 2

9. PLAN DE ESTUDIOS AÑO: (1987 y 1993)

10. DURACION DE LA MATRERIA: cuatrimestral

11. HORAS DE CLASE SEMANAL:

a)TEORICAS: 3 hs c)PRACTICAS: 3 hs

b)LABORATORIO: 2 hs d)SEMINARIOS: hs

12. CARGA HORARIA TOTAL SEMANAL: 8 hs

13. ASIGNATURAS CORRELATIVAS: Lógica; Probabilidades y estadística

14. FORMA DE EVALUACION: 2 parciales, 3 trabajos de implementación, coloquio final.

15. PROGRAMA Y BIBLIOGRAFIA: Adjuntas a esta hoja.

16. DOCENTES: Alvarez, José Angel (Profesor a cargo); Igor Zwir (JTP); Rocío Romero Zaliz (Ayudante)

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Fecha: 27/11/2000

CARAL.DOC Lic. José ALVAREZ

Aprendizaje automático – Programa y bibliografía

Objetivo: Realizar una introducción a los conceptos y métodos básicos en el área del aprendizaje automático. Analizar aplicaciones reales de los principales métodos.

Docentes: José Alvarez, Igor Zwir y Rocío Romero Zaliz

Correlatividades: Lógica; Probabilidades y estadística

Días y horas: Teóricas: miércoles de 19 a 22; Prácticos: lunes de 19 a 22. Laboratorio a determinar.

Puntos: 3

Contenidos

1. Introducción. Problemas de aprendizaje bien planteados. Diseño de sistemas de aprendizaje. Enfoques y cuestiones fundamentales.
2. Aprendizaje de conceptos. Hipótesis de aprendizaje inductivo. Ordenamiento general-específico. Espacio de versiones y algoritmo de eliminación de candidatos. El aprendizaje de conceptos como búsqueda. Sesgo inductivo.
3. Aprendizaje de árboles de decisiones. Representación de árboles de decisiones. Problemas apropiados. Algoritmo básico. Algoritmos ID3, ASSISTANT y C4.5. El aprendizaje de árboles de decisiones como búsqueda. Sesgo inductivo. Problemas principales en el aprendizaje de árboles inductivos.
4. Aprendizaje bayesiano. Teorema de Bayes y aprendizaje de conceptos. Hipótesis de máxima verosimilitud y de menor error cuadrático. Principio de longitud mínima de descripción. Clasificador bayesiano óptimo. Redes bayesianas de creencias. Algoritmo EM.
5. Teoría Computacional del Aprendizaje. Aprendizaje PAC. Complejidad muestral. Cota de error. Precisión.
6. Aprendizaje basado en instancias. Aprendizaje de k vecinos más próximos. Regresión localmente ponderada. Funciones de base radial. Razonamiento basado en casos.
7. Algoritmos genéticos. Los algoritmos genéticos como búsquedas en un espacio de hipótesis. Programación genética. Modelos de evolución y aprendizaje.
8. Aprendizaje de conjunto de reglas. Algoritmos de cubrimiento secuencial. Aprendizaje de reglas de primer orden. Programa FOIL. La inducción como deducción invertida. Inversión de la resolución.
9. Aprendizaje analítico. Definición y relación con el aprendizaje inductivo. Aprendizaje con teorías perfectas de dominio. El aprendizaje basado en explicaciones.
10. Combinación del aprendizaje inductivo y analítico. Utilización de conocimiento previo para inicializar una hipótesis. Utilización de conocimiento previo para alterar el objetivo de búsqueda.

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11. Aprendizaje por refuerzo. Aprendizaje Q. Recompensas no determinísticas y acciones. Generalización a partir de ejemplos. Relación con la programación dinámica.
12. El Aprendizaje Automático como disciplina empírica. Análisis y procesamiento de datos. Evaluación de hipótesis.
13. Atributos. Calidad del conjunto de atributos. Problema de la relevancia/irrelevancia de atributos. Problema de selección del subconjunto de atributos. Selección vs. construcción de atributos. Ponderación de atributos. Discretización. Selección de ejemplos. Aprendizaje de conjuntos de clasificadores (ensemble learning). Bagging, boosting, etc.
14. Evaluación y selección de algoritmos. Metodología experimental y cuestiones estadísticas. Enfoques multiestratégicos.

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Thrun, S.B.; Bala, J.; Bloedorn, E.; Bratko, I.; Cestnik, B.; Cheng, J.; De Jong, K.; Dzeroski, S.; Fahlman, S.E.; Fisher, D.; Hamann, R.; Kaufman, K.; Keller, S.; Kononenko, I.; Kreuziger, J.; Michalski, R.S.; Mitchell, T.; Pachowicz, P.; Reich, Y. et al. "The Monk's Problems - A Performance Comparison of Different Learning Algorithms", Carnegie Mellon University CMU-CS.91-197, December 1991.

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